



JAIPUR METRO

JAIPUR METRO RAIL CORPORATION LIMITED

Invitation for Bid

Date:	17.11.2016
Loan/Grant No. and Title:	3062-IND: Jaipur Metro Rail Line 1-Phase B Project
Contract No. and Title:	DC No. JP/JS15: DESIGN, MANUFACTURE, SUPPLY, INSTALLATION TESTING & COMMISSIONING OF PUBLIC ADDRESS SYSTEM, PASSENGER INFORMATION DISPLAY SYSTEM AND MASTER CLOCK SYSTEM FOR JMRC PHASE 1B.
Deadline for Submission of Bids: up to 15.00 Hrs. on 16.12.2016	

1. INDIA has received financing from the Asian Development Bank (ADB) toward the cost of Jaipur Metro Rail Line 1-Phase B Project. Part of this financing will be used for payments under the Contract named above. Bidding on Direct Contract Mode of procurement is open only to the designated JMRC Line-1 Phase-A (Mansarovar to Chandpole Section) contract executing agency, i.e., M/s Thales Consortium comprising of M/s Thales Portugal S.A. and M/s Thales Communications and Security S.A.S. France.
2. Jaipur Metro Rail Corporation Limited (JMRC) ("the Employer") invites sealed bids from M/s Thales Consortium for the **"Manufacture, Supply, Installation, Testing & Commissioning of Public Address System, Passenger Information Display System And Master Clock System for two underground Metro Stations at Chhoti Chaupar and Badi Chaupar on East-West corridor of Jaipur Metro Phase-1B at Jaipur, Rajasthan, India – "DC No. JP/JS 15"**.
3. Bidding will be conducted in accordance with ADB's Single-Stage: Two-Envelope bidding procedure as applicable for Direct Contract Mode of procurement and in conformance with ADB Procurement Plan given in ADB Project Administration Manual for JMRTS (Project No. P46417 Loan Number L3062) from the designated JMRC Line-1

IFB for DC No. JP/JS 15: Manufacture, Supply, Installation, Testing & Commissioning of Public Address System, Passenger Information Display System And Master Clock System for two underground Metro Stations at Chhoti Chaupar and Badi Chaupar on East-West corridor of Jaipur Metro Phase- 1B at Jaipur, Rajasthan, India, on direct contract mode is published here for intimation purpose only. Parties/Vendors other than the designated vendor as at 1 above are requested not to participate in bidding process against above IFB.

Signature
Page 1 of 2
JAIPUR METRO RAIL CORPORATION LTD.
JAIPUR

Phase-A (Mansarovar to Chandpole Section) contract executing agency, i.e., M/s Thales Consortium comprising of M/s Thales Portugal S.A. and M/s Thales Communications and Security S.A.S. France.

4. Key details of the Bid are as under:-

Bid Security amount	:	NA
Availability of Bid Document commences from	:	17.11.2016
Pre Bid Session on	:	Will be notified later
Dead line for submission of Bid	:	Up to 1500 Hrs 16.12.2016

5. **Eligibility Criteria:** Reference to be made to clauses of Section 3 (Evaluation and Qualification Criteria) as applicable for direct mode of contract on designated contractor M/s Thales Consortium.

6. To obtain further information following may be contacted:

**Mr. Ashwani Saxena, Director (Project),
Jaipur Metro Rail Corporation Limited
3rd Floor, RAJSICO Building, Udyog Bhawan,
Tilak Marg, C-Scheme, City: Jaipur (Rajasthan)
Postal Code: 302005
Country: India
Telephone: +91-141-5192452/+91-141-5192453
Facsimile number: 0141-5192451
Electronic mail address: jmrc.gmsnt@gmail.com;
dp.jmrc@gmail.com**

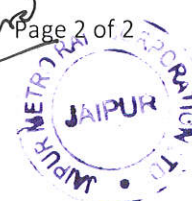
7. Availability of Bid Documents for JS 15 (Phase 1B) commences from 17.11.2016. Designated Contractor M/s Thales Consortium or its representative may collect the Bid Documents for JS 15 (Phase 1B) from 17.11.2016 onward from address as above.

8. Delivery of Bid:

- To the address above.
- On or before the deadline: up to 15.00 Hrs on 16.11.2016

Bids will be opened immediately after the deadline for bid submission in the presence of bidders' designated Contractor M/s Thales Consortium or its representative(s) who choose to attend.

IFB for DC No. JP/JS 15: Manufacture, Supply, Installation, Testing & Commissioning of Public Address System, Passenger Information Display System And Master Clock System for two underground Metro Stations at Chhoti Chaupar and Badi Chaupar on East-West corridor of Jaipur Metro Phase- 1B at Jaipur, Rajasthan, India, on direct contract mode is published here for intimation purpose only. Parties/Vendors other than the designated vendor as at 1 above are requested not to participate in bidding process against above IFB.

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Page 2 of 2




Procurement of Works

JAIPUR METRO RAIL CORPORATION LIMITED

BIDDING DOCUMENT

for

Procurement on Direct Contract Mode

of

DC No.- JP/JS15 (Phase-1B)

**BID DOCUMENTS FOR DESIGN, MANUFACTURE, SUPPLY,
INSTALLATION TESTING & COMMISSIONING OF PUBLIC ADDRESS
SYSTEM, PASSENGER INFORMATION DISPLAY SYSTEM AND
MASTER CLOCK SYSTEM FOR JMRC PHASE 1B**

PART-I BIDDING PROCEDURES

Section 1 - Instructions to Bidders (ITB)

Section 2 - Bid Data Sheet (BDS)

Section 3 - Evaluation and Qualification Criteria (EQC)

Section 4 -Bidding Forms (BDF)

Section 5 -Eligible Countries (ELC)

JAIPUR METRO RAIL CORPORATION LTD.

Khanij Bhawan, Tilak Marg,

C- Scheme, Jaipur (Rajasthan) PIN-302005

Country: India



Procurement of Works

JAIPUR METRO RAIL CORPORATION LIMITED

BIDDING DOCUMENT

for

Procurement on Direct Contract Mode

of

DC No.- JP/JS15 (Phase-1B)

**BID DOCUMENTS FOR DESIGN, MANUFACTURE, SUPPLY,
INSTALLATION TESTING & COMMISSIONING OF PUBLIC ADDRESS
SYSTEM, PASSENGER INFORMATION DISPLAY SYSTEM AND
MASTER CLOCK SYSTEM FOR JMRC PHASE 1B**

PART-I BIDDING PROCEDURES

Section 1 - Instructions to Bidders (ITB)

JAIPUR METRO RAIL CORPORATION LTD.

**Khanij Bhawan, Tilak Marg,
C- Scheme, Jaipur (Rajasthan) PIN-302005
Country: India**

Section 1 - Instructions to Bidders

Table of Contents

A.	General.....	1-3
1.	Scope of Bid	1-3
2.	Source of Funds	1-3
3.	Fraud and Corruption	1-3
4.	Eligible Bidders.....	1-4
5.	Eligible Plant and Services.....	1-6
B.	Contents of Bidding Document.....	1-6
6.	Sections of Bidding Document	1-6
7.	Clarification of Bidding Document, Site Visit, Pre-Bid Meeting	1-6
8.	Amendment of Bidding Document	1-7
C.	Preparation of Bids	1-7
9.	Cost of Bidding	1-7
10.	Language of Bid	1-7
11.	Documents Comprising the Bid.....	1-8
12.	Letter of Bid and Schedules	1-8
13.	Alternative Bids	1-8
14.	Documents Establishing the Eligibility of Plant and Services	1-9
15.	Documents Establishing the Eligibility and Qualifications of the Bidder	1-9
16.	Documents Establishing Conformity of the Plant and Services	1-9
17.	Technical Proposal, Subcontractors	1-10
18.	Bid Prices and Discounts	1-10
19.	Currencies of Bid and Payment	1-12
20.	Period of Validity of Bids	1-12
21.	Bid Security/Bid-Securing Declaration	1-12
22.	Format and Signing of Bid.....	1-13
D.	Submission and Opening of Bids	1-14
23.	Submission, Sealing, and Marking of Bids.....	1-14
24.	Deadline for Submission of Bids	1-14
25.	Late Bids	1-15
26.	Withdrawal, Substitution, and Modification of Bids	1-15
27.	Bid Opening.....	1-15

E.	Evaluation and Comparison of Bids	1-17
28.	Confidentiality	17
29.	Clarification of Bids	1-17
30.	Deviations, Reservations, and Omissions	1-17
31.	Examination of Technical Bids	1-17
32.	Responsiveness of Technical Bid	1-18
33.	Nonmaterial Nonconformities	1-18
34.	Detailed Evaluation of Technical Bids	1-19
35.	Eligibility and Qualification of the Bidder	1-19
36.	Correction of Arithmetical Errors	1-20
37.	Conversion to Single Currency	1-20
38.	Margin of Preference	1-20
39.	Evaluation of Price Bids	1-20
40.	Comparison of Bids	1-21
41.	Employer's Right to Accept Any Bid, and to Reject Any or All Bids	1-21
F.	Award of Contract	1-21
42.	Award Criteria	1-21
43.	Notification of Award	1-21
44.	Signing of Contract	1-22
45.	Performance Security	1-22

Section 1 - Instructions to Bidders

A. General

- | | |
|--------------------------------|---|
| 1. Scope of Bid | <p>1.1 In connection with the Invitation for Bids (IFB) indicated in the Bid Data Sheet (BDS), the Employer, as indicated in the BDS, issues this Bidding Document for the procurement of plant and services as specified in Section 6 (Employer's Requirements). The name, identification, and number of lot/s (contract/s) of the international competitive bidding (ICB) are provided in the BDS.</p> <p>1.2 Unless otherwise stated, throughout this Bidding Document definitions and interpretations shall be as prescribed in Section 7 (General Conditions of Contract).</p> |
| 2. Source of Funds | <p>2.1 The Borrower or Recipient (hereinafter called "Borrower") indicated in the BDS has applied for or received financing (hereinafter called "funds") from the Asian Development Bank (hereinafter called "ADB") toward the cost of the project named in the BDS. The Borrower intends to apply a portion of the funds to eligible payments under the contract(s) for which this Bidding Document is issued.</p> <p>2.2 Payments by ADB will be made only at the request of the Borrower and upon approval by ADB in accordance with the terms and conditions of the Financing Agreement between the Borrower and ADB (hereinafter called "Financing Agreement"), and will be subject in all respects to the terms and conditions of that Financing Agreement. No party other than the Borrower shall derive any rights from the Financing Agreement or have any claim to the funds.</p> |
| 3. Fraud and Corruption | <p>3.1 ADB's Anticorruption Policy requires Borrowers (including beneficiaries of ADB-financed activity), as well as Bidders, Suppliers, and Contractors under ADB-financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, ADB</p> <p>(a) defines, for the purposes of this provision, the terms set forth below as follows:</p> <ul style="list-style-type: none"> (i) "corrupt practice" means the offering, giving, receiving, or soliciting, directly or indirectly, anything of value to influence improperly the actions of another party; (ii) "fraudulent practice" means any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation; (iii) "coercive practice" means impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party; (iv) "collusive practice" means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party; (v) "obstructive practice" means (a) deliberately destroying, falsifying, altering, or concealing of evidence material to an ADB investigation; (b) making false statements to investigators in order to materially impede an ADB investigation; (c) failing to comply with requests to provide information, documents, or records in |

connection with an Office of Anticorruption and Integrity (OAI) investigation; (d) threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or (e) materially impeding ADB's contractual rights of audit or access to information; and

- (vi) "integrity violation" is any act which violates ADB's Anticorruption Policy, including (i) to (v) above and the following: abuse, conflict of interest, violations of ADB sanctions, retaliation against whistleblowers or witnesses, and other violations of ADB's Anticorruption Policy, including failure to adhere to the highest ethical standard.
- (b) will reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations in competing for the Contract;
- (c) will cancel the portion of the financing allocated to a contract if it determines at any time that representatives of the Borrower or of a beneficiary of ADB-financing engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations during the procurement or the execution of that contract, without the Borrower having taken timely and appropriate action satisfactory to ADB to remedy the situation;
- (d) will impose remedial actions on a firm or an individual, at any time, in accordance with ADB's Anticorruption Policy and Integrity Principles and Guidelines (both as amended from time to time), including declaring ineligible, either indefinitely or for a stated period of time, to participate¹ in ADB-financed, administered, or supported activities or to benefit from an ADB-financed, administered, or supported contract, financially or otherwise, if it at any time determines that the firm or individual has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices or other integrity violations; and
- (e) will have the right to require that a provision be included in the Bidding Documents and in contracts financed by ADB, requiring Bidders, suppliers and contractors to permit ADB or its representative to inspect their accounts and records and other documents relating to the bid submission and contract performance and to have them audited by auditors appointed by ADB.

3.2 Furthermore, Bidders shall be aware of the provision stated in the General Conditions of Contract (GCC 9.6 and 42.2.1 (c)).

4. Eligible Bidders

- 4.1 A Bidder may be a natural person, private entity, or government-owned enterprise subject to ITB 4.5 - or any combination of them with a formal intent to enter into an agreement or under an existing agreement in the form of a Joint Venture. In the case of a Joint Venture,
 - (a) all partners shall be jointly and severally liable, and
 - (b) the Joint Venture shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the partners of the Joint Venture during the bidding process and, in the event the Joint Venture is awarded the Contract, during contract execution.

¹ Whether as a Contractor, Subcontractor, Consultant, Manufacturer or Supplier, or Service Provider; or in any other capacity (different names are used depending on the particular Bidding Document).

- 4.2 A Bidder, and all partners constituting the Bidder, shall have the nationality of an eligible country, in accordance with Section 5 (Eligible Countries). A Bidder shall be deemed to have the nationality of a country if the Bidder is a citizen or is constituted, incorporated, or registered, and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed subcontractors or suppliers for any part of the Contract including related services.
- 4.3 A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidder may be considered to be in a conflict of interest with one or more parties in this bidding process if any of, including but not limited to, the following apply:
- (a) they have controlling shareholders in common; or
 - (b) they receive or have received any direct or indirect subsidy from any of them; or
 - (c) they have the same legal representative for purposes of this bid; or
 - (d) they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to material information about or improperly influence the bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or
 - (e) a Bidder participates in more than one bid in this bidding process, either individually or as a partner in a joint venture, except for alternative offers permitted under ITB 13. This will result in the disqualification of all Bids in which it is involved. However, subject to any finding of a conflict of interest in terms of ITB 4.3 (a) - (d) above, this does not limit the participation of a Bidder as a subcontractor in another Bid or of a firm as a subcontractor in more than one Bid; or
 - (f) a Bidder or any affiliated entity, participated as a consultant in the preparation of the design or technical specifications of the plant and services that are the subject of the Bid; or
 - (g) a Bidder was affiliated with a firm or entity that has been hired (or is proposed to be hired) by the Employer or Borrower as Project Manager for the Contract.
- 4.4 A firm shall not be eligible to participate in any procurement activities under an ADB-financed, administered, or supported project while under temporary suspension or debarment by ADB pursuant to its Anticorruption Policy (see ITB 3), whether such debarment was directly imposed by ADB, or enforced by ADB pursuant to the Agreement for Mutual Enforcement of Debarment Decisions. A bid from a temporary suspended or debarred firm will be rejected.
- 4.5 Government-owned enterprises in the Borrower's country shall be eligible only if they can establish that they (i) are legally and financially autonomous, (ii) operate under commercial law, and (iii) are not dependent agencies of the Employer.
- 4.6 Bidders shall provide such evidence of their continued eligibility satisfactory to the Employer, as the Employer shall reasonably request.
- 4.7 Firms shall be excluded if by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower's country prohibits any import of goods or contracting of works or services from that country or any payments to

persons or entities in that country.

- 4.8 In case a prequalification process has been conducted prior to the bidding process, this bidding is open only to prequalified Bidders.
- 5. Eligible Plant and Services**
- 5.1 The plant and services to be supplied under the Contract shall have their origin in eligible source countries as defined in ITB 4.2 and all expenditures under the Contract will be limited to such plant and services.
- 5.2 For purposes of ITB 5.1 above, “origin” means the place where the plant, or component parts thereof are mined, grown, produced, or manufactured, and from which the services are provided. Plant components are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that is substantially in its basic characteristics or in purpose or utility from its components.

B. Contents of Bidding Document

- 6. Sections of Bidding Document**
- 6.1 The Bidding Document consists of Parts I, II, and III, which include all the sections indicated below, and should be read in conjunction with any addenda issued in accordance with ITB 8.
- PART I Bidding Procedures**
- Section 1 - Instructions to Bidders (ITB)
 - Section 2 - Bid Data Sheet (BDS)
 - Section 3 - Evaluation and Qualification Criteria (EQC)
 - Section 4 - Bidding Forms (BDF)
 - Section 5 - Eligible Countries (ELC)
- PART II Requirements**
- Section 6 - Employer's Requirements (ERQ)
- PART III Conditions of Contract and Contract Forms**
- Section 7 - General Conditions of Contract (GCC)
 - Section 8 - Special Conditions of Contract (SCC)
 - Section 9 - Contract Forms (COF)
- 6.2 The Invitation for Bids (IFB) issued by the Employer is not part of the Bidding Document.
- 6.3 The Employer is not responsible for the completeness of the Bidding Document and its addenda, if they were not obtained directly from the source stated by the Employer in the IFB.
- 6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Document. Failure to furnish all information or documentation required by the Bidding Document may result in the rejection of the Bid.
- 7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting**
- 7.1 A prospective Bidder requiring any clarification on the Bidding Document shall contact the Employer in writing at the Employer's address indicated in the BDS, or raise inquiries during the pre-bid meeting if provided for in accordance with ITB 7.4. Refer BDS 7.1. The Employer will respond to any request for clarification, provided that such request is received no later than 21 days prior to the deadline for submission of bids. The Employer's response shall be in writing with copies to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3, including a description of the inquiry but without identifying its source. Should the Employer deem it necessary to amend the Bidding Document as a result of a request for clarification, it shall do so following the procedure under ITB 8 and ITB

- 7.2 The Bidder is advised to visit and examine the site where the plant is to be installed and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the Bid and entering into a contract for the provision of plant and services. The costs of visiting the site shall be at the Bidder's own expense.
- 7.3 The Bidder and any of its personnel or agents will be granted permission by the Employer to enter its premises and lands for the purpose of such visit, but only upon the express condition that the Bidder, its personnel, and agents, will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.
- 7.4 The Bidder's designated representative is invited to attend a pre-bid meeting, if provided for in the BDS. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.
- 7.5 The Bidder is requested to submit any questions in writing, to reach the Employer not later than 1 week before the pre-bid meeting.
- 7.6 Minutes of the pre-bid meeting, including the text of the questions raised, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3. Any modification to the Bidding Document that may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an addendum pursuant to ITB 8 and not through the minutes of the pre-bid meeting.
- 7.7 Nonattendance at the pre-bid meeting will not be a cause for disqualification of a Bidder.
- 8. Amendment of Bidding Document**
- 8.1 At any time prior to the deadline for submission of Bids, the Employer may amend the Bidding Document by issuing addenda.
- 8.2 Any addendum issued shall be part of the Bidding Document and shall be communicated in writing to all who have obtained the Bidding Document from the Employer in accordance with ITB 6.3.
- 8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their Bids, the Employer may, at its discretion, extend the deadline for the submission of Bids, pursuant to ITB 24.2

C. Preparation of Bids

- 9. Cost of Bidding**
- 9.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Employer shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.
- 10. Language of Bid**
- 10.1 The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer, shall be written in the English language. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages into the English language, in

which case, for purposes of interpretation of the Bid, such translation shall govern.

11. Documents Comprising the Bid

11.1 The Bid shall comprise two envelopes submitted simultaneously, one containing the Technical Bid and the other the Price Bid, both envelopes enclosed together in an outer single envelope.

11.2 The Technical Bid submitted by the Bidder shall comprise the following:

- (a) Letter of Technical Bid;
- (b) Bid Security or Bid-Securing Declaration, in accordance with ITB 21;
- (c) alternative Bids, if permissible, in accordance with ITB 13;
- (d) written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 22.2;
- (e) documentary evidence in accordance with ITB 14.1, that the plant and services offered by the Bidder in its Bid or in any alternative Bid, if permitted, are eligible;
- (f) documentary evidence in accordance with ITB 15, the Bidder's eligibility and qualifications to perform the contract if its Bid is accepted;
- (g) Technical Proposal in accordance with ITB 17.
- (h) documentary evidence in accordance with ITB 16, that the plant and services offered by the Bidder conform to the Bidding Document;
- (i) in the case of a bid submitted by a Joint Venture, the Bid shall include a copy of the Joint Venture Agreement entered into by all partners. Alternatively, a Letter of Intent to execute a Joint Venture Agreement in the event of a successful bid shall be signed by all partners and submitted with the Bid, together with a copy of the proposed agreement;
- (j) list of subcontractors, in accordance with ITB 17.2; and
- (k) any other document required in the BDS.

11.3 The Price Bid submitted by the Bidder shall comprise the following:

- (a) Letter of Price Bid;
- (b) completed schedules as required, including Price Schedules, in accordance with ITB 12 and ITB 18;
- (c) alternative price Bids, if permissible, in accordance with ITB 13; and
- (d) any other document required in the BDS.

12. Letter of Bid and Schedules

12.1 The Letters of Technical Bid and Price Bid, and the Schedules, and all documents listed under ITB 11, shall be prepared using the relevant forms furnished in Section 4 (Bidding Forms). The forms must be completed without any alterations to the text, and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested and as required in the BDS.

13. Alternative Bids

13.1 The BDS indicates whether alternative Bids are allowed. If they are allowed, the BDS will also indicate whether they are permitted in accordance with ITB 13.3, or invited in accordance with ITB 13.2 and/or ITB 13.4.

13.2 When alternatives to the Time Schedule are explicitly invited, a statement

to that effect will be included in the BDS, and the method of evaluating different time schedules will be described in Section 3 (Evaluation and Qualification Criteria).

- 13.3 Except as provided under ITB 13.4 below, Bidders wishing to offer technical alternatives to the Employer's requirements as described in the Bidding Document must also provide: (i) a price at which they are prepared to offer a plant meeting the Employer's requirements; and (ii) all information necessary for a complete evaluation of the alternatives by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed installation methodology and other relevant details. Only the technical alternatives, if any, of the lowest evaluated Bidder conforming to the basic technical requirements shall be considered by the Employer.
- 13.4 When Bidders are invited in the BDS to submit alternative technical solutions for specified parts of the facilities, such parts shall be described in Section 6 (Employer's Requirements). Technical alternatives for the specific parts of the facilities that comply with the performance and technical criteria specified for the plant and services shall be considered by the Employer on their own merits, pursuant to ITB 32.
- 14. Documents Establishing the Eligibility of Plant and Services**
- 14.1 To establish the eligibility of the plant and services in accordance with ITB 5, Bidders shall complete the country of origin declarations in the Price Schedule Forms, included in Section 4 (Bidding Forms).
- 15. Documents Establishing the Eligibility and Qualifications of the Bidder**
- 15.1 To establish its eligibility and qualifications to perform the Contract in accordance with Section 3 (Evaluation and Qualification Criteria), the Bidder shall provide the information requested in the corresponding information sheets included in Section 4 (Bidding Forms).
- 15.2 Domestic Bidders, individually or in joint ventures, applying for eligibility for domestic preference shall supply all information required to satisfy the criteria for eligibility as described in ITB 38. Refer BDS.
- 16. Documents Establishing Conformity of the Plant and Services**
- 16.1 The documentary evidence of the conformity of the plant and services to the Bidding Document may be in the form of literature, drawings and data, and shall furnish:
- (a) a detailed description of the essential technical and performance characteristics of the plant and services, including the functional guarantees of the proposed plant and services, in response to the Specification;
 - (b) a list giving full particulars, including available sources, of all spare parts and special tools necessary for the proper and continuing functioning of the plant for the period named in the BDS, following completion of plant and services in accordance with provisions of the contract; and
 - (c) a commentary on the Employer's Specifications and adequate evidence demonstrating the substantial responsiveness of the plant and services to those specifications. Bidders shall note that standards for workmanship, materials and equipment designated by the Employer in the Bidding Document are intended to be descriptive (establishing standards of quality and performance) only and not

restrictive. The Bidder may substitute alternative standards, brand names and/or catalog numbers in its Bid, provided that it demonstrates to the Employer's satisfaction that the substitutions are substantially equivalent or superior to the standards designated in the Specifications.

17. Technical Proposal, Subcontractors

- 17.1 The Bidder shall furnish a Technical Proposal including a statement of work methods, equipment, personnel, schedule and any other information as stipulated in Section 4 (Bidding Forms), in sufficient detail to demonstrate the adequacy of the Bidders' proposal to meet the work requirements and the completion time.
- 17.2 For major items of plant and services as listed by the Employer in Criterion 2.5 of Section 3 (Evaluation and Qualification Criteria), which the Bidder intends to purchase or subcontract, the Bidder shall give details of the name and nationality of the proposed Subcontractors, including Manufacturers, for each of those items. In addition, the Bidder shall include in its Bid information establishing compliance with the requirements specified by the Employer for these items. Bidders are free to list more than one Subcontractor against each item of the plant and services. Quoted rates and prices will be deemed to apply to whichever Subcontractor is appointed, and no adjustment of the rates and prices will be permitted.
- 17.3 The Bidder shall be responsible for ensuring that any Subcontractor proposed complies with the requirements of ITB 4, and that any plant, or services to be provided by the Subcontractor comply with the requirements of ITB 5 and ITB 15.1

18. Bid Prices and Discounts

- 18.1 Unless otherwise specified in the BDS and/or Section 6 (Employer's Requirements), bidders shall quote for the entire plant and services on a "single responsibility" basis such that the total Bid price covers all the Contractor's obligations mentioned in or to be reasonably inferred from the Bidding Document in respect of the design, manufacture, including procurement and subcontracting (if any), delivery, construction, installation, and completion of the plant. This includes all requirements under the Contractor's responsibilities for testing, pre-commissioning and commissioning of the plant and, where so required by the Bidding Document, the acquisition of all permits, approvals, and licenses, etc.; the operation, maintenance, and training services and such other items and services as may be specified in the Bidding Document, all in accordance with the requirements of the General Conditions. Items against which no price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed to be covered by the prices for other items.
- 18.2 Bidders are required to quote the price for the commercial, contractual and technical obligations outlined in the Bidding Document.
- 18.3 Bidders shall give a breakdown of the prices in the manner and detail called for in the Price Schedules included in Section 4 (Bidding Forms). Where no different Price Schedules are included in the Bidding Document, Bidders shall present their prices in the following manner: Separate numbered Schedules included in Section 4 (Bidding Forms) shall be used for each of the following elements. The total amount from each Schedule (Nos. 1 to 4) shall be summarized in a Grand Summary (Schedule No. 5) giving the total bid price(s) to be entered in the Letter of Price Bid. Absence of the total bid price in the Letter of Price Bid may result in the rejection of the Bid.

- Schedule No. 1: Plant and Mandatory Spare Parts Supplied from Abroad
- Schedule No. 2: Plant and Mandatory Spare Parts Supplied from Within the Employer's Country
- Schedule No. 3: Design Services
- Schedule No. 4: Installation and Other Services
- Schedule No. 5: Grand Summary (Schedule Nos. 1 to 4)
- Schedule No. 6: Recommended Spare Parts

Bidders shall note that the plant and mandatory spare parts included in Schedule Nos. 1 and 2 above exclude materials used for civil, building, and other construction works. All such materials shall be included and priced under Schedule No. 4, Installation and Other Services.

18.4 In the Schedules, Bidders shall give the required details and a breakdown of their prices as follows:

- (a) Plant to be Supplied from Abroad (Schedule No. 1):
 - (i) the price of the plant shall be quoted carriage and insurance paid (CIP)-named place of destination basis specified in the BDS;
 - (ii) all customs duties and other taxes paid or payable in the Employer's country on the plant if the contract is awarded to the Bidder; and
 - (iii) the total price for the plant.
- (b) Plant Supplied from Within the Employer's Country (Schedule No. 2):
 - (i) the price of the plant shall be quoted on an EXW Incoterm basis (ex works, ex factory, ex warehouse, ex showroom, as applicable), including all customs duties and sales and other taxes already paid or payable on the components and raw material used in the manufacture or assembly of plant quoted ex works or ex factory, or on the previously imported plant of foreign origin quoted ex warehouse, ex showroom;
 - (ii) sales tax and other taxes payable in the Employer's country on the plant if the contract is awarded to the Bidder, and
 - (iii) the total price for the plant.
- (c) Design Services. (Schedule No. 3). Rates or prices shall include all taxes, duties, levies, and charges payable in the Employer's country as of 28 days prior to the deadline for submission of Bids.
- (d) Installation and Other Services (Schedule No. 4) shall be quoted separately and shall include rates or prices for local transportation, insurance, and other services incidental to delivery of the plant, all labor, contractor's equipment, temporary works, materials, consumables, and all matters and things of whatsoever nature, including operations and maintenance services, the provision of operations and maintenance manuals, training, etc., where identified in the Bidding Document, as necessary for the proper execution of the installation and other services, including all taxes, duties, levies, and charges payable in the Employer's country as of 28 days prior to the deadline for submission of bids.
- (e) Recommended spare parts (Schedule No. 6) shall be quoted separately as specified in either subparagraph (a) or (b) above in accordance with the origin of the spare parts.

- 18.5 The current edition of Incoterms, published by the International Chamber of Commerce shall govern.
- 18.6 The prices shall be either fixed or adjustable as specified in the BDS.
- (a) In the case of Fixed Price, prices quoted by the Bidder shall be fixed during the Bidder's performance of the contract and not subject to variation on any account. A Bid submitted with an adjustable price quotation will be treated as nonresponsive and rejected.
- (b) In the case of Adjustable Price, prices quoted by the Bidder shall be subject to adjustment during performance of the contract to reflect changes in the cost elements such as labor, material, transport, and contractor's equipment in accordance with the procedures specified in the corresponding appendix to the Contract Agreement. A Bid submitted with a fixed price quotation will not be rejected, but the price adjustment will be treated as zero. Bidders are required to indicate the source of labor and material indexes in the corresponding Form in Section 4 (Bidding Forms).
- 18.7 If so indicated in BDS 1.1, Bids are being invited for individual lots (contracts) or for any combination of lots (packages). Bidders wishing to offer any price reduction (discount) for the award of more than one contract shall specify in their Letter of Price Bid the price reductions applicable to each package, or alternatively, to individual contracts within the package, and the manner in which the price reductions will apply.
- 19. Currencies of Bid and Payment**
- 19.1 The currency(ies) of the bid shall be, as specified in the BDS.
- 19.2 Bidders may be required by the Employer to justify, to the Employer's satisfaction, their local and foreign currency requirements.
- 20. Period of Validity of Bids**
- 20.1 Bids shall remain valid for the period specified in the BDS after the bid submission deadline date prescribed by the Employer. A bid valid for a shorter period shall be rejected by the Employer as nonresponsive.
- 20.2 In exceptional circumstances, prior to the expiration of the bid validity period, the Employer may request Bidders to extend the period of validity of their Bids. The request and the responses shall be made in writing. If a bid security is requested in accordance with ITB 21, it shall also be extended 28 days beyond the deadline of the extended bid validity period. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request shall not be required or permitted to modify its Bid.
- 21. Bid Security/ Bid Securing Declaration**
- 21.1 Unless otherwise specified in the BDS, the Bidder shall furnish as part of its Bid, in original form, either a Bid-Securing Declaration or a bid security as specified in the BDS. In the case of a bid security, the amount and currency shall be as specified in the BDS.
- 21.2 If a Bid-Securing Declaration is required pursuant to ITB 21.1, it shall use the form included in Section 4 (Bidding Forms). The Employer will declare a Bidder ineligible to be awarded a Contract for a specified period of time, as indicated in the BDS, if a Bid-Securing Declaration is executed.
- 21.3 If a bid security is specified pursuant to ITB 21.1, the bid security shall be, at the Bidder's option, in any of the following forms:
- (a) an unconditional bank guarantee,

- (b) an irrevocable letter of credit, or
- (c) a cashier's or certified check,

all from a reputable source from an eligible country as described in Section 5 (Eligible Countries). In the case of a bank guarantee, the bid security shall be submitted using either the Bid Security Form included in Section 4 (Bidding Forms) or another form acceptable to the Employer. The form must include the complete name of the Bidder. The bid security shall be valid for 28 days beyond the original validity period of the Bid, or beyond any period of extension if requested under ITB 20.2.

- 21.4 Unless otherwise specified in the BDS, any Bid not accompanied by a substantially compliant bid security or Bid-Securing Declaration, if one is required in accordance with ITB 21.1, shall be rejected by the Employer as nonresponsive.
- 21.5 If a bid security is specified pursuant to ITB 21.1, the bid security of the unsuccessful Bidder shall be returned as promptly as possible upon the successful Bidder's furnishing of the performance security pursuant to ITB 45.
- 21.6 If a bid security is specified pursuant to ITB 21.1, the bid security of successful Bidders shall be returned as promptly as possible once the successful Bidder has signed the Contract and furnished the required performance security.
- 21.7 The bid security may be forfeited or the Bid-Securing Declaration executed:
 - (a) if a Bidder withdraws its Bid during the period of bid validity specified by the Bidder on the Letters of Technical Bid and Price Bid, except as provided in ITB 20.2 or
 - (b) if the successful Bidder fails to:
 - (i) sign the Contract in accordance with ITB 44;
 - (ii) furnish a performance security in accordance with ITB 45; or
 - (iii) accept the arithmetical corrections of its Bid in accordance with ITB 36.
- 21.8 The bid security or the Bid-Securing Declaration of a Joint Venture shall be in the name of the Joint Venture that submits the Bid. If the Joint Venture has not been legally constituted at the time of bidding, the bid security or the Bid-Securing Declaration shall be in the names of all future partners as named in the letter of intent referred to in ITB 4.1.

22. Format and Signing of Bid

- 22.1 The Bidder shall prepare one original set of the Technical Bid and one original set of the Price Bid comprising the Bid as described in ITB 11 and clearly mark it "ORIGINAL - TECHNICAL BID" and "ORIGINAL - PRICE BID". Alternative bids, if permitted in accordance with ITB 13, shall be clearly marked "ALTERNATIVE". In addition, the Bidder shall submit copies of the Bid, in the number specified in the BDS and clearly mark each of them "COPY." In the event of any discrepancy between the original and the copies, the original shall prevail.
- 22.2 The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified in the BDS and shall be attached to the Bid. The name and position held by

each person signing the authorization must be typed or printed below the signature. All pages of the bid, except for unamended printed literature, shall be signed or initialed by the person signing the Bid. If a Bidder submits a deficient authorization, the Bid shall not be rejected in the first instance. The Employer shall request the Bidder to submit an acceptable authorization within the number of days as specified in the BDS. Failure to provide an acceptable authorization within the prescribed period of receiving such a request shall cause the rejection of the Bid.

22.3 A Bid submitted by a Joint Venture shall be signed so as to be legally binding on all partners.

22.4 Any amendments such as interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the Bid.

D. Submission and Opening of Bids

23. Submission, Sealing, and Marking of Bids

23.1 Bidders may submit their Bids by mail or by hand. When so specified in the BDS, Bidders shall have the option of submitting their Bids electronically. Procedures for submission, sealing and marking are as follows:

(a) Bidders submitting Bids by mail or by hand shall enclose the original and each copy of the Bid, including alternative Bids, if permitted in accordance with ITB 13, in separate sealed envelopes, duly marking the envelopes as "ORIGINAL," "ALTERNATIVE," and "COPY." These envelopes containing the original and the copies shall then be enclosed in one single envelope. The rest of the procedure shall be in accordance with ITB 23.2 to ITB 23.6.

(b) Bidders submitting Bids electronically shall follow the electronic bid submission procedures specified in the BDS.

23.2 The inner and outer envelopes shall

- (a) bear the name and address of the Bidder,
- (b) be addressed to the Employer in accordance with ITB 24.1, and
- (c) bear the specific identification of this bidding process indicated in the BDS 1.1.

23.3 The outer envelopes and the inner envelopes containing the Technical Bid shall bear a warning not to open before the time and date for the opening of Technical Bid, in accordance with ITB 27.1.

23.4 The inner envelopes containing the Price Bid shall bear a warning not to open until advised by the Employer in accordance with ITB 27.7.

23.5 Alternative Bids, if permissible in accordance with ITB 13, shall be prepared, sealed, marked, and delivered in accordance with the provisions of ITB 20 and ITB 21, with the inner envelopes marked in addition "ALTERNATIVE NO...." as appropriate.

23.6 If all envelopes are not sealed and marked as required, the Employer will assume no responsibility for the misplacement or premature opening of the Bid.

24. Deadline for Submission of

24.1 Bids must be received by the Employer at the address and no later than the date and time indicated in the BDS.

Bids

- 24.2 The Employer may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Document in accordance with ITB 8, in which case all rights and obligations of the Employer and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.
- 25. Late Bids**
- 25.1 The Employer shall not consider any Bid that arrives after the deadline for submission of Bids, in accordance with ITB 24. Any Bid received by the Employer after the deadline for submission of Bids shall be declared late, rejected, and returned unopened to the Bidder.
- 26. Withdrawal, Substitution, and Modification of Bids**
- 26.1 A Bidder may withdraw, substitute, or modify its Bid after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITB 22.2, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the Bid must accompany the respective written notice. All notices must be:
- (a) prepared and submitted in accordance with ITB 22 and ITB 23 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked "Withdrawal," "Substitution," "Modification;" and
 - (b) received by the Employer prior to the deadline prescribed for submission of Bids, in accordance with ITB 24.
- 26.2 Bids requested to be withdrawn in accordance with ITB 26.1 shall be returned unopened to the Bidders.
- 26.3 No Bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of Bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Technical Bid or any extension thereof.
- 27. Bid Opening**
- 27.1 The Employer shall open the Technical Bids in public at the address, on the date, and time specified in the BDS in the presence of Bidder's designated representatives and anyone who choose to attend. Any specific electronic bid opening procedures required if electronic bidding is permitted in accordance with ITB 23.1, shall be as specified in the BDS. The Price Bids will remain unopened and will be held in custody of the Employer until the specified time of their opening. If the Technical Bid and the Price Bid are submitted together in one envelope, the Employer may reject the entire Bid. Alternatively, the Price Bid may be immediately resealed for later evaluation.
- 27.2 First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding Bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening.
- 27.3 Second, outer envelopes marked "SUBSTITUTION" shall be opened. The inner envelopes containing the Substitution Technical Bid and/or Substitution Price Bid shall be exchanged for the corresponding envelopes being substituted, which are to be returned to the Bidder unopened. Only the Substitution Technical Bid, if any, shall be opened, read out, and recorded. Substitution Price Bid will remain unopened in accordance with ITB 27.1. No envelope shall be substituted unless the corresponding Substitution Notice contains a valid authorization to request the

substitution and is read out and recorded at bid opening.

27.4 Next, outer envelopes marked "MODIFICATION" shall be opened. No Technical Bid and/or Price Bid shall be modified unless the corresponding Modification Notice contains a valid authorization to request the modification and is read out and recorded at the opening of Technical Bids. Only the Technical Bids, both Original as well as Modification, are to be opened, read out, and recorded at the opening. Price Bids, both Original as well as Modification, will remain unopened in accordance with ITB 27.1.

27.5 All other envelopes holding the Technical Bids shall be opened one at a time, and the following read out and recorded:

- (a) the name of the Bidder;
- (b) whether there is a modification or substitution;
- (c) the presence of a bid security or a Bid-Securing Declaration, if required; and
- (d) any other details as the Employer may consider appropriate.

Only Technical Bids and alternative Technical Bids read out and recorded at bid opening shall be considered for evaluation. Unless otherwise specified in the BDS, all pages of the Letter of Technical Bid are to be initialed by at least three representatives of the Employer attending the bid opening. No Bid shall be rejected at the opening of Technical Bids except for late Bids, in accordance with ITB 25.1.

27.6 The Employer shall prepare a record of the opening of Technical Bids that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal, substitution, or modification; and alternative Bids; and the presence or absence of a bid security or a Bid-Securing Declaration, if one was required. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders who submitted Bids on time, and posted online when electronic bidding is permitted.

27.7 At the end of the evaluation of the Technical Bids, the Employer will invite bidders who have submitted substantially responsive Technical Bids and who have been determined as being qualified for award to attend the opening of the Price Bids. The date, time, and location of the opening of Price Bids will be advised in writing by the Employer. Bidders shall be given reasonable notice of the opening of Price Bids.

27.8 The Employer will notify Bidders in writing who have been rejected on the grounds of their Technical Bids being substantially nonresponsive to the requirements of the Bidding Document and return their Price Bids unopened.

27.9 The Employer shall conduct the opening of Price Bids of all Bidders who submitted substantially responsive Technical Bids, in the presence of Bidders' representatives who choose to attend at the address, on the date, and time specified by the Employer. The Bidder's representatives who are present shall be requested to sign a register evidencing their attendance.

27.10 All envelopes containing Price Bids shall be opened one at a time and the following read out and recorded:

- (a) the name of the Bidder;
- (b) whether there is a modification or substitution;
- (c) the Bid Prices, including any discounts and alternative offers; and

(d) any other details as the Employer may consider appropriate.

Only Price Bids, discounts, and alternative offers read out and recorded during the opening of Price Bids shall be considered for evaluation. Unless otherwise specified in the BDS, all pages of the Letter of Price Bid and Price Schedules are to be initialed by at least three representatives of the Employer attending the opening. No Bid shall be rejected at the opening of Price Bids.

- 27.11 The Employer shall prepare a record of the opening of Price Bids that shall include, as a minimum: the name of the Bidder, the Bid Price (per lot if applicable), any discounts, and alternative offers. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders who submitted Bids on time, and posted online when electronic bidding is permitted.

E. Evaluation and Comparison of Bids

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| 28. Confidentiality | <p>28.1 Information relating to the evaluation of Bids and recommendation of contract award, shall not be disclosed to Bidders or any other persons not officially concerned with such process until information on the Contract award is communicated to all Bidders.</p> <p>28.2 Any attempt by a Bidder to influence the Employer in the evaluation of the Bids or Contract award decisions may result in the rejection of its Bid.</p> <p>28.3 Notwithstanding ITB 28.2, from the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Employer on any matter related to the bidding process, it should do so in writing.</p> |
| 29. Clarification of Bids | <p>29.1 To assist in the examination, evaluation, and comparison of the Technical and Price Bids, and qualification of the Bidders, the Employer may, at its discretion, ask any Bidder for a clarification of its Bid. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the response shall be in writing. No change in the substance of the Technical Bid or prices in the Price Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Bids, in accordance with ITB 36.</p> <p>29.2 If a Bidder does not provide clarifications of its Bid by the date and time set in the Employer's request for clarification, its Bid may be rejected.</p> |
| 30. Deviations, Reservations, and Omissions | <p>30.1 During the evaluation of Bids, the following definitions apply:</p> <p>(a) "Deviation" is a departure from the requirements specified in the Bidding Document;</p> <p>(b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and</p> <p>(c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Document.</p> |
| 31. Examination of Technical Bids | <p>31.1 The Employer shall examine the Technical Bid to confirm that all documents and technical documentation requested in ITB 11.2 have been provided, and to determine the completeness of each document submitted.</p> |

If any of these documents or information is missing, the Bid may be rejected.

31.2 The Employer shall confirm that the following documents and information have been provided in the Technical Bid. If any of these documents or information is missing, the offer shall be rejected.

- (a) Letter of Technical Bid;
- (b) written confirmation of authorization to commit the Bidder;
- (c) Bid Security or Bid-Securing Declaration, if applicable; and
- (d) Technical Proposal in accordance with ITB 17.

32. Responsiveness of Technical Bid

32.1 The Employer's determination of a bid's responsiveness is to be based on the contents of the Bid itself, as defined in ITB11.

32.2 A substantially responsive Technical Bid is one that meets the requirements of the Bidding Document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that,

- (a) if accepted, would:
 - (i) affect in any substantial way the scope, quality, or performance of the plant and services specified in the Contract; or
 - (ii) limit in any substantial way, inconsistent with the Bidding Document, the Employer's rights or the Bidder's obligations under the proposed Contract; or
- (b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive Bids.

32.3 The Employer shall examine the technical aspects of the Bid submitted in accordance with ITB 17, Technical Proposal, in particular to confirm that all requirements of Section 6 (Employer's Requirements) have been met without any material deviation, reservation, or omission.

32.4 If a Bid is not substantially responsive to the requirements of the Bidding Document, it shall be rejected by the Employer and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.

33. Nonmaterial Nonconformities

33.1 Provided that a Bid is substantially responsive, the Employer may waive any nonconformities in the Bid that do not constitute a material deviation, reservation, or omission.

33.2 Provided that a Bid is substantially responsive, the Employer may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the Bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the Price Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.

33.3 Provided that a Bid is substantially responsive, the Employer shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component. The adjustment shall be made using the method indicated in Section 3

(Evaluation and Qualification Criteria).

34. Detailed Evaluation of Technical Bids

- 34.1 The Employer will carry out a detailed technical evaluation of the Bids not previously rejected as being substantially nonresponsive, to determine whether the technical aspects are in compliance with the Bidding Document. The Bid that does not meet minimum acceptable standards of completeness, consistency, and detail, and the specified minimum and/or maximum requirements for specified functional guarantees, will be treated as nonresponsive and hence rejected. To reach such a determination, the Employer will examine and compare the technical aspects of the bids on the basis of the information supplied by the Bidders, taking into account the following:
- (a) overall completeness and compliance with the Employer's Requirements; deviations from the Employer's Requirements; conformity of the plant and services offered with specified performance criteria; suitability of the plant and services offered in relation to the environmental and climatic conditions prevailing at the site; and quality, function and operation of any process control concept included in the Bid. The Bid that does not meet minimum and/or maximum acceptable standards of completeness, consistency, and detail will be rejected for non-responsiveness;
 - (b) type, quantity, and long-term availability of mandatory and recommended spare parts and maintenance services; and
 - (c) other relevant factors, if any, listed in Section 3 (Evaluation and Qualification Criteria).
- 34.2 Where alternative technical solutions have been allowed in accordance with ITB 13, and offered by the Bidder, the Employer will make a similar evaluation of the alternatives. Where alternatives have not been allowed but have been offered, they shall be ignored.

35. Eligibility and Qualification of the Bidder

- 35.1 The Employer shall determine to its satisfaction during the evaluation of Technical Bids whether a Bidder meets the eligibility and qualifying criteria specified in Section 3 (Evaluation and Qualification Criteria).
- 35.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB 15.
- 35.3 An affirmative determination shall be a prerequisite for the opening and evaluation of a Bidder's Price Bid. A negative determination shall result into the disqualification of the Bid, in which event the Employer shall return the unopened Price Bid to the Bidder.
- 35.4 The capabilities of the manufacturers and subcontractors proposed in its Bid for the major items of plant and services to be used by the lowest evaluated Bidder will also be evaluated for acceptability in accordance with Section 3 (Evaluation and Qualification Criteria). Their participation should be confirmed with a letter of intent between the parties, as needed. Should a manufacturer or subcontractor be determined to be unacceptable, the Bid will not be rejected, but the Bidder will be required to propose, without changing its bid price, an acceptable substitute manufacturer or subcontractor meeting the minimum technical specifications stated in Section 6 (Employer's Requirements). If a Bidder does not provide an acceptable substitute manufacturer or subcontractor by the date and time set in the Employer's request for substitution of manufacturer or

subcontractor, its Bid may be rejected.

- 35.5 Prior to signing the Contract, the corresponding Appendix to the Contract Agreement shall be completed, listing the approved manufacturers or subcontractors for each item concerned.

36. Correction of Arithmetical Errors

- 36.1 During the evaluation of Price Bids, the Employer shall correct arithmetical errors on the following basis:
- (a) where there are errors between the total of the amounts given under the column for the price breakdown and the amount given under the Total Price, the amounts given under the column for the price breakdown shall prevail and the Total Price will be corrected accordingly;
 - (b) where there are errors between the total of the amounts of Schedule Nos. 1 to 4 and the amount given in Schedule No. 5 (Grand Summary), the total of the amounts of Schedule Nos. 1 to 4 shall prevail and the Schedule No. 5 (Grand Summary) will be corrected accordingly;
 - (c) if there is a discrepancy between the grand total price given in Schedule No. 5 (Grand Summary) and the bid amount in item (c) of the Letter of Price Bid, the grand total price given in Schedule No. 5 (Grand Summary) will prevail and the bid amount in item (c) of the Letter of Price Bid will be corrected; and
 - (d) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetical error, in which case the amount in figures shall prevail subject to (a), (b), and (c) above.
- 36.2 If the Bidder that submitted the lowest evaluated Bid does not accept the correction of errors, its Bid shall be disqualified and its bid security may be forfeited or its Bid-Securing Declaration executed.

37. Conversion to Single Currency

- 37.1 For evaluation and comparison purposes, the currency(ies) of the Bid shall be converted into a single currency as specified in the BDS .

38. Margin of Preference

- 38.1 Unless otherwise specified in the BDS, a margin of preference shall not apply.

39. Evaluation of Price Bids

- 39.1 The Employer shall use the criteria and methodologies listed in this clause. No other evaluation criteria or methodologies shall be permitted.
- 39.2 I. To evaluate a Price Bid, the Employer shall consider the following:
- (a) the bid price, excluding provisional sums and the provision, if any, for contingencies in the Price Schedules;
 - (b) price adjustment for correction of arithmetical errors in accordance with ITB 36.1;
 - (c) price adjustment due to discounts offered in accordance with ITB 18.7;
 - (d) price adjustment due to quantifiable nonmaterial nonconformities in accordance with ITB 33.3;
 - (e) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with ITB 37; and
 - (f) the evaluation factors indicated in Section 3 (Evaluation and Qualification Criteria).
- II. The Employer's evaluation of a Bid will exclude and not take into account,

- (a) in the case of Plant and Mandatory Spare Parts (Schedule No. 1) supplied from abroad, all taxes and duties, applicable in the Employer's country and payable on the Plant and Mandatory Spare Parts if the Contract is awarded to the Bidder; and
 - (b) in the case of Plant and Mandatory Spare Parts (Schedule No. 2) supplied from within the Employer's country, sales and other taxes, applicable in the Employer's country and payable on the Plant and Mandatory Spare Parts if the Contract is awarded to the Bidder.
- 39.3 If price adjustment is allowed in accordance with ITB 18.6, the estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in bid evaluation.
- 39.4 If this Bidding Document allows Bidders to quote separate prices for different lots (contracts), and the award to a single Bidder of multiple lots (contracts), the methodology to determine the lowest evaluated price of the lot (contract) combinations, including any discounts offered in the Letter of Price Bid, is specified in Section 3 (Evaluation and Qualification Criteria).
- 39.5 If the Bid, which results in the lowest Evaluated Bid Price, is seriously unbalanced or front loaded in the opinion of the Employer, the Employer may require the Bidder to produce detailed price analyses for any or all items of the Price Schedules, to demonstrate the internal consistency of those prices with the methods and time schedule proposed. After evaluation of the price analyses, taking into consideration the terms of payments, the Employer may require that the amount of the performance security be increased at the expense of the Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract.
- 40. **Comparison of Bids** 40.1 The Employer shall compare all substantially responsive Bids to determine the lowest evaluated Bid, in accordance with ITB 39.2. Refer BDS.
- 41. **Employer's Right to Accept Any Bid, and to Reject Any or All Bids** 41.1 The Employer reserves the right to accept or reject any Bid, and to annul the bidding process and reject all Bids at any time prior to contract award, without thereby incurring any liability to Bidders. In case of annulment, all Bids submitted and specifically, bid securities, shall be promptly returned to the Bidders.

F. Award of Contract

- 42. **Award Criteria** 42.1 The Employer shall award the Contract to the Bidder whose offer has been determined to be the lowest evaluated Bid and is substantially responsive to the Bidding Document, provided further that the Bidder is determined to be eligible and qualified to perform the Contract satisfactorily. Refer BDS.
- 43. **Notification of Award** 43.1 Prior to the expiration of the period of bid validity, the Employer shall notify the successful Bidder, in writing, that its Bid has been accepted.
- 43.2 At the same time, the Employer shall also notify all other Bidders of the results of the bidding. The Employer will publish in an English language newspaper or well-known freely accessible website the results identifying the Bid and lot numbers, and the following information: (i) name of each Bidder who submitted a bid; (ii) bid prices as read out at bid opening; (iii) name and evaluated prices of each bid that was evaluated; (iv) name of Bidders whose Bids were rejected and the reasons for their rejection; and (v) name of the winning Bidder, and the price it offered, as well as the duration and summary scope of the contract awarded. After publication of

award, unsuccessful Bidders may request in writing to the Employer for a debriefing seeking explanations on the grounds on which their Bids were not selected. The Employer shall promptly respond in writing to any unsuccessful Bidder who, after publication of contract award, request for a debriefing.

43.3 Until a formal contract is prepared and executed, the notification of award shall constitute a binding Contract.

44. Signing of Contract

44.1 Promptly after notification, the Employer shall send the successful Bidder the Contract Agreement.

44.2 Within 28 days of receipt of the Contract Agreement, the successful Bidder shall sign, date, and return it to the Employer.

45. Performance Security

45.1 Within 28 days of the receipt of notification of award from the Employer, the successful Bidder shall furnish the performance security in accordance with the conditions of contract, subject to ITB 39.5, using for that purpose the Performance Security Form included in Section 9 (Contract Forms), or another form acceptable to the Employer.

45.2 Failure of the successful Bidder to submit the above-mentioned Performance Security or sign the Contract shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security or execution of the Bid-Securing Declaration. In that event, the Employer may award the Contract to the next lowest evaluated Bidder whose offer is substantially responsive and is determined by the Employer to be qualified to perform the Contract satisfactorily.



Procurement of Works

JAIPUR METRO RAIL CORPORATION LIMITED

BIDDING DOCUMENT

for

Procurement on Direct Contract Mode

of

DC No.- JP/JS15 (Phase-1B)

**BID DOCUMENTS FOR DESIGN, MANUFACTURE, SUPPLY,
INSTALLATION TESTING & COMMISSIONING OF PUBLIC ADDRESS
SYSTEM, PASSENGER INFORMATION DISPLAY SYSTEM AND
MASTER CLOCK SYSTEM FOR JMRC PHASE 1B**

PART-I BIDDING PROCEDURES

Section 2 - Bid Data Sheet (BDS)

JAIPUR METRO RAIL CORPORATION LTD.

**Khanij Bhawan, Tilak Marg,
C- Scheme, Jaipur (Rajasthan) PIN-302005
Country: India**

Section 2 - Bid Data Sheet

This section consists of provisions that are specific to each procurement and supplement the information or requirements included in Section 1 - Instructions to Bidders.

A. General

ITB 1.1	<p>The number of the Invitation for Bids (IFB) is :ONE (Single Bid)</p> <p>The Employer is: Jaipur Metro Rail Corporation 3rd Floor ,RAJSICO Building, UdhogBhawan Premises , C-Scheme Jaipur, Rajasthan,India</p> <p>The name of the international competitive bidding (ICB) is:Not Applicable</p> <p>The identification number of the Bid is: JP/JS15 (Ph-1B)</p> <p>The number and identification of lots (contracts) comprising this Bid :- One (JP/JS-15B)</p>
ITB 2.1	<p>The Borrower is: Jaipur Metro Rail Corporation. 3rd Floor , RAJSICO Building, UdhogBhawan Premises , C-Scheme Jaipur, Rajasthan, India</p> <p>The Borrower has received financing (hereinafter called funds) from the Asian Development Bank (hereinafter called ADB) towards the cost of the Project-Design Manufacture, Supply, Installation, Testing and Commissioning of Public Address System, Passenger Information Display System and Master Clock System (JS15) for Jaipur Metro Rail Project (Phase 1B)</p>
ITB 4.3(e)	Not applicable as direct mode of contracting is adopted.
ITB 4.8	Not Applicable
ITB 6.2 & 6.3	Not applicable.

B. Contents of Bidding Documents

ITB 7.1	<p>For <u>clarification purposes</u> only, the Employer's address is:</p> <p>Attention: Director (Project), Jaipur Metro Rail Corporation.</p> <p>Street address: RAJSICO Building, UdhogBhawan Premises , C-Scheme Floor/Room number: 3rd Floor,</p> <p>City: Jaipur</p> <p>ZIP code: 302005</p> <p>Country: INDIA</p> <p>Telephone: 0141- 5192450</p> <p>Fax: 0141-5192451</p> <p>E-mail address: jmrc.gmsnt@gmail.com</p>
ITB 7.4	<p>A Pre-Bid meeting may take place if Prospective bidder/ contractor have some doubt or seek clarification. The date, time and place are as follows :</p> <p>Date: To be notified later</p> <p>Time: To be notified later</p> <p>Place: Jaipur Metro Rail Corporation. 3rd Floor, RAJSICO Building, UdhogBhawan Premises , C-Scheme, Jaipur, Rajasthan, India</p> <p>A site visit can be organized by the Employer, if required. The cost of same shall be borne by bidder/ contractor.</p>

C. Preparation of Bids

ITB 11.2 (b)	Bid Security or Bid-Securing Declaration is not to be submitted.
ITB 11.2 (c)	Alternative bids are not permissible.
ITB 11.2 (k)	<p>The Bidder shall submit with its Technical Bid the following additional documents:</p> <ol style="list-style-type: none"> 1. Certificate Of Compliance (Form COC to Section 4) 2. Endorsement of the requirement of SCC/GCC (Annexure-III of SCC, Section-8)
ITB 11.3 (b)	Quantity specified in Minimum BOQ, Section 4 is the total minimum quantity to be covered as part of scope of work .Any other item or enhancement to listed items required to complete the contract shall also be provided as part of this lump sum contract. The bidder shall fill the price schedules on Section 4 using the items

	listed in Minimum BOQ as a baseline document.
ITB 11.3 (d)	The Bidder shall, on or before the date and time notified in Bid Documents, submit along with his Bid:-Original with Two copies each of all the Bid document, including Bid Drawings and Addenda thereto, with each page signed and stamped to confirm acceptance by the Bidder of the contents.
ITB 12.1	The units and rates in figures entered into the Price Schedules should be typewritten or if written by hand, must be in print form. Price Schedules not presented accordingly may be considered nonresponsive.
ITB 13.1	Alternative bids are not acceptable .
ITB 13.2	Alternatives to the Time Schedules shall not be permitted .
ITB 13.4	Alternative technical solutions shall be permitted for any part or sub systems of the plant and service.
ITB 15.2	No provision of domestic preference is kept.
ITB 16.1 (a)	Only applicable for equipment / sub system different from one supplied & installed in Phase 1-A of JMRTS [MSOR- CDPE section], but as per PS & GS.
ITB 16.1 (b)	The period following completion of plant and services in accordance with provisions of the contract shall be 10 years from the date of taking over of plant or start of Revenue Operation Date, whichever is later.
ITB 16.1(c)	For same equipment as utilized in JMRC Phase 1-A, responsiveness shall constitute Certificate of Compliance, Form COC, Bidding Forms.
ITB 18.3	Prices quoted for Schedule 6 (a) & (b) shall not to be used for bid price evaluation.
ITB 18.4(a)(i)	The Incoterm for quoting plant to be supplied from abroad is CIP . The place of destination for delivery of materials shall be Jaipur Metro Rail Corporation, Mansarovar Depot, Bhriugu Path, Mansarovar Jaipur, Rajasthan 302020 India .
ITB 18.4(a)(ii)	The price quoted shall be inclusive of all taxes, levies, duties, cess, freight, insurance and all other incidental charges required to fulfill the contract requirements including statutory deduction viz., TDS towards Income Tax T/Works Contract Tax etc., except, to the extent applicable and available, Concessional Custom Duty for Project Import under chapter 98.01 of Custom

	Tariff Act, Excise Duty & Rajasthan VAT and Rajasthan Entry Tax.[Refer provisions of SCC Clause 7.]
ITB 18.6	The prices quoted by the Bidder shall be fixed .
ITB 19.1	<p>The currencies of the Bid shall be as follows:</p> <ul style="list-style-type: none"> (a) The prices shall be quoted either in the currency of the Employer Country (Indian National Rupee), or in any fully convertible currency of up to three foreign currencies. (b) A Bidder expecting to incur a portion of its expenditures in the performance of the Contract in more than one currency, and wishing to be paid accordingly, shall so indicate in the Schedule of Prices and the Letter of Price Bid. (c) If some of the contract expenditures related to Design, Installation and Other Services are to be incurred in the Employer's country, such expenditures shall be quoted in either foreign and/or local currency, depending upon the currency in which the costs are to be incurred. (d) Bidders may be required by the Employer to clarify their local and foreign currency requirements, and to substantiate that the amounts included in the Price Schedules are reasonable and responsive to ITB 18.1 in which case a detailed breakdown of its foreign currency requirements shall be provided by the Bidder (e) During the performance of the contract, the foreign currency portions of the outstanding balance of the Contract Price may be adjusted by agreement between the Employer and the Contractor to reflect any changes in foreign currency requirements for the contract. Any such adjustment shall be effected by comparing the amounts quoted in the bid with the amounts already used in the Facilities and the Contractor's future needs for imported items.
ITB 20.1	The bid validity period shall be 180 days from the date of final submission.
ITB 21	Not applicable.
ITB 22.1	In addition to the original Bid, the numbers of copies to be submitted are two .
ITB 22.2	<p>The written confirmation of authorization to sign on behalf of the Bidder shall consist of nomination of one of the members of the partnership, consortium or joint venture to be in-charge; and this authorisation shall be covered in the Power of Attorney signed by the legally authorised signatories of all members of consortium or joint venture.</p> <p>The Bidder shall submit an acceptable authorization within reasonable period.</p>

ITB 22.3	<p>The bidder, to qualify for award of Contract, shall submit a written power of attorney authorising the signatories of the bid to commit each member of the partnership, consortium or joint venture.</p> <p>The bidder shall submit the following information:-</p> <ul style="list-style-type: none"> i) A Copy ofMemorendum of understanding (MOU) relating to the composition of bidder shall be submitted. ii) Nomination of one of the members of the partnership, consortium or joint venture to be in-charge; and this authorisation shall be covered in the Power of Attorney signed by the legally authorised signatories of all members of consortium or joint venture; iii) Details of the intended participation by each member shall be reconfirmed and expanded with complete details of the proposed division of responsibilities and corporate relationships among the individual members. iv) The joint venture/consortium/partnership agreement must contain a clause stating "All the partners are jointly and severally liable to JMRC". <p style="padding-left: 40px;">In case the tenderer being successful, joint venture/consortium/partnership agreement shall be registered in Jaipur so as to be legally valid and binding on partners/members of the joint venture/consortium/partnership</p> <ul style="list-style-type: none"> v) The lead partner in charge shall be authorized to incur liabilities, receive payments and receive instructions for and on behalf of any or all partners of the joint venture/consortium/partnership.
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D. Submission and Opening of Bids

ITB 23.1	Bidders shall not have the option of submitting their bids electronically. Bidders must submit their bids by hand / post.
ITB 24.1	<p>For <u>bid submission purposes</u>only, the Employer's address is</p> <p>Attention: Director (Project), Jaipur Metro Rail Corporation.</p> <p>Street address: RAJSICO_Building, UdhogBhawan Premises , C-Scheme</p> <p>Floor/Room number: 3rd Floor</p> <p>City: Jaipur</p> <p>ZIP code: 302005</p> <p>Country: INDIA</p>

	The deadline for bid submission is Date: 16.12.2016 Time: 1500 Hrs
ITB 25.1	Not Applicable.
ITB 26	Not Applicable.
ITB 27	As applicable to the extent of Single Bid in Direct Contracting method.

E. Evaluation and Comparison of Bids

ITB 29.2	Not Applicable.
ITB 30.1	In addition, all deviations shall be recorded in Statement Of Deviations- Form SD to Bidding Forms
ITB 31.2 (c)	Not Applicable.
ITB 32.4	Not Applicable.
ITB 33.3	Not Applicable.
ITB 34.1	<p>The contractor/ prospective bidder is advised that the Employer's policy in respect to evaluation is that Technical & Financial Packages will be opened on same day and reviewed to determine their acceptability and responsiveness to Section 6.</p> <p>Also, the technical evaluation of bid will take into account submission of Certificate of Compliance, Form COCof Biddingform to confirm compliance to Employer's requirements of same equipments/ sub systems already supplied as existing equipment. If otherwise, Bidder shall furnish all the details as mentioned in referred item.</p>
ITB 35.3	Not Applicable.
ITB 36.2	Not Applicable.
ITB 37.1	<p>The currency that shall be used for bid evaluation and comparison purposes to convert bid prices expressed in various currencies into a single currency is Indian Rupee(INR).</p> <p>The source of the selling exchange rate shall be of Reserve bank of India</p> <p>The date for the selling exchange rate shall be 28 days prior to the date of submission of bid.</p>

ITB 38.1	A margin of preference shall not be applied.
ITB 39.2.II	The evaluation of price bid shall take into account prices inclusive of all taxes as applicable in accordance with provisions of SCC Clause 7 or elsewhere in the bidding document.
ITB 39.3,39.4 & 39.5	Not Applicable.
ITB 40.1	Comparison of bids shall not be applicable, as Single bidding method is applied. However, Unacceptable & unresponsive bid will be rejected.

F. Award of Contract

ITB 42	The Employer shall award the Contract to the Bidder whose offer has been determined to be the reasonable & responsive to the Employer's requirement.
ITB 43.2	Not Applicable.



Procurement of Works

JAIPUR METRO RAIL CORPORATION LIMITED

BIDDING DOCUMENT

for

Procurement on Direct Contract Mode

of

DC No.- JP/JS15 (Phase-1B)

**BID DOCUMENTS FOR DESIGN, MANUFACTURE, SUPPLY,
INSTALLATION TESTING & COMMISSIONING OF PUBLIC ADDRESS
SYSTEM, PASSENGER INFORMATION DISPLAY SYSTEM AND
MASTER CLOCK SYSTEM FOR JMRC PHASE 1B**

PART-I BIDDING PROCEDURES

Section 3 - Evaluation and Qualification Criteria (EQC)

JAIPUR METRO RAIL CORPORATION LTD.

Khanij Bhawan, Tilak Marg,

C- Scheme, Jaipur (Rajasthan) PIN-302005

Country: India

Section 3 - Evaluation and Qualification Criteria

Table of Criteria

1. Evaluation.....	3-2
1.1 Technical Evaluation	3-2
1.2 Alternative Technical Solutions.....	3-2
1.3.1 Quantifiable Deviations and Omissions	3-2
1.3.2 Time Schedule	3-2
1.3.3 Operating and Maintenance Costs	3-2
1.3.4 Functional Guarantees of the Facilities	3-2
1.3.5 Work, Services, Facilities, etc., to be provided by the Employer	3-2
1.3.6 Specific Additional Criteria	3-2
1.3.7 Domestic Preference.....	3-2
1.4 Multiple Contracts	3-2
2. Qualification	3-3
2.1 Eligibility	3-3
2.1.1 Nationality.....	3-3
2.1.2 Conflict of Interest	3-3
2.1.3 ADB Eligibility	3-3
2.1.4 Government-Owned Enterprises	3-3
2.1.5 United Nations Eligibility.....	3-3
2.2 Pending Litigation and Arbitration	3-4
2.2.1 Pending Litigation and Arbitration	3-4
2.3 Financial Situation.....	3-5
2.3.1 Historical Financial Performance	3-5
2.3.2 Average Annual Turnover	3-5
2.3.3 Financial Resources Requirements.....	3-6
2.4 Contractor's Experience	3-7
2.5 Subcontractors	3-7

1. Evaluation

1.1 Technical Evaluation

Technical Evaluation shall be as per the criteria listed in ITB 34.1 (a) – (b).

1.2 Alternative Technical Solutions Not Applicable

1.3.1 Quantifiable Deviations and Omissions Not Applicable

1.3.2 Time Schedule Not Applicable

1.3.3 Operating and Maintenance Costs Not Applicable

1.3.4 Functional Guarantees of the Facilities Not Applicable

1.3.5 Work, Services, Facilities, etc., to be provided by the Employer Not Application

1.3.6 Specific Additional Criteria Not Applicable

1.3.7 Domestic Preference Not Applicable

1.4 Multiple Contracts Not Applicable.

2. Qualification

It is the legal entity or entities comprising the Bidder, and not the Bidder's parent companies, subsidiaries, or affiliates, that must satisfy the qualification criteria described below.

2.1 Eligibility

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	

2.1.1 Nationality

Nationality in accordance with ITB Subclause 4.2.	must meet requirement	must meet requirement	must meet requirement	not applicable	Forms ELI - 1; ELI - 2 with attachments
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2.1.2 Conflict of Interest

No conflicts of interest in accordance with ITB Subclause 4.3.	must meet requirement	must meet requirement	must meet requirement	not applicable	Letter of Technical Bid
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2.1.3 ADB Eligibility

Not having been declared ineligible by ADB, as described in ITB Subclause 4.4.	must meet requirement	must meet requirement	must meet requirement	not applicable	Letter of Technical Bid
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2.1.4 Government-Owned Enterprise

Bidder required to meet conditions of ITB Subclause 4.5.	must meet requirement	must meet requirement	must meet requirement	not applicable	Forms ELI - 1; ELI - 2 with attachments
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2.1.5 United Nations Eligibility

Not having been excluded by an act of compliance with a UN Security Council resolution in accordance with ITB Subclause 4.7.	must meet requirement	must meet requirement	must meet requirement	not applicable	Letter of Technical Bid
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2.2 Pending Litigation and Arbitration

Pending litigation and arbitration criterion shall apply as below.

2.2.1 Pending Litigation and Arbitration

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
All pending litigation and arbitration, if any, shall be treated as resolved against the Bidder and so shall in total not represent more than 50% percent of the Bidder's net worth calculated as the difference between total assets and total liabilities.	must meet requirement by itself or as partner to past or existing Joint Venture	not applicable	must meet requirement by itself or as partner to past or existing Joint Venture	not applicable	Form LIT - 1

2.3 Financial Situation

2.3.1 Historical Financial Performance

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
Submission of audited financial statements or, if not required by the law of the Bidder's country, other financial statements acceptable to the Employer, for the last 03 years to demonstrate the current soundness of the Bidder's financial position. As a minimum, the Bidder's net worth for the last year calculated as the difference between total assets and total liabilities should be positive.	must meet requirement	not applicable	must meet requirement	not applicable	Form FIN - 1 with attachments

2.3.2 Average Annual Turnover

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
Minimum average annual turnover of (INR) 1.13 Crore calculated as total certified payments received for contracts in progress or completed, within the last 3 years.	must meet requirement	must meet requirement	must meet 50% of the requirement	must meet 75% of the requirement	Form FIN - 2

2.3.3 Financial Resources

If the bid evaluation process and the decision for the award of the Contract takes more than one (1) year from the date of bid submission, Bidders shall be asked to resubmit their current contract commitments and latest information on financial resources supported by latest audited accounts / audited financial statements, or if not required by the law of the Bidder's country, other financial statements acceptable to the Employer, and the Bidders' financial capacity shall be reassessed on this basis.

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
The Bidder must demonstrate that it has the financial resources to meet:					
(a) its current contract commitments, as defined in FIN-4 (Total Financial Requirements for Current Contract Commitments), plus	must meet requirement	not applicable	must meet requirement for its own contractual commitments	not applicable	Form FIN - 4
(b) the requirements for the Subject Contract of INR 14 lacs	must meet requirement	must meet requirement	must meet 50%(A)	must meet 75%(B)	Form FIN – 3 and Form FIN - 4

2.4 Bidder's Experience

Not Used.

2.5 Subcontractors

Subcontractors or Manufacturers for the following major items of plant and services must meet the following minimum criteria, herein listed for that item in case the Subcontractor/Manufacturer were not approved during Phase 1-A of JMRTS . Failure to comply with this requirement will result in rejection of the subcontractor but not the Contractor.

Item No.	Description of Item	Minimum Criteria to be met	Documents Submission Requirements
1	PIDS Display Boards	Subject to review by Employer's representative	Form EXP-3
2	Loudspeakers, PAS Control equipment		
3	Sub-Master Clocks, Slave Clocks		
4	Station Servers & Switches		
5	Cables for PIDS/PAS/MCK systems		



Procurement of Works

JAIPUR METRO RAIL CORPORATION LIMITED

BIDDING DOCUMENT

for

Procurement on Direct Contract Mode

of

DC No.- JP/JS15 (Phase-1B)

**BID DOCUMENTS FOR DESIGN, MANUFACTURE, SUPPLY,
INSTALLATION TESTING & COMMISSIONING OF PUBLIC ADDRESS
SYSTEM, PASSENGER INFORMATION DISPLAY SYSTEM AND
MASTER CLOCK SYSTEM FOR JMRC PHASE 1B**

PART-I BIDDING PROCEDURES

Section 4 -Bidding Forms (BDF)

JAIPUR METRO RAIL CORPORATION LTD.

Khanij Bhawan, Tilak Marg,

C- Scheme, Jaipur (Rajasthan) PIN-302005

Country: India

Section 4 - Bidding Forms

This section contains the forms to be completed by the Bidder and submitted as part of its Bid.

Table of Forms

Letter of Technical Bid	4-2
Letter of Price Bid	4-4
Price Schedules	4-6
Schedule No. 1. Plant and Mandatory Spare Parts Supplied from Abroad	4-7
Schedule No. 2. Plant and Mandatory Spare Parts Supplied from Within the Employer's Country	4-9
Schedule No. 3. Design Services	4-10
Schedule No. 4. Installation and Other Services	4-11
Schedule No. 5. Grand Summary	4-12
Schedule No. 6(a) Recommended Spare Parts	4-13
Schedule No. 6(b) Comprehensive AMC beyond DLP for 2 years	4-13
Table –I: Minimum BOQ	4-14
Technical Proposal	4-18
FORM COC: Certificate of Compliance	4-19
FORM SD: Statement of Deviations	4-20
Personnel	4-22
Form PER – 1: Proposed Personnel	4-23
Form PER – 2: Resume of Proposed Personnel	4-23
Equipment	4-23
Form EQU: Equipment	4-23
Proposed Subcontractors and/or Manufacturers for Major Items of Plant and Services	4-24
Bidder's Qualification	4-25
Form ELI - 1: Bidder's Information Sheet	4-26
Form ELI - 2: Joint Venture Information Sheet	4-27
Form LIT - 1: Pending Litigation and Arbitration	4-28
Form FIN - 1: Historical Financial Performance	4-30
Form FIN - 2: Average Annual Turnover	4-31
Form FIN - 3: Availability of Financial Resources	4-32
Form FIN- 4: Financial Requirements for Current Contract Commitments	4-33
Form FIN- 5: Compliance Check of Financial Resources	4-34
Form EXP-1: Contracts of Similar Size and Nature	4-36
Form EXP-2: Experience in Key Activities	4-36
Form EXP-3: Subcontractors	4-37

Letter of Technical Bid

-- Note --

The bidder must accomplish the Letter of Technical Bid on its letterhead clearly showing the bidder's complete name and address.

Date:

ICB No.:

Invitation for Bid No.:

To:

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) 8.
- (b) We offer to design, manufacture, test, deliver, install, pre-commission, and commission in conformity with the Bidding Document the following Plant and Services:
.....
.....
- (c) Our Bid consisting of the Technical Bid and the Price Bid shall be valid for a period of 180 days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
- (d) We, including any Subcontractors or Manufacturers for any part of the Contract, have or will have nationalities from eligible countries, in accordance with ITB 4.2.
- (e) We, including any Subcontractors or Suppliers for any part of the Contract, do not have any conflict of interest in accordance with ITB 4.3.
- (f) Our firm, its affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the contract, has not been declared ineligible by ADB, under the Employer's country laws or official regulations or by an act of compliance with a decision of the United Nations Security Council.
- (g) [We are not a government-owned enterprise] / [We are a government-owned enterprise but meet the requirements of ITB 4.5].¹

¹ Use one of the two options as appropriate.

- (h) We agree to permit ADB or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors appointed by ADB.
- (i) If our Bid is accepted, we commit to mobilizing key equipment and personnel in accordance with the requirements set forth in Section 6 (Employer's Requirements) and our technical proposal, or as otherwise agreed with the Employer.

Name

In the capacity of

Signed

Duly authorized to sign the Bid for and on behalf of

Date

Letter of Price Bid

-- Note --

The bidder must accomplish the Letter of Price Bid on its letterhead clearly showing the bidder's complete name and address.

Date:

ICB No.:

Invitation for Bid No.:

To:

We, the undersigned, declare that:

(a) We have examined and have no reservations to the Bidding Document, including Addenda issued in accordance with Instructions to Bidders (ITB) 8. _____

(b) We offer to design, manufacture, test, deliver, install, pre-commission, and commission in conformity with the Bidding Document the following Plant and Services:

(c) The total bid price quoted in accordance with SCC Clause 7, excluding any discounts offered in item (d) below is fixed, lump sum amount and is the sum of

[amount of foreign currency in words], [amount in figures], and [amount of local currency in words], [amount in figures]

The total proposal price from the Grand Summary (Schedule No. 5) should be entered by the contractor inside this box. Absence of the total proposal price in the Letter of Price proposal may result in the rejection of the proposal.

(d) The discounts offered and the methodology for their application are as follows:

(e) Our Bid shall be valid for a period of 180 days from the date fixed for the submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

(f) If our Bid is accepted, we commit to obtain a performance security in accordance with the Bidding Document.

- (g) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract: ¹

Name of Recipient	Address	Reason	Amount
.....
.....

- (h) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed.
- (i) We understand that you are not bound to accept the bid that you may receive.
- (j) We agree to permit ADB or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors appointed by ADB.

Name

In the capacity of

Signed

Duly authorized to sign the Bid for and on behalf of

Date

¹ If none has been paid or is to be paid, indicate "None."

Price Schedules PREAMBLE

General

1. The Price Schedules are divided into separate Schedules as follows:

Schedule No. 1:	Plant and Mandatory Spare Parts Supplied from Abroad
Schedule No. 2:	Plant and Mandatory Spare Parts Supplied from within the Employer's Country
Schedule No. 3:	Design Services
Schedule No. 4:	Installation and Other Services
Schedule No. 5:	Grand Summary
Schedule No. 6(a):	Recommended Spare Parts
Schedule No. 6(b):	Comprehensive AMC beyond DLP for 2 years as per Appendix 12.3 & 12.4, PS, Section 6.
2. The Schedules are to be filled by Bidder using Minimum BOQ (Table-I, Section 4) as a reference which specifies the minimum quantity to be supplied. The minimum BOQ does not generally give a full description of the plant to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer's Requirements and other sections of the Bidding Document and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rates and prices shall be deemed to cover the full scope as aforesaid, including overheads and profit.
3. If Bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with ITB 7 prior to submitting their bid.

Pricing

4. The units and rates in figures entered into the Price Schedules should be typewritten or if written by hand, must be in print form. Price Schedules not presented accordingly may be considered nonresponsive. Any alterations necessary due to errors, etc., shall be initialed by the Bidder.

As specified in the Bid Data Sheet and Special Conditions of Contract, prices shall be fixed and firm for the duration of the Contract.
5. Bid prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the Bidding Document.

For each item, Bidders shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules.

Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in Section 6 (Employer's Requirements) or elsewhere in the Bidding Document.
6. Payments will be made to the Contractor in the currency or currencies indicated under each respective item.
7. When requested by the Employer for the purposes of making payments or part payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.

Schedules of Rates and Prices

Schedule No. 1: Plant and Mandatory Spare Parts Supplied from Abroad

Item	Description	Country of Origin	Quantity ^b	Unit Price ^{a,c}		Total Price ^{a,c}	Taxes and Duties
				Foreign Currency	CIP	Foreign Currency	Local Currency
1	2	3	4	5	6	7 = 4 x 6	8
TOTAL Column 7 to be carried forward to Schedule No. 5: Grand Summary							

Name of Bidder _____

Signature of Bidder _____

- ^a Specify currencies in accordance with ITB 19.1 of the BDS. Create additional columns for up to a maximum of three foreign currencies if so required.
- ^b Quantity specified in Schedule 1,2,3,4 should be the total minimum quantity to be covered as part of scope of work . The bidder should fill Schedule 1,2,3,4, of Section 4 using the minimum BOQ(Table-I, section 4) as a baseline schedule. Any other item or enhancement to listed items required to complete the contract shall also be provided as part of this lump sum contract.
- ^c Column 5 Price shall be inclusive of all taxes, levies, duties, cess, freight, insurance and all other incidental charges required to fulfill the contract requirements including statutory deduction viz., TDS towards Income Tax T/Works Contract Tax etc., except, to the extent applicable and available, Concessional Custom Duty as applicable for Project Import under chapter 98.01 of Custom Tariff Act, Excise Duty & Rajasthan VAT and Rajasthan Entry Tax.

Country of Origin Declaration Form

Item	Description	Country

Schedule No. 2: Plant and Mandatory Spare Parts Supplied from Within the Employer's Country

Item	Description	Quantity ^c	Unit Price ^a		Total Price	Sales & Other Taxes
			Local Currency	EXW Price ^b		
1	2	3	4	5	6 = 3 x 5	8
TOTAL Column 6 to be carried forward to Schedule No. 5: Grand Summary						

Name of Bidder _____

Signature of Bidder _____

- a Specify currency in accordance with ITB 19.1 of the BDS.
- b Column 5 Price shall be inclusive of all taxes, levies, duties, cess, freight, insurance and all other incidental charges required to fulfil the contract requirements including statutory deduction viz., TDS towards Income Tax T/Works Contract Tax etc., except, to the extent applicable and available, Concessional Custom Duty as applicable for Project Import under chapter 98.01 of Custom Tariff Act, Excise Duty & Rajasthan VAT and Rajasthan Entry Tax.
- c. Quantity specified in Schedule 1,2,3,4 should be the total minimum quantity to be covered as part of scope of work . The bidder should fill Schedule 1,2,3,4,5 of Section 4 using the minimum BOQ (Table-I, section 4) as a baseline schedule. Any other item or enhancement to listed items required to complete the contract shall also be provided as part of this lump sum contract.

Schedule No. 3: Design and other Services

Item	Description	Quantity	Unit Price ^{a,b}		Total Price ^{a,b}		Service Tax (already included in 6)
			Local Currency Portion	Foreign Currency Portion	Local Currency Portion	Foreign Currency Portion	
1	2	3	4	5	6 = 3 x 4	7 = 3 x 5	8
TOTAL Columns 6 and 7 to be carried forward to Schedule No. 5: Grand Summary							

Name of Bidder _____

Signature of Bidder _____

a. Specify currency in accordance with ITB 19.1 of the BDS.

b. The contractor shall quote price as per tender conditions and show separately the amount of service tax included in the bid's price. Refer SCC Clause 7 for further details.

Schedule No. 4 - Installation and Other Services(e.g. testing)

Item	Description	Quantity ^c	Unit Price ^{a,b}		Total Price ^{a,b}		Service Tax (already included in 6)
			Local Currency Portion	Foreign Currency Portion	Local Currency Portion	Foreign Currency Portion	
1	2	3	4	5	6 = 3 x 4	7 = 3 x 5	8
TOTAL Columns 6 and 7 to be carried forward to Schedule No. 5: Grand Summary							

Name of Bidder _____

Signature of Bidder _____

a. Specify currency in accordance with ITB 19.1 of the BDS.

b. The contractor shall quote price as per tender conditions and show separately the amount of service tax included in the bid's price. Refer SCC Clause 7 for further details.

Schedule No. 5: Grand Summary

Schedule No.	Title	Total Price ^a	
		Foreign	Local
1	Plant and Mandatory Spare Parts Supplied from Abroad ^b		
2	Plant and Mandatory Spare Parts Supplied from Within the Employer's Country ^b		
3	Design Services		
4	Installation and Other Services		
Grand Total to be carried forward to Letter of Price Bid			

Name of Bidder _____

Signature of Bidder _____

^a Specify currency in accordance with ITB 19.1 of the BDS. Create additional columns for up to a maximum of three foreign currencies if so required.

^b Prices are inclusive of all applicable taxes and duties as per SCC Clause 7 or elsewhere in Contract

*** Schedule No. 6(a): Recommended Spare Parts**

Item	Description*	Part No.	Primary Source of Supply	Secondary Source of Supply	Land Time (Month)	Shelf Life (Month)	Unit Cost Without Escalation	Number of units required for the system during expected life	Number of units required for the system during the first 10 years	Quantity	Unit Price ^a		Total Price ^a	
											EXW Local Parts Local Currency	CIP Imported Parts Foreign Currency	Local Currency Portion	Foreign Currency Portion
1									2	3	4	5	6 = 3 x 4	7 = 3 x 5
TOTAL														

* Description should include details like part number, lead time, shelf life etc as per SCC Clause no.3.

†Schedule No.6 (b): Comprehensive AMC beyond DLP for 2 years as per Appendix 12.3 & 12.4, PS, Section 6

Item	Description	Quantity ^c	Unit Price ^{a,b}		Total Price ^{a,b}		Service Tax (already included in 6)
			Local Currency Portion	Foreign Currency Portion	Local Currency Portion	Foreign Currency Portion	
1	2	3	4	5	6 = 3 x 4	7 = 3 x 5	8
TOTAL							

Name of Bidder _____

Signature of Bidder _____

a Specify currency in accordance with ITB 19.1 of the BDS.

b The contractor shall quote price as per tender conditions and show separately the amount of service tax included in the bid's price. Refer SCC Clause 7 for further details.

† Not to be used for Bid Price evaluation.

Table –I: Minimum BOQ for PIDS, PAS & Master Clock System for Jaipur Metro Phase 1-B

Schedule-A1-PAS/PIDS System		Unit	Qty
S. No.	Item Description		
Passenger Information Display System			
1	PAS/PIDS Integrated Workstation (non redundant) for underground stations including Mic with Servers.	No.	2
2	LCD (TFT active matrix) type display board at platform for Underground stations	No.	16
3	LCD (TFT active matrix) type display board at Concourse for Underground stations	No.	4
Public Address System			
4	PA Loudspeakers - unidirectional/Ceiling/Wall loudspeaker excluding parking area	No.	500
5	(A) PAS equipment cabinet with full functionalities Of:-	No.	2
	(i) PA amplifier of rating as per requirement (give ratings of each type, numbers & rates)	No.	16
	(ii) 8 Channel Mixer	No.	2
	(iii) Digital Equalizer	No.	2
	(iv) Zone Controller (Zone+ Monitor)	No.	2
	(v) Gate Keeper equipment for monitor and switch redundant amplifiers	No.	2
	(vi)NLC (noise Level Cancellation equipment)	No.	16
6	Hard Wired PAS Control Panel with microphone or Digital call station	No.	6
7	i) Loudspeaker cable (unarmoured) (KM) fire survival type with Low smoke/zero halogen content ii) Noise Sensor and data cables with Low Smoke Zero Helozen content (KM)	KM	14
8	PIDS Power Cable (unarmoured) (KM) fire retardant type with Low smoke/zero halogen content	KM	3.5
9	PIDS Data Cable (unarmoured) (KM) fire retardant type with Low smoke/zero halogen content	KM	3.5
10	Supply and delivery of site materials (racks,Distribution boards,DDF ODF,IDF,connectors, connecting cables, HDPE etc.) for complete installation Testing commissioning for PAS/PIDS system.	No.	2
11	GI conduit as per specifications (KM)	KM	2
12	Any other items necessary for meeting fully the contract requirements		LS
Schedule-A2-PAS/PIDS System		Unit	Qty
13	Application Engineering and Documentation		LS

14	Interface application Engineering and Design with DDC constructions of station, Traction etc.		LS
15	Testing & Commissioning at station level		LS
16	Integrating testing & commissioning with other telecom contractor and also including all other designated contractors.		LS
17	As built drawing for PIDS/PAS system		LS
19	Supervised Maintenance for PIDS/PAS 4 Man Months		LS
20	Defect Liability period maintenance support for PAS/PIDS system (24 months)		LS
21	Contract Spares as per PS, Appendix-E		LS
22	Project Management for PAS/PIDS System		LS
23	Interface and Integration with existing Central PIDS/PAS system at OCC level		LS
	Schedule-A3 Clock System		
1	Station-Sub-Master Clock	No.	2
2	Analog Clock Double Sided 60 cm dia	No.	8
3	Digital Indoor Clock	No.	20
4	Digital Outdoor Clock	No.	8
5	Power Cable (unarmoured) (KM) Fire Retardant type with low smoke/Zero halogen	KM	4.5
6	Data Cable(unarmoured) (KM) Fire Retardant type with low smoke/Zero halogen	KM	2.5
7	Earth cable for fire retardant type Fire Retardant type with low smoke/Zero halogen(16 sq mm)	KM	1.5
8	GI Conduit as per specifications (in KM)	KM	0.3
9	Supply and delivery of site materials (racks,Distribution boards,DDF IDF,connectors, connecting cables, etc.) for complete installation Testing commissioning for Clock system.	No.	2
10	Any other items necessary for meeting fully the contract requirements		LS
	Schedule-A4 Clock System		
1	Application Engineering and Documentation		LS
2	Interface application Engineering and Design with DDC contractors of station, Traction etc.		LS
3	Testing & Commissioning at station level		LS
4	Integrated Testing & Commissioning with Other Telecom Contractors & also including all other designated contractors		LS
5	As built drawing for Clock system		LS

6	Supervised Maintenance for Clock 4 Man Month local		LS
7	Defect Liability period maintenance support for Clock system(24 months)		LS
8	Project Management for Clock System		LS
9	Contract Spares as per PS, Appendix-E		LS
10	Interface and Integration with Master Clock System at OCC level		LS

Note: This is a minimum quantity of items to be supplied by contractor to complete the scope of Works as specified in contract. The contractor should fill quantities in Schedule 1,2,3,4 using this minimum BOQ as a baseline reference taking into account the scope of Works as per design. Installation costs should be filled in Schedule 4.

Technical Proposal

The Bidder shall submit a Certificate of Compliance (Form COC to Bidding Forms, Section 4) on all the clauses of the Employer's Requirements undertaking that the technical proposal amongst others for phase 1-B of JMRTS shall be same as that of Phase 1-A of JMRTS . The contractor shall describe here the proposed changes to technical proposal employed earlier and indicate in the Certificate of Compliance that the proposed changes are in full compliance of Employer's Requirements. Where the Bidder is not able to comply fully with certain clauses and proposes an alternative design it should be mentioned as deviations .All the deviations shall be consolidated and listed separately in the Statement of Deviations (Form SD to Bidding Forms, Section 4). Excepting the items listed in the statement of deviations, the contractor shall give a Certificate of Compliance in the from attached of all the items. The bidder shall also submit Form PER-1,PER-2,EQU and any other forms listed under this section.

FORM COC: Certificate of Compliance**CONTRACTOR'S LETTERHEAD****CERTIFICATE OF COMPLIANCE**

This Certificate is issued in the full knowledge that the Technical Proposals by the Contractor for Phase 1-B of JMRTS shall be same as that for Phase 1-A of Jaipur Metro. If otherwise, the technical proposal submitted in Section 4 of Bidding Document, are in, Clause by Clause, Compliance with the Instruction to Bidder, Employer's Requirements (General Specifications and Particular Specifications), General Conditions of Contract (GCC), Special Conditions of Contract (SCC) except as noted in Form SD to the Bidding Forms (Statement of Deviations) accompanying this Certificate.

Signed _____

Authorised Representative

FORM SD: Statement of Deviations**(A) STATEMENT OF DEVIATIONS FROM THE INSTRUCTION TO BIDDER**

Clause Number	Details of Deviations	Remarks explaining reasons for deviations and why it may be considered by the employer

(B) STATEMENT OF DEVIATIONS FROM THE GCC AND SCC

Clause Number	Details of Deviations	Remarks explaining reasons for deviations and why it may be considered by the employer

(C) STATEMENT OF DEVIATIONS FROM THE EMPLOYERS REQUIREMENT- GENERAL**SPECIFICATIONS AND TECHNICAL SPECIFICATION**

Clause Number	Details of Deviations	Remarks explaining reasons for deviations and why it may be considered by the employer

Note:

1. We hereby confirm that the pricing for unconditional withdrawal of the deviations from Instruction to Contractor, GCC & SCC and the Employers Requirements (General Specifications and Particulars Specifications) noted in this Form SD has been given in the financial Bid.
2. We hereby confirm that all implicit and explicit deviations, comments and remarks mentioned elsewhere in our proposal shall be treated as NULL and VOID and stand withdrawn.
3. We hereby confirm that but for the deviations noted in this Form SD, our proposal is full and truly compliant.

SIGNATURE OF BIDDER

Personnel

Form PER – 1: Proposed Personnel

Bidders should provide the details of proposed personnel to be stationed in Jaipur or at Contractor's Headquarters dealing with Key design, installation and commissioning activities and their experience record in the relevant Information Forms below for each of the candidate.

1.	Title of position*
	Name
2.	Title of position*
	Name
3.	Title of position*
	Name
4.	Title of position*
	Name
etc.	Title of position*
	Name

-- Note --

* As listed in Section 6 (Employer's Requirements).

Form PER – 2: Resume of Proposed Personnel

The Bidder shall provide all the information requested below. Use one form for each position.

Position		
Personnel information	Name	Date of birth
	Professional qualifications	
Present employment	Name of employer	
	Address of employer	
	Telephone	Contact (manager/personnel officer)
	Fax	E-mail
	Job title	Years with present employer

Summarize professional experience in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company/Project/Position/Relevant Technical and Management Experience

Equipment

Form EQU: Equipment

The Bidder shall provide adequate information and details to demonstrate clearly that it has the capability to meet the equipment requirements indicated in Section 6 (Employer's Requirements) for all equipment proposed for use in phase 1-B, which is different from that utilized during Phase 1-A, JMRTS, if any, using the Forms below. A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder.

Item of Equipment		
Equipment Information	Name of manufacturer	Model and power rating
	Capacity	Year of manufacture
Current Status	Current location	
	Details of current commitments	
Source	Indicate source of the equipment	
	<input type="checkbox"/> Owned <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

Omit the following information for equipment owned by the Bidder.

Owner	Name of owner	
	Address of owner	
	Telephone	Contact name and title
	Fax	Telex
Agreements	Details of rental/lease/manufacture agreements specific to the project	

Proposed Subcontractors and/or Manufacturers for Major Items of Plant and Services

The following Subcontractors and/or Manufacturers are proposed for carrying out the item of the facilities indicated. Bidders are free to propose more than one for each item.

Major Items of Plant and Services	Proposed Subcontractors or Manufacturers	Nationality

Bidder's Qualification

To establish its qualifications to perform the contract in accordance with Section 3 (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding Information Sheets included hereunder.

Form ELI - 1: Bidder's Information Sheet

Bidder's Information	
Bidder's legal name	
In case of Joint Venture, legal name of each partner	
Bidder's country of constitution	
Bidder's year of constitution	
Bidder's legal address in country of constitution	
Bidder's authorized representative (name, address, telephone numbers, fax numbers, e-mail address)	
Attached are copies of the following documents:. <ul style="list-style-type: none"> <input type="checkbox"/> 1. In case of single entity, articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and ITB 4.2 <input type="checkbox"/> 2. Authorization to represent the firm or Joint Venture named above, in accordance with ITB 22.2 <input type="checkbox"/> 3. In case of Joint Venture, letter of intent to form Joint Venture or Joint Venture agreement, in accordance with ITB 4.1 <input type="checkbox"/> 4. In case of a government-owned enterprise, any additional documents not covered under 1 above required to comply with ITB 4.5 	

Form ELI - 2: Joint Venture Information Sheet

Each member of the Joint Venture must fill out this form separately. Subcontractor must fill out this form.

Subcontractors are those listed in Technical Proposal – Proposed Subcontractors and/or Manufacturers for Major Items of Plant and Services.

Joint Venture/Subcontractor Information	
Bidder's legal name	
Joint Venture Partner's or Subcontractor's legal name	
Joint Venture Partner's or Subcontractor's country of constitution	
Joint Venture Partner's or Subcontractor's year of constitution	
Joint Venture Partner's or Subcontractor's legal address in country of constitution	
Joint Venture Partner's or Subcontractor's authorized representative information (name, address, telephone numbers, fax numbers, e-mail address)	
<p>Attached are copies of the following documents:</p> <p><input type="checkbox"/> 1. Articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and ITB 4.2</p> <p><input type="checkbox"/> 2. Authorization to represent the firm named above, in accordance with ITB 22.2</p> <p><input type="checkbox"/> 3. In the case of government-owned enterprise, documents establishing legal and financial autonomy and compliance with commercial law, in accordance with ITB 4.5</p>	

Form LIT – 1: Pending Litigation and Arbitration

Each Bidder must fill out this form if so required under Criterion 2.2 of Section 3 (Evaluation and Qualification Criteria) to describe any pending litigation or arbitration formally commenced against it.

In case of joint ventures, each Joint Venture Partner must fill out this form separately, and provide the Joint Venture Partner name below:

Joint Venture Partner: _____

Pending Litigation and Arbitration			
<p>Choose one of the following:</p> <p><input type="checkbox"/> No pending litigation and arbitration.</p> <p><input type="checkbox"/> Below is a description of all pending litigation and arbitration against the Bidder (or each Joint Venture member if Bidder is a Joint Venture).</p>			
Year	Matter in Dispute	Value of Pending Claim in INR Equivalent	Value of Pending Claim as a Percentage of Net Worth

- Note -

This form shall only be included if Criterion 2.2 of Section 3 (Evaluation and Qualification Criteria) is applicable.

Form FIN - 1: Historical Financial Performance

Each Bidder must fill out this form.

In case of joint ventures, each Joint Venture Partner must fill out this form separately, and provide the Joint Venture Partner name below:

Joint Venture Partner: _____

Financial Data for Previous 3 Years [INR Equivalent]		
Year 1:	Year 2:	Year 3:

Information from Balance Sheet

Total Assets (TA)			
Total Liabilities (TL)			
Net Worth = TA-TL			
Current Assets (CA)			
Current Liabilities (CL)			
Working Capital = CA - CL			

Most Recent Working Capital		To be obtained for most recent year and carried forward to FIN-3 Line 1; in case of Joint Ventures, to the corresponding Joint Venture Partner's FIN-3
-----------------------------	--	--

Information from Income Statement

Total Revenues			
Profits Before Taxes			
Profits After Taxes			

- ☐ Attached are copies of financial statements (balance sheets including all related notes, and income statements) for the last 3 years, as indicated above, complying with the following conditions.
- Unless otherwise required by Section 3 of the Bidding Documents, all such documents reflect the financial situation of the legal entity or entities comprising the Bidder and not the Bidder's parent companies, subsidiaries or affiliates.
 - Historical financial statements must be audited by a certified accountant.
 - Historical financial statements must be complete, including all notes to the financial statements.
 - Historical financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).

Form FIN - 2: Average Annual Turnover

Each Bidder must fill out this form.

The information supplied should be the Annual Turnover of the Bidder or each member of a Joint Venture in terms of the amounts billed to clients for each year for work in progress or completed, converted to US dollars at the specified exchange rate.

In case of joint ventures, each Joint Venture Partner must fill out this form separately, and provide the Joint Venture Partner name below:

Joint Venture Partner: _____

Annual Turnover Data for the Last 3 Years			
Year	Amount Currency	Exchange Rate	INR Equivalent

Average Annual Turnover

Form FIN – 3: Availability of Financial Resources

Bidders must demonstrate sufficient financial resources, usually comprising of Working Capital supplemented by credit line statements or overdraft facilities and others to meet the Bidder's financial requirements for

- (a) its current contract commitments, and
- (b) the subject contract.

In case of joint ventures, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner name below:

Joint Venture Partner: _____

Financial Resources		
No.	Source of financing	Amount (INR equivalent)
1	Working Capital (to be taken from FIN-1)	
2	Credit Line ^a	
3	Other Financial Resources	
Total Available Financial Resources		

^a To be substantiated by a letter from the bank issuing the line of credit.

Form FIN- 4: Financial Requirements for Current Contract Commitments

Bidders (or each Joint Venture partner) should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

In case of joint ventures, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner name below:

Joint Venture Partner: _____

Current Contract Commitments						
No .	Name of Contract	Employer's Contact (Address, Tel, Fax)	Contract Completion Date	Outstanding Contract Value (X)	Remaining Contract Period in months (Y)	Monthly Financial Resources Requirement (X / Y)
1						
2						
3						
4						
Total Monthly Financial Requirement for Current Contract Commitments						INR

Form FIN - 5: Compliance Check of Financial Resources (Criterion 2.3.3 of Section 3)**Form FIN-5A: For Single Entities**

For Single Entities:	Total Available Financial Resources from FIN-3 (C)	Total Monthly Financial Requirement for Current Contract Commitments (CCC) from FIN-4 (D)	Available Financial Resources net of CCC (C-D)	≥	Requirement ^a
(Name of Bidder)				≥	100% of Requirement from Section 3 - 2.3.3(b)

Form FIN-5B: For Joint Ventures

For Joint Ventures:	Total Available Financial Resources from FIN-3 (C)	Total Monthly Financial Requirement for Current Contract Commitments (CCC) from FIN-4 (D)	Available Financial Resources net of CCC (C-D)	≥	Requirement ^a
One Partner:					
(Name of Partner)				≥	B(%) of Requirement
Each (Other) Partner:					
(Name of Partner 1)				≥	A(%) of Requirement
(Name of Partner 2)				≥	A(%) of Requirement
(Name of Partner 3)				≥	A(%) of Requirement
All partners combined			$\sum (C-D)^b =$	≥	100% of Requirement from Section 3 - 2.3.3(b)

- Note -

Form FIN – 5 is made available for use by the bidder as a self-assessment tool, and by the employer as evaluation work sheet, to determine compliance with financial resources.

^a Requirement for the subject contract is defined in Criterion 2.3.3(b) of Section 3. Value A is the required percentage of the subject contract, which each partner must meet; and value B is the

required percentage of the subject contract, which one partner must meet. A and B values are defined in Criterion 2.3.3 of Section 3 (Evaluation and Qualification Criteria).

- ^b $\Sigma (C - D)$ = *sum of available financial resources net of current contract commitments (CCC) for all partners.*

Form EXP – 1: Contracts of Similar Size and Nature

Not Applicable

Form EXP - 2: Experience in Key Activities

Not Applicable

Form EXP - 3: Subcontractors

Fill out one (1) form per contract.

Contract for the Major Items		
Contract No of	Contract Identification	
Award Date		Completion Date
Role in Contract	<input type="checkbox"/> Contractor <input type="checkbox"/> Management Contractor <input type="checkbox"/> Subcontractor	
Total Contract Amount	INR	
If partner in a Joint Venture or subcontractor, specify participation of total contract amount	Percent of Total	Amount
Employer's name Address Telephone number Fax number E-mail		
Description of the major items in accordance with Criterion 2.5 of Section 3		



Procurement of Works

JAIPUR METRO RAIL CORPORATION LIMITED

BIDDING DOCUMENT

for

Procurement on Direct Contract Mode

of

DC No.- JP/JS15 (Phase-1B)

**BID DOCUMENTS FOR DESIGN, MANUFACTURE, SUPPLY,
INSTALLATION TESTING & COMMISSIONING OF PUBLIC ADDRESS
SYSTEM, PASSENGER INFORMATION DISPLAY SYSTEM AND
MASTER CLOCK SYSTEM FOR JMRC PHASE 1B**

PART-I BIDDING PROCEDURES

Section 5 - Eligible Countries (ELC)

JAIPUR METRO RAIL CORPORATION LTD.

**Khanij Bhawan, Tilak Marg,
C- Scheme, Jaipur (Rajasthan) PIN-302005
Country: India**

Section 5 - Eligible Countries

- | | |
|---------------------------------|-------------------------------------|
| 1. Afghanistan | 35. Micronesia, Federated States of |
| 2. Armenia | 36. Mongolia |
| 3. Australia | 37. Myanmar |
| 4. Austria | 38. Nauru |
| 5. Azerbaijan | 39. Nepal |
| 6. Bangladesh | 40. The Netherlands |
| 7. Belgium | 41. New Zealand |
| 8. Bhutan | 42. Norway |
| 9. Brunei Darussalam | 43. Pakistan |
| 10. Cambodia | 44. Palau |
| 11. Canada | 45. Papua New Guinea |
| 12. China, People's Republic of | 46. Philippines |
| 13. Cook Islands | 47. Portugal |
| 14. Denmark | 48. Samoa |
| 15. Fiji | 49. Singapore |
| 16. Finland | 50. Solomon Islands |
| 17. France | 51. Spain |
| 18. Georgia | 52. Sri Lanka |
| 19. Germany | 53. Sweden |
| 20. Hong Kong, China | 54. Switzerland |
| 21. India | 55. Taipei, China |
| 22. Indonesia | 56. Tajikistan |
| 23. Ireland | 57. Thailand |
| 24. Italy | 58. Timor-Leste |
| 25. Japan | 59. Tonga |
| 26. Kazakhstan | 60. Turkey |
| 27. Kiribati | 61. Turkmenistan |
| 28. Korea, Republic of | 62. Tuvalu |
| 29. Kyrgyz Republic | 63. United Kingdom |
| 30. Lao PDR | 64. United States of America |
| 31. Luxembourg | 65. Uzbekistan |
| 32. Malaysia | 66. Vanuatu |
| 33. Maldives | 67. Viet Nam |
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Procurement of Works

JAIPUR METRO RAIL CORPORATION LIMITED

BIDDING DOCUMENT

for

Procurement on Direct Contract Mode

of

DC No.- JP/JS15 (Phase-1B)

**BID DOCUMENTS FOR DESIGN, MANUFACTURE, SUPPLY,
INSTALLATION TESTING & COMMISSIONING OF TELEPHONE
SYSTEM FOR JMRC PHASE 1B**

PART-II REQUIREMENTS

Section 6 – Employer's Requirements

Volume – I General Specification

JAIPUR METRO RAIL CORPORATION LTD.

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1. GENERAL SPECIFICATION OF PA/PIDS/MCK PHASE-1B

TABLE OF CONTENTS

CHAPTER 1.

1. GENERAL	1
1.1 Application of the General Specification (GS).....	1
1.1.4 Abbreviations	1
1.2 Definitions	3
1.3 Glossary of Terms	4
1.4 Submission for Review	4
1.5 Standards, Codes of Practice.....	5
1.6 Employer's Drawings	5
1.7 Specifications in Metric and Imperial Units	5
1.8 System Safety	5
1.9 Climatic Condition / Operating Environment.....	6
1.10 Survey and Site Investigations	8

CHAPTER 2.

2. PLANNING, PROGRAMME AND PROGRESS MONITORING	1
2.1 Planning.....	1
2.2 Programming General Requirements.....	1
2.3 Progress Monitoring.....	1
2.4 Works Programme.....	1
2.5 Design Submission Programme	3
2.6 Design, Procurement and Manufacturing Programme	4
2.7 Installation Programme.....	5
2.8 Program Review.....	6
2.9 Work Program Revisions	6
2.10 Monthly Progress Report.....	6

2.11	Key Date and Milestone Report.....	7
2.12	Progress Meetings.....	7
2.13	Quarterly Review Meetings.....	8

CHAPTER 3.

3. MANAGEMENT PLANS AND SUBMISSIONS	1
3.1 General	1
3.2 General Organisation	1
3.3 Project Management Plan	1
3.4 Systems Assurance Plans	4
3.5 Design, Procurement and Manufacturing Plan	7
3.6 Construction and Installation Management Plan	13
3.7 Completion Management Plan	15

CHAPTER 4.

4. DOCUMENTS SUBMISSION AND REVIEW	1
4.1 Documents, Submissions and Correspondence	1
4.2 Submissions to the Employer's Representative	1
4.3 Records and Reports	3
4.4 Records	5

CHAPTER 5.

5. QUALITY MANAGEMENT	1
5.1 Introduction.....	1
5.2 General Requirements	1
5.3 Management Quality Plan	2
5.4 Design Quality Plan	2
5.5 Manufacturing Quality Plan	2
5.6 Site Quality Plan	3
5.7 Inspection and Test Plans, Records and Reports.....	3
5.8 Review, Verification & Audit.....	4

5.9	Quality Control Register	4
5.10	Summaries of Inspection and/or Test	5
5.11	Notification of Non-conformities.....	5

CHAPTER 6.

6. SOFTWARE MANAGEMENT AND CONTROL	1
6.1 Prescriptive Framework.....	1
6.2 Software Framework	1
6.3 Software Management Control.....	1
6.4 Status Reporting.....	1
6.5 Auditing	1
6.6 Software Acceptance	1
6.7 Availability of Source Code and Development Tools	1
6.8 Re-Use of Existing Software.....	1
6.9 Application of “Commercial Off The Shelf” Software (COTS)	2
6.10 Millennium Bug	2
6.11 Test Software	2
6.12 Global Positioning System Week-counter Rollover.....	2

CHAPTER 7.

7. MATERIALS AND EQUIPMENT	1
7.1 Materials and Equipment Provided by the Employer	1
7.2 Materials	1
7.3 Equipment	2
7.4 Electronic Control Racks & Cabinets	3

CHAPTER 8.

8. PACKAGING, STORAGE, SHIPPING AND DELIVERY	1
8.1 Storage of Equipment	1
8.2 General Precautions.....	1
8.3 Packaging Procedures	1

8.4	Shipping	1
8.5	Delivery	2

CHAPTER 9.

9.	TESTING AND COMMISSIONING	1
9.1	General	1
9.2	Manufacturing Test Plan	1
9.3	Commissioning Plan	3
9.4	On-Site Testing and Commissioning Plan	4
9.5	Activity of the Employer and the Employer's Representative	8
9.6	Records and Reports	8
9.7	Test Equipment and Facilities	10
9.8	Witnessing by the Employer and the Employer's Representative	10
9.9	Failures	11
9.10	Repeat Tests	11
9.11	Fault Categories	12
9.12	Fault Log	12
9.13	Hardware Failure Reports	12
9.14	Software Failure Reports	12

CHAPTER 10.

10.	TRAINING	1
10.1	Training Requirements	1
10.2	Training Method	2
10.3	Employer's Instructor Training	2
10.4	Training Plant & Equipment	3
10.5	Testing and Assessment	3
10.6	Training Records	3
10.7	Not Used	3

CHAPTER 11.

11.	OPERATION AND MAINTENANCE DOCUMENTATION.....	1
11.1	General	1
11.2	Arrangement and Format of Manuals.....	1
11.3	Drawings.....	2
11.4	Submissions	2
11.5	Operation and Maintenance Manuals	3

CHAPTER 12.

12.	SUPERVISION AND PLANNING OF MAINTENANCE.....	1
12.1	Scope	1
12.2	Maintenance Planning & Management Staff	1
12.3	Supervisory Staff	1

CHAPTER 13.

13.	SUPPLY OF SPARE PARTS, SPECIAL TOOLS AND TEST EQUIPMENT	1
13.1	Details of supply	1
13.2	Manufacture and delivery of Spare Parts.....	1
13.3	Contract Spares	3
13.4	Commissioning Spares.....	3
13.5	Defects Liability Spares	3
13.6	Not Used	4
13.7	Coding and Tagging of Spare Parts and Special Tools and Test Equipment	4

CHAPTER 14.

14.	THE WORKS AND CARE OF THE WORKS	1
14.1	Methods of Construction	1
14.2	Temporary Works	1
14.3	Normal Working Hours	1

14.4	Drawings and Schedules	1
14.5	Notification and Inspection of Works	1
14.6	Construction Restraints	1
14.7	Protection from Water	2
14.8	Protection from Weather	2
14.9	Protection of Work.....	2

CHAPTER 15.

15.	SITE ESTABLISHMENT AND ATTENDANCE	1
15.1	Use of the Site.....	1
15.2	Survey of the Site	1
15.3	Fences and Signs on the Site.....	1
15.4	The Contractor's Site Accommodation	1
15.5	Site Utilities and Access	2
15.6	Not Used	2
15.7	Clearance of the Site	2
15.8	Attendance	2
15.9	Contractor's Equipment.....	3
15.10	Security	3

CHAPTER 16.

16.	LIAISON WITH OTHERS	1
16.1	Liaison with Others	1
16.2	Work by Other Contractors	1
16.3	Interface Management.....	1

CHAPTER 17.

17.	THE SITE.....	1
17.1	Access to Site	1
17.2	Site Restrictions	1
17.3	Site Services	2

17.4	Site Cleanliness	3
17.5	Engineering Conditions for Temporary Land Allocation	3
17.6	Attendance by Civil Works Project Contractor	3
17.7	Access to the Site by Other Contractors	3
17.8	Transportation to Site	4
17.9	Contractor's Own Rolling Stock	5
17.10	Defined Area Working and Works Train Operations	5
17.11	Work in Vicinity of Operating Tracks	6
17.12	Rodent Control	8

CHAPTER 18.

18.	HEALTH AND SAFETY	1
18.1	Health and Safety Philosophy	1
18.2	Health and Safety Management	1
18.3	Legislation, Codes of Practice, Standards, etc.	1
18.4	Breach of Health and Safety Obligations	1
18.5	Contractor's Health and Safety Documentation.....	2
18.6	Contractor's Safety Arrangements	3
18.7	Site Conditions	6

CHAPTER 19.

19.	DAMAGE AND INTERFERENCE	1
19.1	Damage and Interference.....	1
19.2	Watercourses and Drainage Systems	2
19.3	Utilities.....	2
19.4	Structures, Roads and Other Property.....	3
19.5	Access	3
19.6	Trees and Other Similar Obstructions.....	4

CHAPTER 20.

20.	ENVIRONMENTAL PROTECTION REQUIREMENTS	1
-----	---	---

20.1	GENERAL	1
20.2	NOISE.....	1

CHAPTER 21.

21.	NOT USED	1
-----	----------------	---

CHAPTER 22.

22.	TEMPORARY ELECTRICITY SUPPLY	1
22.2	Applicability	1
22.3	Work on Site	1
22.4	Electrical General	1
22.5	Materials, Appliances and Components	1
22.6	Design Considerations	2
22.7	Mains Voltage.....	2
22.8	Types of Distribution Supply.....	2
22.9	Protection of Circuits	2
22.10	Earthing.....	2
22.11	Plugs, Socket Outlets and Couplers	3
22.12	Cable	3
22.13	Lighting Installation.....	4
22.14	Electrical Motors	4
22.15	Inspection and Testing	4
22.16	Identification	4
22.17	Maintenance	4
22.18	Maintenance Record	4
22.19	Metering	5
22.20	Inability to Supply	5

APPENDIX 1.

1. MONTHLY PROGRESS REPORT	1
1.1 Topics	1
1.2 Details	2
1.3 Copies	2

APPENDIX 2.

2. CONTRACT SYSTEMS SAFETY MANAGEMENT	1
2.1 Safety Assurance Programme	1
2.2 Hazard Analysis	1
2.3 Results	2

APPENDIX 3.

3. SUBMISSION FOR REVIEW REQUEST FORM.....	1
---	----------

APPENDIX 4.

4. SCHEDULE OF ITEMS TO BE SUBMITTED BY CONTRACTOR	1
---	----------

APPENDIX 5.

5. TYPICAL TYPE TEST REQUIREMENTS	1
5.1 Electronic and Electrical Equipment	1
5.2 Mechanical Tests	1
5.3 Environmental Tests	2
5.4 Electrical Tests	2

APPENDIX 6.

6. REQUEST FOR INSPECTION OF WORKS FORM.....	1
---	----------

APPENDIX 7.

7. NOT USED	1
--------------------------	----------

APPENDIX 8.

8. FIRST AID REQUIREMENTS 1

8.1 Not Used..... 1

8.2 PROVISIONS BY THE CONTRACTOR..... 1

APPENDIX 9.

9. NOT USED 1

End of Table of Contents

Compliance to General Specifications

CHAPTER 1

1. GENERAL

1.1 Application of the General Specification (GS)

1.1.1 The provisions contained in the Particular Specification (PS) and the Employer's Drawings shall prevail over the provisions contained in this GS.

1.1.2 The provisions contained in the GS shall prevail over the provisions contained in International Standards, European Standards, British Standards, Indian Standards, British Standard Codes of Practice and similar standard documents stated in the Contract.

1.1.3 This GS shall be read in conjunction with the other documents constituting the Contract.

1.1.4 Abbreviations

Common abbreviations used in the GS and in the PSs shall have the following meanings:

ACB	: Air Circuit Breaker
AMC	: Annual Maintenance Contract
BCC	: Backup Control Centre
BS	: British Standard
CADD	: Computer Aided Design and Drafting
CAR	: Corrective Action Request
CNP	: Construction Noise Permits
COTS	: Commercial Off the Shelf
CPM	: Critical Path Method
CV	: Curriculum Vitae
DLP	: Defects Liability Period
JMRC	: Jaipur Metro Rail Corporation
DVT	: Design Verification Table
E&M	: Electrical & Mechanical
EMC	: Electromagnetic Compatibility
EMIP	: Environmental Mitigation Implementation Plan
EMP	: Environmental Management Plan
EMSD	: Electrical and Mechanical Services Department
EMU	: Electric Multiple Unit
EN	: Euro-Norm (European Standards)
EPD	: Environmental Protection Department
ETI	: Employer's Training Instructors

FAI	: First Article Inspection
FAT	: Factory Acceptance Test(s)
FMEACA	: Failure Mode Effect and Criticality Analysis
GCC	: General Conditions of Contract
GIF	: Graphic Information Format
GS	: General Specification (this document)
HV	: High Voltage
IEC	: International Electro-technical Commission
IEE	: The Institution of Electrical Engineers
IP	: Ingress Protection
IS	: Indian Standards
ISO	: International Standards Organisation
ITT	: Instructions To Tenderers
ITU	: International Telecommunications Union
LV	: Low Voltage
MC	: Metro Corridor
MCB	: Miniature Circuit Breaker
MMI	: Man-Machine Interface
MTR	: Mass Transit Railway
NSR	: Noise Sensitive Receivers
OCC	: Operations Control Centre
OCS	: Overhead Contact System (Rigid Conductor)
OSR	: Operational Safety Report
OSR(S)	: Operational Safety Report (Software)
OHE	: OverHead Equipment (Flexible Catenary)
P3	: Primavera Project Planner
PLC	: Programmable Logic Controller
PPE	: Personal Protective Equipment
PS	: Particular Specification
PVC	: Polyvinyl Chloride
QA	: Quality Assurance
RAMS	: Reliability, Availability, Maintainability and Safety
RC	: Rail Corridor
RTU	: Remote Terminal Unit
SAR	: Special Administrative Region
SAT	: Systems Acceptance Test(s)

SCC	: Special Conditions of Contract
SIL	: Safety Integrity Level
SQAP	: Software Quality Assurance Plan
SRR	: Submission Review Request
SWA	: Steel Wire Armoured
T/C	: Time Chainage
TRIP	: Track Related Installation Programme

Table 1-1 General Abbreviations

- 1.1.5 Further abbreviations may be defined within the body of the GS or PS where there is only local applicability. Where such abbreviations exist the Contractor shall exercise great care that the abbreviation is not used out of context when communicating with the Employer, the Employer's Representative or any Third Party.
- 1.1.6 Abbreviations of units of measurement used in the GS shall have the meanings as defined under the SI system of units.

1.2 Definitions

Words and phrases defined in the GCC or SCC shall retain the same meaning within the GS and PS unless specifically redefined within this GS or under the provisions of clause 1.1.1 above for the purpose of a particular clause or group of clauses.

- (1) "Access Dates" are dates that are to be achieved by other than the Contractor and which are considered to be essential to the successful completion of the Contract to the original planned schedule. A list of the activities completion of which are considered to give rise to an Access Date are included in the PS.
- (2) "Commissioning" means the process of setting to work the complete transportation system through a series of integrated tests that demonstrate the installation and performance in accordance with the specified criteria.
- (3) "Day" means calendar day unless expressly stated otherwise.
- (4) "Defined Area" means an area within which Works Trains will be operated and the Employer's defined area working safety rules will apply.
- (5) "Key Dates" are dates which are to be achieved by the Contractor and which are considered to be essential to the successful completion of the project to the original planned schedule. A list of the activities, completion of which gives rise to a Key Date, is included in the PS.
- (6) "Service Trial" means the phase after completion of the System Acceptance Tests where the training and operating procedures are validated through the running of the trains to the published timetable. Service Trial form part of the Tests on Completion to be performed under the Contract in order to achieve Employer's Taking Over of the Works or any Section.
- (7) "Quality Control Point" means a point in time when a notice or other document is to be submitted to the Employer's Representative in accordance with the Contract before the Contractor can commence, proceed with or terminate an activity

- (8) “Quality Hold Point” means a point in time when a notice of no objection by the Employer’s Representative is required.
- (9) “‘S’ curve” means the graphical relationship between the planned (and actual where appropriate) quantity of completed work (or resources) and time. The curve produced is to be illustrated on an accumulative basis where the slope of the line indicates the rate of undertaking the work or rate of expenditure of the resources.
- (10) “Specification (the)” means the aggregate sum of the documents and any amendments thereto, issued to Tenderers by DMRC as part of the Tender process before the final date for submission of Tenders. This shall include but not be limited to; Design Criteria, Employer’s Requirements, Employer’s Tender Drawings, Preliminary Operating Plan and Clarification of Tender Documents issued in accordance with the ITT but shall not include the ITT it self nor any minutes of meetings.
- (11) “Specification (this)” means the particular document within which the reference is made.
- (12) “Validation” means the process of confirmation by examination and provision of objective evidence that the application produced achieves the particular requirements specified.
- (13) “Verification” means the process of confirmation by examination and provision of objective evidence that the specified requirements have been incorporated within design.

1.3 Glossary of Terms

- 1.3.1 Words and expressions to which meanings are assigned in any paragraph of the GS shall have the same meanings in other paragraphs of the GS except when the context otherwise requires.
- 1.3.2 Utilities are electricity, lighting, traffic control, telephone and other communication cables, gas, water, sewage and drainage pipes and ducts, including all associated protection, supports, ancillary structures, fittings and equipment.

1.4 Submission for Review

- 1.4.1 Reference in the GS and PS to any submission made by the Contractor to the Employer’s Representative having been reviewed without objection by the Employer’s Representative shall mean the issue of a notice of no objection by the Employer’s Representative issued in response to a submission made by the Contractor. Documents, drawings, specifications, calculations, technical papers, material samples, methods of construction and any other matters which have been reviewed without objection by the Employer’s Representative shall not be changed without further submission for review to the Employer’s Representative of the proposed changes.
- 1.4.2 Clause 4.2 below prescribes the process to be adopted for submissions of documents, material samples and any other items to the Employer’s Representative. Schedules of items that are to be submitted to the Employer’s Representative for review are contained within this GS and/or the PS.
- 1.4.3 Submissions for review shall be made in accordance with the dates (relative to the Works Programme) stated in the GS and/or the PS, or in accordance with Appendix 4 of this Specification. For items not specifically given a submission date in the Specification submissions shall be strictly in accordance with the agreed Submissions Programme or as directed by the Employer’s Representative.

1.5 Standards, Codes of Practice

- 1.5.1 Unless otherwise stated in the Contract, reference in the GS to International Standards, European Standards, British Standards, British Standard Codes of Practice and similar standards shall be to that edition of the document stated in the PS, including all latest amendments issued by the relevant authority. In the event that no specific edition reference is given, the current edition as at the date of issue of the Letter of Acceptance shall apply.
- 1.5.2 Later editions of International Standards, European Standards, other national or international Standards or Codes of Practice and other similar standards, or standards which are considered to be equivalent, shall not apply unless reviewed without objection by the Employer's Representative. The Employer's Representative shall give or withhold his notice of no objection after the Contractor has provided him with a copy of the relevant standard for information. If a notice of no objection is given, the Contractor shall provide two copies of the document for use by the Employer's Representative.
- 1.5.3 Permanent Works, Temporary Works, Contractor's Equipment, hardware, firmware, software, apparatus of all kinds, and, where appropriate, materials and workmanship shall be in accordance with the Standards quoted in the Specification and the requirements identified in the PS or, where no Standard is identified, the Contractor shall make a proposal which shall be subject to review by the Employer's Representative.

1.6 Employer's Drawings

- 1.6.1 The Employer's Drawings assist in describing the scope of the Works in general and clarify constraints, interface arrangements and the conceptual nature of the finished structures/system outline.
- 1.6.2 The Contractor shall carefully check all Employer's Drawings and advise the Employer's Representative of discrepancies, omissions, errors or ambiguities should any be found.
- 1.6.3 The Contractor shall note that any drawings included but marked "For information only" do not form part of the Contract.
- 1.6.4 Dimensions shall not be obtained by scaling from the Employer's Drawings. Dimensions that are not shown or are not calculable from dimensions shown on Employer's Drawings shall be obtained from the Employer's Representative.

1.7 Specifications in Metric and Imperial Units

- 1.7.1 Specifications in imperial units shall not be substituted for specifications in metric units stated in the Contract without the prior consent of the Employer's Representative.
- 1.7.2 Conversion of metric units to imperial units and of imperial units to metric units shall be in accordance with the Standard International Practice.

1.8 System Safety

1.8.1 Safety philosophy

- 1.8.1.1 Safety of passengers, staff and the general public is paramount for railway operation. Prime consideration shall be given to all design issues that can have an effect on safety.
- 1.8.1.2 During the construction phase the safety of all staff involved in the Works and any members of the general public affected by the Works shall be the prime feature of all working methods, including storage and transport to site as well as all temporary works not incorporated into the final construction.

1.9 Climatic Condition / Operating Environment

1.9.1 General

1.9.1.1 The following information on climatic conditions in Jaipur shall be taken into account by the Contractor when designing any part of the Permanent Works. The Contractor shall ensure that due allowance is made for more severe local conditions when Permanent Works are required to operate, for example, with restricted ventilation that may lead to higher local ambient temperatures, and any other factors that may affect the operating environment in any way.

- (1) Unless specific figures are provided elsewhere, the Permanent Works will generally be required to function at its rated value with the values of ambient temperature and relative humidity appropriate to the location of the equipment within the classifications shown in Table 1-2. Certain parts of the Permanent Works may need to be rated for more or less onerous conditions as required by the PS.
- (2) Clause 1.11.2 below gives the different classifications of environment to be encountered. For any type of item, examples of which are installed in more than one environmental class, all examples of the type shall be suitable for installation in the most severe environmental class conditions encountered by any example of the type.
- (3) The Contractor's attention is drawn to the more severe environmental conditions that may exist during the construction period and shall take adequate measures to protect the Permanent Works against any deleterious effects of such conditions during the time between installation and final completion of the Project.
- (4) Air throughout the Project will contain considerable moisture content and the atmosphere will be corrosive. The Permanent Works shall be tropicalised and vermin proof.

1.9.2 Classification of Equipment Environment

The locations at which equipment may be installed have been divided into four environmental classes as shown in Table 1-2. The classes of environment are considered to become more extreme from A to D.

CLASS	LOCATION of EQUIPMENT
A	Air Conditioned Offices, Computer and Equipment Rooms
B	Ventilated Equipment Rooms in buildings at the surface or at the underground station or structures.
C	Train Tunnels
D	Outdoors

Table 1-2 Classes of Environment

The following are the minimum design requirements for equipment to be installed in each class of environment. Where any class does not have a value for a parameter the most extreme value quoted for the lesser class environments should be used.

1.9.3 Requirements for Class A

Minimum Temperature -	5°C
Ambient Temperature -	<u>25°C</u>
Maximum Temperature -	35°C
Relative Humidity -	Minimum 0%, Nominal 65%, Maximum 95% (Non Condensing)
Electrical Noise -	High Frequency to 1MHz, 1kV damped to 50% after 6 cycles. Radio Frequency field strength 10 V/m, UHF & VHF bands.

1.9.4 Requirements for Class B

Ambient Temperature -	30°C
Maximum Temperature -	45°C
Relative Humidity -	Nominal 70%, Maximum 100% (Non Condensing)
Air Quality -	Polluted and dusty - SO ₂ : 80-120mg/m ³ Suspended Particulate Matter: 360-540mg/ m ³
Electrical Noise -	Impulse 1kV, 1.2/50 rise/decay, 500Σ source impedance, 0.5 J source energy. Radio & High frequency as Class A.

1.9.5 Requirements for Class C

Ambient Temperature -	46°C
Maximum Temperature -	60°C
Electrical Noise -	Impulse 5kv, otherwise as Class B.

1.9.6 Requirements for Class D**1.9.6.1 Temperature**

All equipment shall be designed and tested in accordance with the given figured allowing a margin of at least 10% greater and 2°C less than the limits recorded. All designs for equipment shall work within the enclosures proposed with the specified environment outside the enclosure

1.9.7 Electromagnetic Compatibility (EMC)

For this, the following EMC classification in accordance to IEC 801 or similar, for the equipment rooms shall be achieved:

1.9.7.1 Electrostatic discharge

The electronic equipment rooms shall be designed in accordance to class 2 of IEC 801-2 or similar.

1.9.7.2 Electromagnetic fields

The electronic equipment rooms shall be designed in accordance to class 2 of IEC 801-3 or similar.

1.9.7.3 Fast transient interference (Burst)

The electronic equipment rooms shall be designed in accordance to class 2 of IEC 801-4 or similar.

1.9.7.4 High energy transient interference

The electronic equipment rooms shall be designed in accordance to class 2 of IEC 801-5 or similar.

1.9.7.5 Switching processes in high-voltage installations

The location of computer systems in the neighbourhood < 1m of high-voltage installations, such as medium voltage or transformer stations as well as direct parallel exposure of power and data cables should be avoided.

1.9.8 Magnetic fields

The following magnetic field strengths at the place of installation of cathode ray tube (CRT) based visual display units (VDU) should not be exceeded:

DC fields: 10 A/m or 12 μ T

AC fields: 1 A/m or 1,2 μ T

If the image quality is impaired by values exceeding the above the Contractor shall provide any necessary shielding or alternative corrective measures to restore the picture quality. Note flat screen VDU using LED technology or similar may be acceptable if a sufficiently high resolution and image size can be obtained.

1.10 Survey and Site Investigations

1.10.1 For reference to surveys external to the Contract, the Contractor shall refer all Levels to Mean Sea Level (MSL) Datum, which is that generally used throughout Jaipur.

1.10.2 The datum used for the Contract shall be Mean Sea Level Datum.

CHAPTER 2

2. PLANNING, PROGRAMME AND PROGRESS MONITORING

2.1 Planning

2.1.1 The Contractor shall develop in detail, a logical method of executing the Works taking into account their complex nature and different phases and shall provide programmes which reflect the detailed planning undertaken.

2.1.2 The programmes shall start with the Commencement Date of the Works as day one, are to be realistic, achievable and shall be accompanied by the detailed supporting Plans referred to in Chapter 3 below.

2.2 Programming General Requirements

2.2.1 Programme activities shall be discrete items of work, which when combined, produce definable elements, components, Milestones, Stages and Sections of the Works and clearly identify the completion obligations of the Contractor. Design programmes shall be organised by Design Stages and Plans as described in clause 3.5.1 below.

2.2.2 Key Dates and Milestones shall be an integral part of all programmes and all activities, and sequencing and interrelationships required to achieve each completion obligation shall be shown. Milestones shall not impose constraints that in any way affect the programme logic and float or limit the achievement of Key Dates. Milestones shall not be introduced into any programme as constrained dates.

2.2.3 The critical path shall be clearly identified in the programme and fully described in the accompanying programme narrative. Activity descriptions shall clearly convey the nature and scope of the Works. Programmes shall take into account the activities of precursor, concurrent, adjacent and follow on Project Contractors as well as utility service diversions, new utilities and connections and any other activity that may affect the progress of the Works.

2.2.4 The Contractor shall also incorporate the Employer's Representative's requirements for additional activities, to further explain or subdivide complex or long duration tasks, without affecting completion dates.

2.3 Progress Monitoring

The Contractor shall monitor its and its subcontractors' performance and against programmes to ensure its compliance with its obligations under the Contract. Monitoring of the Works shall include direct, daily monitoring of the progress of the Works and the preparation of written and computerised reports to be submitted to the Employer's Representative. The reports shall include all necessary supporting data to apprise the Employer's Representative of the status of the completion of the Works as described in clause 2.10 below.

2.4 Works Programme

The Works Programme to be submitted under the Contract shall be developed from the Outline Works Programme submitted and developed during the Tender period. Similarly the Design Submission Programme shall be developed from the Outline Design Submission Programme submitted and developed during the Tender period.

2.4.1 Submission Dates

- 2.4.1.1 Within 30 days of the Commencement Date of the Works, the Contractor shall submit for review by the Employer's Representative, his proposed initial version of the Works Programme which shall provide full programme details for the first six months of the Contract and shall provide outline details for the remaining period of the Contract.
- 2.4.1.2 Within 60 days of the Commencement Date of the Works, the Contractor shall submit for review by the Employer's Representative the proposed full version of the Works Programme.
- 2.4.1.3 Should the Contractor fail to submit the initial and full versions of the Works Programme within the timescales nominated above the Employer may nominate the Outline Works Programme as the first issue of the Works Programme required under the Contract.
- 2.4.1.4 In the event that the Employer does nominate the Outline Works Programme as the first issue of the Works Programme under the Contract the Employer's Representative may include any amendments that he sees fit to change external constraining dates, duration of activities by parties other than the Contractor and subdivide the Contractor's own activities to provide additional detail and links to other activities but without altering the duration or sequencing of the activities shown on the Outline Works Programme.
- 2.4.1.5 Any either initial or final Works Programme resulting from a nomination by the Employer of the Outline Works Programme as amended shall be taken by the Contractor as his own work and any responsibility for further maintenance of the Works Programme as nominated shall remain the Contractor's.
- 2.4.2 Content**
- 2.4.2.1 The Works Programme shall demonstrate by reference to its Sub-Programmes, Supplementary Programmes and associated Management Plans, the sequence and duration of activities and any restraints thereto, that the Contractor shall adopt to achieve Key Dates and to fulfil all Contract obligations. The Works Programme shall become the Employer's Representative's basis of administration of the time-related aspects of the Contract.
- 2.4.2.2 The Contractor shall provide the Employer's Representative with substantiation for each constraint whether target start, target finish or mandatory constraint entered by the Contractor into the Works Programme. The number of constraints shall be kept to an absolute minimum.
- 2.4.2.3 The Works Programme shall include activities for all the phases and stages of the Works, clearly showing all logical interdependencies and stages in the development of the Contractor's design, procurement, installation, commissioning and setting to work. As a minimum, it shall include:
- (1) all work comprising the Permanent Works;
 - (2) preparation, submission and review of Design Documents showing all items where review by the Employer's Representative is required;
 - (3) not used
 - (4) procurement of all major materials and items of Contractor's Equipment for the Works, including the dates orders are to be placed, manufacture period and the expected delivery date to the Site for each item;
 - (5) any software development requirements and Validation time frames;
 - (6) all manufacture or prefabrication of materials or components;
 - (7) all design and installation of major Temporary Works;
 - (8) all activities associated with the securing of necessary permits and other statutory approvals for the Works;
 - (9) access and availability dates for all Project Contractors;
 - (10) all interfaces related to the Project that may affect the progress of the Works;
 - (11) testing and commissioning activities which demonstrate an understanding of the interfaces and requirements of Chapter 9 below; and

(12) Training.

2.4.2.4 The Works Programme shall be divided into Sub-Programmes of manageable sizes addressing in more specific detail, the content of the Management Plans as stated in Chapter 3 below. The Sub-Programmes shall be as follows:

- (1) Design Submission Programme;
- (2) Design, Procurement and Manufacturing Programme;
- (3) Installation Programme;
- (4) Testing and Commissioning Programme: and
- (5) Not Used

2.4.2.5 The submission of the full version of the Works Programme shall include the Design, Procurement and Manufacturing Programme and a preliminary version of the Installation Programme and the Testing and Commissioning Programme identifying all major installation, testing activities and associated interfaces.

2.4.2.6 The Sub-Programmes shall be further substantiated by the supplementary programmes, as required by the Employer's Representative.

2.4.2.7 The Contractor's Works Programme shall comply with the following:

- (1) all programmes submitted in both hard copy and electronic data format;
- (2) all programmes, shall be prepared using the latest version of CPM scheduling software Primavera Project Planner or similar;
- (3) Not Used;
- (4) a standard Gregorian calendar shall be used for planning and execution of the Works. All programme submissions shall include details of the Contractor's allowance for Public Holidays and non-work periods. If a Key Date or Milestone falls on a Public Holiday or non-work day, it shall be effective the next working day;
- (5) the planning unit for the duration of all programme activities shall be the day. Any activity having a duration of more than thirty (30) days shall be divided into sub-activities that shall not exceed (30) days;
- (6) CPM programmes shall reflect status using remaining duration and percent complete;
- (7) all programmes shall be fully resource loaded as appropriate or required by the Employer's Representative covering all stages and aspects of the Contract and shall include, but not be limited to:
 - (a) major manpower for both design and installation ;
 - (b) number of items of Contractor's Equipment ;
 - (c) number of drawings and other design deliverables ;
 - (d) principle quantities of components or parts ;
 - (e) principle quantities of bulk materials inclusive of cabling, pipe, ductwork and equipment items, etc.

2.4.2.8 All programmes constituting the Works Programme shall be organised in a logical work breakdown structure including work stages or phases. Each activity shall be coded to indicate, as a minimum, the work group or entity responsible for the activity, the area, facility or location and the Cost Centre in which the activity is included, from information provided in the Pricing Document. Key Dates and Milestones shall be coded so as to be separately identifiable. The Contractor may be required to assign additional activity codes as required by the Employer's Representative.

2.5 Design Submission Programme

2.5.1 The Contractor shall, within 30 days of the Commencement Date of the Works, submit a Design Submission Programme covering all proposed submissions to the Employer's Representative. The Design Submission Programme shall be broken down into a submission programme for each of the Management Plans defined in clause 3.5.2 below each of which shall define the dates for individual submissions and these shall conform to the baseline dates shown in the Works Programme.

- 2.5.2 The Submissions Programme shall include the requirements of the Design Submissions as described in clause 3.5.1 below, including the procurement activities of all sub-contractors and suppliers.
- 2.5.3 The Submissions Programme shall include each submission for every item listed in the Specification as being required to be submitted.
- 2.5.4 The Submissions Programme shall ensure that all submissions are properly co-ordinated with the Contractor's overall Works Programme, particularly in respect of the following:-
- (i) progress of design, manufacture, installation and testing work;
 - (ii) co-ordination with other Contractors; and
 - (iii) including due allowance for the Employer's Representative's review process to be undertaken, including the time needed for any re-submissions.
- 2.5.5 The Design Submission Programme shall specifically include a milestone for the submission by the Contractor of the Final Design on completion of the Preliminary Design stage referred to in clause 3.5.1.1 below. The Final Design shall include at least but not limited to; details showing all of the proposed equipment, interconnections, physical layout, installation locations and interfaces to other suppliers.
- 2.6 Design, Procurement and Manufacturing Programme**
- 2.6.1 Within 60 days of the Commencement Date of the Works, the Contractor shall submit for review by the Employer's Representative a Design, Procurement and Manufacturing Programme that shall be an integrated part of the overall Works Programme.
- 2.6.2 The Design, Procurement and Manufacturing Programme shall show the interdependencies between engineering disciplines as well as between the Contractor and its sub-contractors and suppliers. This programme shall demonstrate compliance with the requirements of the Submissions Programme in clause 2.5 below.
- 2.6.3 The Contractor shall submit a weighted bar chart of the Contractor's design, procurement and manufacturing activities. Each activity weight shall normally not be more than 5% of the total man-hour content or value of the respective work.
- 2.6.4 The Design, Procurement and Manufacturing Programme shall include a separate breakdown, supported by the Material Control Schedule, which shall be a complete amplification of the Contractor's programme and equipment list, including those items which are subject to long lead time or component parts which are manufactured from countries outside the country of assembly and testing.
- 2.6.5 The Material Control Schedule shall be automated, and shall detail the following information for each permanent major and minor material and significant component. The format of such a schedule shall include:
- (1) name, description, supplier/sub-supplier details;
 - (2) drawing information (where appropriate), title, drawing status, submission dates, shop drawings/ fabrication drawing preparation, etc.;
 - (3) the manufacturing process, manufacturing of test pieces, trial production, Employer's Representative's inspection, monthly production of components and monthly supply of components;

- (4) the assembly process, erection and assembly sequences (particularly for the first pieces) prior to shipment, test assemblies, monthly assembly requirement, Employer's Representative's inspection, testing of assemblies; and
- (5) transportation process, quality release from factory, factory storage, transport to dock, shipment.

2.6.6 The Contractor shall continuously maintain this schedule and report upon the status of each item as part of the Contractor's regular progress reporting.

2.6.7 From this base data, the Contractor shall prepare an exception report detailing all components that are in delay. This report shall be annotated with the reason for the delay and indicate what action the Contractor is taking to recover the lost time.

2.6.8 The Contractor shall submit, as part of the Design, Procurement and Manufacturing Programme, a Factory Testing Programme that shall support all aspects of the Factory Testing Plan. This Programme shall clearly demonstrate the logic and include the topics listed in clause 3.5.3 below.

2.6.9 The Factory Testing Programme shall be fully detailed, with activities individually identifying all tests for which a certificate will be issued, and shall include activities for preparation, submittal and review of the test procedures.

2.6.10 The Factory Testing Programme shall demonstrate the logical dependencies between the individual tests of the Works, and shall also show the interfaces and dependencies with the Contractor's delivery programme.

2.6.11 The Factory Testing Programme shall include details of inspection, testing and witnessing of the Contractor's and subcontractor's procurement and manufacturing activities. As a minimum, it shall include:

- (1) First Article Inspection;
- (2) Quality Hold Points;
- (3) Quality Control Points;
- (4) Type Tests; and
- (5) Routine tests.

2.7 Installation Programme

2.7.1 The Installation Programme shall be submitted as stated in the PS or as directed by the Employer's Representative. The Installation Programme shall comply with the requirements of clause 2.4.2.7 above.

2.7.2 The Installation Programme shall indicate the physical areas to which the Contractor requires access, access date, duration required and the required degree of completion for civil or architectural finishes prior to the access date.

2.7.3 The Installation Programme shall take into account the requirements for arrival at port, delivery, storage, preservation and positioning of large items of Contractor's Equipment and Permanent Works and shall set out the Contractor's proposed delivery route for such items to the Site.

2.7.4 Installation Tests shall be clearly shown in the Installation Programme and shall include those interface tests required to be carried out by others to establish a timetable for these tests.

2.7.5 Activities that may be expedited by the use of overtime, additional shifts or by any other means shall be identified and explained.

2.7.6 In preparing the Installation Programme, the Contractor should note that the following conditions shall apply:

- (1) the Contractor shall not have exclusive access to any part of the Site except by the specific consent of the Employer's Representative;
- (2) the Contractor shall take note that concurrent time allocations for certain areas may be given to more than one contractor. The Contractor shall co-ordinate the Contractor's work in such areas with that of Project Contractors through the Employer's Representative;
- (3) the absence of a programme date or installation period for the Contractor in a specific area shall not prejudice the right of the Employer's Representative to establish a reasonable programme date or installation period for that area;
- (4) the Contractor shall comply with the identified Key Dates. The Contractor shall also comply with the Milestone dates identified in the Schedule of Milestones; and
- (5) the Contractor shall deliver all Contractor's Equipment and Permanent Works for stations and ventilation shafts by road and via temporary access openings unless otherwise reviewed by the Employer's Representative.

2.7.7 The Testing and Commissioning Programme shall be submitted as stated in the PS or as directed by the Employer's Representative and shall comply with the requirements of clause 2.4.2.7 above.

The Contractor shall submit the Testing and Commissioning Programme that shall fulfil all the on-Site testing and commissioning requirements.

2.8 Programme Review

2.8.1 The Employer's Representative shall, within 28 days of receipt of the initial submission of any programme for review, either give a notice of no objection or provide specific details as to why a notice of no objection is not given. If the Contractor is advised that the programme is not given a notice of no objection, the Contractor shall amend the programme taking into account the Employer's Representative's comments and/or requirements and resubmit the programme within 14 days.

2.8.2 In the case of further re-submittals, the resubmission time shall also be 14 days.

2.9 Works Programme Revisions

2.9.1 The Contractor shall immediately notify the Employer's Representative in writing of the need for any change in the Works Programme, whether due to a change of intention or circumstances or for any other reason. Where such a proposed change affects the timely completion of the Works or any Section or Stage; the Contractor shall within 14 days of the date of notifying the Employer's Representative submit for the Employer's Representative's review his proposed revised Works Programme and accompanying Programme Analysis Report. The proposed revised Works Programme shall show the sequence of operations of any and all work related to the change and the impact of changed work or changed conditions on the Works and Project Contractors and their works.

2.9.2 If at any time the Employer's Representative considers the actual or anticipated progress of the work reflects a significant deviation from the Works Programme, he may request the Contractor to submit a proposed revised Works Programme. Upon receipt of such a request the Contractor shall submit within 14 days a revised Works Programme, together with an accompanying Programme Analysis Report and Narrative Statement, that shall demonstrate the means by which the Contractor intends to eliminate the deviation.

2.10 Monthly Progress Report

- 2.10.1 The Contractor shall prepare Monthly Progress Reports covering all aspects of the execution of the Works. Such Monthly Progress Reports shall be in writing and shall be delivered to the Employer's Representative by the 5th day of the month following the month of the Monthly Progress Report. The Monthly Progress Report shall take account of work performed up to and including the last day of the month to which the Monthly Progress Report relates.
- 2.10.2 The Monthly Progress Report shall include an executive summary and contain clear and concise statements in respect of every significant aspect of the Works including, without limitation, the requirements specified in this Specification.
- 2.10.3 The Monthly Progress Report shall contain evidence that documents and supports the progress of the Works, as stated in the Interim Payment Certificates, to the satisfaction of the Employer's Representative.
- 2.10.4 The reports, documents and data provided shall be an accurate representation of the current status of the Works and of the work to be accomplished and shall provide the Employer's Representative with a sound basis for identifying problems and deviations from planned work and for making decisions.

2.11 Key Date and Milestone Report

- 2.11.1 The Key Date and Milestone Report shall be prepared in a format reviewed by the Employer's Representative and identify and state the status of :-
- (1) all Key Dates and Milestones that were planned to be achieved in the reporting period or earlier but have not been achieved;
 - (2) all Key Dates and Milestones that have been achieved in the reporting period;
 - (3) all Key Dates and Milestones that are planned to be achieved in the next reporting period; and
 - (4) any future Key Dates and Milestones that appear unlikely to be achieved on time.
- 2.11.2 The Key Date and Milestone Report shall identify, for all relevant Key Dates and Milestones, the planned dates, the actual dates achieved, and where the original planned dates are forecast to be unachieved, the revised dates identified in the Contract, as the same may be revised from time to time in accordance with the Contract.
- 2.11.3 The Key Date and Milestone Report shall also provide an explanation for any deviation from the planned dates. Measures taken or required to recover programme delays shall also be identified.

2.12 Progress Meetings

- 2.12.1 The Employer will chair progress meetings every month with the Contractor. These meetings will be held at dates and times to be advised by the Employer's Representative. Progress meetings shall not be later than 10 days after the issue of the Contractor's Monthly Progress Report.
- 2.12.2 The Employer's Representative may convene at his discretion, at any time upon reasonable notice to the Contractor, any meeting, either on or off the Site, to discuss and address any aspect of the Works or the Contract. The Contractor shall attend any such meetings convened by the Employer's Representative.

- 2.12.3 All meetings shall be convened in Jaipur unless directed otherwise by the Employer's Representative. Meetings shall be attended by senior personnel from the Contractor who shall arrive properly briefed for all aspects of the meeting and shall be empowered to make executive decisions in respect of the execution of the Works.

2.13 Quarterly Review Meetings

- 2.13.1 The Employer's Representative may convene Quarterly Review Meetings in Jaipur at approximately three monthly intervals. The Employer's Representative will notify the Contractor the date of such Quarterly Review Meetings
- 2.13.2 Quarterly Review Meetings shall be held over a period of up to 3 days in order to review the overall progress of the Works in the context of the Project as a whole and to address and resolve any issues relevant to the execution and progress of the Works. Such Quarterly Review Meetings will be chaired by the Senior Director, Capital Projects of the Employer or his delegate. The Contractor shall have in attendance one senior representative of Director Level from each of the companies comprising the Contractor (together with the Managing Director of the company acting as leader or sponsor of the Contractor if it is a joint venture, consortium or partnership whenever necessary and required by the Employer's Representative).
- 2.13.3 The Contractor shall submit names of the persons whom the Contractor proposes to attend each Quarterly Review Meeting to the Employer's Representative for review not less than 7 days prior to each Quarterly Review Meeting.

CHAPTER 3

3. MANAGEMENT PLANS AND SUBMISSIONS

3.1.1 General

3.1.2 In order to organise the various submissions required by the Employer's Representative, and to ensure the Contractor understands and compliance with the requirements of the Contract, a series of Management Plans shall be developed. These Management Plans will serve to structure the submittals in a manner that the Contractor can develop and prepare the submittals and the Employer's Representative can review and comment on a prescribed programme.

3.1.3 The Management Plans shall be configured as a family of "stand-alone" plans and associated documents each covering one of the subjects listed below.

The plans and documents shall be co-ordinated with each other and shall collectively define, describe and encompass the Contractor's proposed methods, procedures, processes, organisation, sequencing of activities, etc. and shall show how these combine together to assure that the Works truly meet the requirements of the Specification in respect of the subjects listed.

3.2 General Organisation

3.2.1 The Plans listed below shall be developed and submitted by the Contractor for the Employer's Representative's review:

Project Management Plan

- Contractor's Project Plan
- Interface Management Plan

Systems Assurance Plans

- Quality Plans- Safety Plans
- Electromagnetic Compatibility Management Plan(if required)
- Software Quality Assurance Plan

Design, Procurement and Manufacturing Plan

- Design Plan
- Design Verification and Validation Plan
- Factory Testing Plan
- Procurement, Manufacturing and Delivery Plan

Construction and Installation Management Plan

- Construction and Installation Plan
- Health and Safety Documentation
- Environmental Qualities Management Plan
- Environmental Mitigation Implementation Schedule
- Traffic Management Submission (if required)

Completion Management Plan

- Commissioning Plan
- Operation and Maintenance Manuals Plan (if required)
- Training Plan (if required)
- Spares Management Plan
- Defects Liability Management Plan

3.3 Project Management Plan

The overall management of the Works shall be the Contractor's responsibility. The organisation of the resources for the design, procurement, manufacture, delivery, installation, testing and commissioning, and setting to work is to be developed into a Project Management Plan. Each section of this plan shall fully describe the Contractor's understanding of the Works and management skills and structure required to achieve the same.

3.3.1 Contractor's Project Plan

3.3.1.1 The Contractor's Project Plan shall provide a clear overview of the Contractor's organisation, management systems and methods to be used for the complete execution of the Works.

3.3.1.2 The Contractor's Project Plan shall include a summary description of each and every stage of implementation of the Works, clearly showing the principal organisational interfaces both within the Contractor's own organisation (including sub-contractors of every tier) and with Other Contractors and Relevant Authorities, defining how each of these interfaces is to be managed and controlled. An organisation chart shall be produced to illustrate the subdivision of the work into elements for effective technical and managerial control, the reporting structure and the interface relationship among all parties involved. Names, addresses, telephone and fax numbers of all principal contacts shall be listed.

3.3.1.3 The Contractor's Project Plan shall contain structured organisation charts showing the hierarchical relationship of the Contractor's organisation (including sub-contractors of every tier). The organisation charts shall be produced as a "family" such that the basic chart shows the overall organisation structure supported by subsidiary charts detailing the internal structure of the various departments or sections of the overall organisation.

3.3.1.4 The Contractor's Project Plan shall include full details of the qualifications, experience, authority and responsibility of the personnel assigned to all key positions of the Contractor's organisation (including sub-contractors of every tier). As a minimum, this shall include all levels down to senior managers and shall include the personnel responsible for each individual department and functional group. A clear reference shall be given as to the location of staff (e.g. Site resident or factory based, etc.). Names, addresses, telephone and fax numbers of all principal contacts shall be listed.

3.3.1.5 The Contractor's Project Plan shall define the Contractor's management structure for the execution of the Works and for the control of the quality of the Works and shall, without limitation, identify and set out:

- (1) the procedure for audit;
- (2) the procedures for the control of receipt and issue of all Works related correspondence so as to ensure traceability;
- (3) the procedures for filing system to be implemented to maintain the Contractor's records during the course of the work. The filing systems used by the Contractor and sub-contractors of any tier shall be compatible as far as is necessary;
- (4) the procedures for the identification, production, verification, internal approval, review (when required) by the Employer's Representative, distribution, implementation and recording of changes to all drawings, reports and specifications;
- (5) the procedures for the evaluation, selection, engagement and monitoring of sub-contractors / suppliers together with the

- means of application of quality assurance to their work including audit and acceptance;
- (6) the procedure for the regular review and revision of each type of quality plan and its supplemental individual specific quality plans to ensure their continuing suitability and effectiveness, in addition to the method to be used for revision and issue of revised documentation;
 - (7) the procedures for the control, calibration and maintenance of inspection, testing and measuring equipment;
 - (8) the procedures for the selection, indexing, disposition and maintenance of project records for storage in the archives. A list of items to be archived including their periods of retention shall be submitted for review by the Employer's Representative;
 - (9) the procedures for identifying training needs and for the provision of training of all personnel performing activities affecting quality; and
 - (10) the procedures for the control of non-conformity.

3.3.1.6 Particulars of Contractor's Manager/Agent

- (1) The Contractor shall give and provide all necessary supervision during the execution of the Works as long as the Employer's Representative considers necessary for the proper fulfilment of the Contractor's obligations under the Contract.
- (2) The Contractor shall ensure that he is at all times represented on the Site by a competent and authorised English/Hindi speaking agent who shall be deemed to have been reviewed without objection by the Employer's Representative provided such agent is not expressly objected to by the Employer's Representative in writing within 14 days from the service of a notice upon the Employer's Representative by the Contractor of the appointment of such agent. Such agent shall be constantly on the Site and shall give his full time to the superintendence of the Works.
- (3) The Employer's Representative shall have the authority to withdraw his notice of no objection to the agent at any time. If such notice of no objection is withdrawn the Contractor shall remove the agent from the Site forthwith and shall not thereafter employ him again on the Site in any capacity and shall forthwith replace him by another competent English/Hindi speaking agent reviewed without objection by the Employer's Representative.
- (4) Such authorised agent shall receive on behalf of the Contractor directions and instructions from the Employer's Representative.
- (5) The following particulars of the proposed agent shall be submitted to the Employer's Representative for review:-
 - (i) name;
 - (ii) copy of Identity Card;
 - (iii) details of qualifications, including copies of certificates; and
 - (iv) details of previous experience.
- (6) The particulars of the agent shall be submitted 30 days before the agreed scheduled start of that part of the Works. Except in the case of a replacement agent (as provided for in clause 3.3.1.6 (3) above), in which case the said particulars shall be submitted forthwith.
- (7) The agent shall possess relevant academic or professional qualification and have at least 10 years experience in relevant engineering works. The Employer's Representative reserves the right to call upon the Contractor to prove such qualifications/experience to the satisfaction of the Employer's Representative.

3.3.1.7 Interface Management Plan

- a) The Contractor shall interface and liaise with other Contractors in accordance with the requirements of clause 16.3 below.
- b) Within 60 days of notification from the Employer's Representative of the identity of each Other Contractor, the Contractor shall develop and submit to the Employer's Representative an Interface Management Plan that is mutually acceptable to both the Contractor and the other Contractors. The Interface Management Plan shall:
 - (1) identify the sub-systems as well as the civil works and facilities with interfacing requirements;
 - (2) define the authority and responsibility of the Contractor's and other Contractors' (and any relevant sub-contractors') staff involved in interface management and development;
 - (3) identify the information to be exchanged, together with the management and technical skills required for the associated development work, at each phase of the Contractor's and other Contractors' (and any relevant sub-contractors') project life-cycles;
 - (4) include considerations of the Interface Hazard Analysis;
 - (5) specify the configuration and version control procedures in accordance with the Contractor's and other Contractors' (and any relevant sub-contractors') quality management system; and
 - (6) address the design, supply, installation, testing and commissioning programme of the contracts to meet the key dates of each contract, and highlight any programme risks requiring management attention.
- c) Once the Interface Management Plan has been reviewed without objection by the Employer's Representative, the Contractor shall execute the Works in accordance with the Interface Management Plan. The Contractor shall advise the Employer's Representative immediately of any difficulty in developing a mutually acceptable Interface Management Plan.
- d) Within 60 days of notification from the Employer's Representative of the identity of each Other Contractor, the Contractor shall develop and submit to the Employer's Representative for review a Detailed Interface Document for each Other Contractor that is mutually acceptable to both contractors. The Detailed Interface Document shall address in detail how the dates identified in the Interface Management Plan shall be achieved and shall identify the data required by the interfacing other Contractors to meet the requirements of the PS.
- e) The Detailed Interface Document shall specify the proposed method and schedule for verifying the interface integrity, the individual equipment/system performance and the combined system performance. The Detailed Interface Document shall include a programme of tests to demonstrate the performance and integrity of the integrated systems. The Interface Specification appended to the PS shall form the basis of the Detailed Interface Document, but does not relieve the Contractor's obligation to identify any new interface to meet the Contract requirements. Any revision to the Detailed Interface Document shall be mutually acceptable by contractors and submitted to the Employer's Representative for review.

3.4 Systems Assurance Plans

- 3.4.1 The Systems Assurance Plans shall be submitted for review to the Employer's Representative in Preliminary and Final forms.
- 3.4.2 The various plans shall be co-ordinated with each other and shall collectively define, describe and encompass the Contractor's proposed methods, procedures, processes, organisation, sequencing of activities, etc. and shall show how these combine together to assure that the Works truly meet the requirements of the Specification in respect of the subjects listed.

3.4.3 Not Used.

3.4.3.1 Quality Plans

The Contractor shall submit for review by the Employer's Representative quality plans in accordance with the requirements of clause 5.2 below.

3.4.4 Safety Plans

3.4.4.1 Site Safety Plan

3.4.4.1.1 The Contractor shall prepare a Site Safety Plan incorporating the requirements of the Project Safety Manual and designed specifically for the various sites (including storage and overseas sites) on which work under the Contract is carried out.

3.4.4.1.2 The Site Safety Plan shall form a part of the Health and Safety Documentation referred to in Chapter 18 below.

3.4.5 RAMS Plan

3.4.5.1.1 The Contractor shall implement a formal Reliability Plan and a formal Maintainability Plan in accordance with the PS.

3.4.5.1.2 The Contractor's Reliability Plan and Maintainability Plan shall include Failure Modes, Effects and Criticality Analysis and the production of a Reliability Critical Items List.

- a) The Contractor shall submit for review by the Employer's Representative the Contractor's Systems Safety Plan. The System Safety plan shall address all the factors referenced in Appendix 2 of this Specification and as required by the PS.
- b) The Contractor shall submit for review by the Employer's Representative the Contractor's Reliability Plan and Maintainability Plan in accordance with the requirements of clause 1.9 above.

3.4.6 Electromagnetic Compatibility Management Plan

- a. The Contractor shall prepare and submit for review by the Employer's Representative an EMC Management Plan which shall, based upon a top-down approach, define the EMC philosophy, activities, means of control for the design processes and EMC submissions to be supplied to demonstrate compliance with the PS and GS.
- b. The EMC Management Plan shall identify a comprehensive list of specifications, standards, method statements and procedures to be submitted to the Employer's Representative for review. The EMC Management Plan shall also include a programme that shall identify the dates for EMC submissions.
- c. The EMC Management Plan shall include an initial list of design documentation, test specifications and test reports with a single paragraph description of each document to indicate compliance with the Specification.
- d. The EMC Management Plan shall include a definition and description of the process and methods used for Verification and Validation that the Works will achieve the required EMC parameters in all respects.
- e. The Contractor shall co-ordinate the levels of interference emissions and

susceptibility of all equipment which are to be designed, manufactured, supplied and installed by the Contractor and its sub-contractors and suppliers. The Contractor shall designate a person as point of contact to deal with EMC matters. Details of the nominated person and any subsequent change of the nominated person shall be subject to review by the Employer's Representative.

- f. The Contractor shall liaise and co-ordinate with all Other Contractors in the exchange of EMC data and related equipment performance characteristics and advises the Employer's Representative when any such information is requested from any Other Contractor. A copy of all EMC related information exchange shall be sent to the Employer's Representative for review.
- g. The Contractor shall comply with the following EMC requirements:
 - (i) The Contractor shall ensure that all electrical and electronic apparatus is designed and constructed to operate without degradation of quality, performance or loss of function in the electromagnetic environment of the Project.
 - (ii) EMC considerations shall be incorporated in the Contractor's procedures for product safety and design Verification.
 - (iii) Detailed requirements in respect of electromagnetic compatibility characteristics are contained in the PS.
 - (iv) The design shall ensure that any electromagnetic interference emissions introduced into the environment do not exceed those detailed in the PS and GS. The Contractor shall ensure that the specified electromagnetic compatibility (EMC) requirements are adequate. Any shortcomings shall be made known to the Employer's Representative immediately and recommendations for corrective action formulated.
 - (v) In respect of the design documentation, the Contractor shall demonstrate by theoretical analysis that the design of the electrical and electronic systems is fully compliant with the EMC requirements identified. The Contractor shall state clearly in the documentation all the assumptions made and parameters used in the analysis.
 - (vi) The Contractor shall detail the methodology, verify and validate any simulation models used in support of the analysis. The Contractor shall prepare and submit to the Employer's Representative for review reports of the Verification and Validation of the models.
 - (vii) Not Used
 - (viii) Not Used
 - (ix) The Contractor shall supply documentation showing how system safety and reliability is ensured. It shall include Failure Modes, system failures, the effect of human intervention and how equipment thresholds have been set in order to keep them above worst case interference levels, and how equipment tolerances and other characteristics in the Specification have been allowed for in designing the system.
 - (x) The Employer's Representative may conduct an independent EMC audit for both the system and its component parts and shall therefore require access to all the relevant design and production information. The

Contractor shall supply sufficient documentation and analysis in a form reviewed by the Employer's Representative.

- (xi) Not Used
- (xii) The Employer's Representative may request at his discretion, attendance at the manufacturing factory prior to delivery to assist in providing confidence that the EMC requirements will be met. However, this will not give design acceptance that can only be given after successful completion of the System Acceptance Tests.
- (xiii) Not Used
- (xiv) The Contractor shall implement corrective actions to rectify any EMC problems identified during design, on-Site testing and when the whole system is in operational service.
- (xv) The Contractor must be fully aware of the EMC requirements and any modifications to systems and equipment carried out by the Contractor during the Defects Liability Period and during DLP period shall not cause the immunity or emission levels of the installed system and equipment to exceed such values. Detailed EMC documentation on all modifications carried out shall be submitted to the Employer's Representative for review. Modification work shall not commence until the respective submission has been reviewed without objection by the Employer's Representative.

3.4.7 Software Quality Assurance Plan

The Software Quality Assurance Plan shall be submitted upon introduction of any new software over and above the software as applicable in JP/JS15 Contract. The Software Quality Assurance Plan shall address all elements of the design and development of software required as part of the Works.

3.5 Design, Procurement and Manufacturing Plan

The Design, Procurement and Manufacturing Plan shall be configured as a family of "stand-alone" plans and associated documents each covering one of the subjects listed below. The plans shall be co-ordinated with each other and shall collectively define, describe and encompass the Contractor's proposed methods, procedures, processes, organisation, sequencing of activities, etc. and shall show how these combine together to assure that the Works fully meet the requirements of the Specification in respect of the subjects listed.

3.5.1 Design Plan

3.5.1.1 Design shall be undertaken to ensure a smooth flow of information for review by the Employer's Representative. Submissions shall be strictly in accordance with the Design Submissions Programme prepared in accordance with clause 2.5 above.

3.5.1.2 The Contractor shall perform his designs for the Works and prepare a design plan for his design work in accordance with the following design stages. The Contractor shall submit to the Employer's Representative for his review, relevant design information as identified under each stage:

- (1) Not used.
- (2) Preliminary Design Stage

The Contractor shall prepare and submit to the Employer's Representative for his review a System Requirement Specification (SRS) which includes, as a minimum, operational, functional, performance and design requirements of the proposed system.

- a. The System Requirement Specification, serving as a means of system requirement management and the Contractor's top level design document, shall state all the requirements completely and unambiguously and how each requirement can be verified and validated.
- b. The System Requirement Specification shall include a compliance matrix that includes cross-references to the requirements stated in the PS, the System Requirement Specification and the Design Verification Table (DVT).
- c. The preliminary design stage, as a minimum, shall identify the function of each system, sub-system, equipment or other element within the overall SRS and specify the relationships and interfaces between each element of the system, including the systems of the interfacing elements of other Contractors.

Further the preliminary design stage shall address each element of the SRS as developed in the Preliminary Design. Equipment and interconnection specifications, with supporting calculation, shall be developed at this stage. . Design of the overall system and elaborating on the proposed system configuration with emphasis on how the interface requirements are to be achieved shall be included in the preliminary design. Manufacturing of production units will only be allowed to commence after receiving a notice of no objection for the relevant design elements

- d. Preliminary electrical and control schematics shall be developed to illustrate how the various operational and functional requirements can be achieved. Software design and development shall also be carried out during this stage.
 - e. The submission shall clarify and confirm as necessary all technical aspects of all interfaces with other elements of the Contractor's overall design and of any interfaces with works being supplied by other Contractors.
 - f. Ergonomic design shall be developed as part of the preliminary design.
 - g. If at any time in the development of the preliminary design, the Contractor wishes to modify the conceptual design by dividing any system or sub-system into a number of smaller systems or by reconfiguring the interfaces or for any other reason, the Contractor shall resubmit the SRS and/or the Preliminary Design for the Employer's Representative's review.
 - h. A detailed submission list for the preliminary design shall be submitted to the Employer's Representative for review prior to the start of the preliminary design. The submission shall be in sufficient detail to evaluate the progress and technical adequacy of the selected design approach.
- (3) A series of Design Reviews shall be arranged prior to the conclusion of the

preliminary Design Stage.

Upon completion of the Preliminary Design Stage the Contractor shall submit for review by the Employer's Representative a homogenous Final Design.

(4) Site Design Stage

Installation detail and method statements for various areas and sections shall be released progressively during this stage. Installation works on Site will only be allowed to commence following the Employer's Representative's review of the relevant design information with no objection raised.

3.5.1.3

Separate parts of the design plan shall be prepared for Contractor and subcontractor design activities. The design plans shall define the Contractor's policy for the design of the Works and shall, without limitation, define:

- (1) the organisation of the Contractor's design staff with particular reference to the design interfaces;
- (2) the specific allocations of responsibility and authority given to identified design staff with particular reference to the review and Verification of design specification, drawings and calculations by the Contractor;
- (3) the specific methods of design necessary to identify any relevant method statements and develop those method statements to a sufficient degree of detail reviewed by the Employer's Representative; and
- (4) the list of procedures and work instructions to be applied to manage and control the quality of the design work, including without limitation:
 - a) the design and performance requirements which shall be defined in terms of basic data and design assumptions made; relevant codes, standards and regulatory requirements; safety, reliability, security and environmental requirements; and commissioning requirements;
 - b) the design methods. Software applications to be used in the design, both proprietary and public domain, including any requirements for physical and mathematical model testing;
 - c) the preparation, checking, issue, distribution, indexing and filing of reports, calculations, drawings and specifications together with the means for their revisions;
 - d) the formal design review, authorisation and approval of design documentation; and
 - e) the independent design Verification and Validation.

3.5.2

Design Verification and Validation Plan

3.5.2.1

The Design Verification and Validation Plan, supplementary to the Design Plan, shall be prepared by the Contractor in order that design Verification and Validation activities are properly directed. The plan shall address, but not be limited to, the following:-

- (1) the objectives of each Verification phase and each Validation phase;
- (2) defined input and output criteria for each development phase;
- (3) identification of types and detailed methods of test, Verification and Validation activities to be carried out;

- (4) detailed planning of Verification and Validation activities to be carried out, including schedules, resources and approval authorities;
- (5) selection and utilisation of the test equipment, and their test environmental conditions; and
- (6) criteria on which the Verification or Validation is judged to be acceptable. These criteria shall be traceable to the design and performance requirements as referred to in Clause 3.5.1.3 (4) a) above.

3.5.2.2 The Contractor shall, by means of a design Verification and Validation process, demonstrate that all requirements within the Specification have been met. The Contractor shall prepare a Design Verification Table (DVT) that identifies the Contractor's proposed methodology for demonstrating compliance.

3.5.2.3 The DVT shall be supplied to the Employer's Representative for his review and shall be monitored throughout the design and construction of the Works. Any changes to the DVT must be submitted to the Employer's Representative for review before implementation.

3.5.2.4 The DVT shall identify the proposed Verification and Validation process (es) for each specification requirement and the acceptance criteria for achieving the requirement. The DVT does not relieve the Contractor of any other requirements of the Specification in relation to design review, Verification, Validation, conformance or planning.

3.5.2.5 For each item in the DVT, the Verification and Validation methods to be used shall be listed by the Contractor. The methods used shall be reviewed by the Employer's Representative. At least one stage of Verification and Validation shall be performed prior to production of an item.

3.5.2.6 Subject to review without objection by the Employer's Representative for each application, the Verification and Validation methods listed below are acceptable if implemented (whether singly or in combination):

- (1) Similarity - equipment and requirement are identical to those successfully applied on other projects.
- (2) Historical - requirement has been met by numerous previous design.
- (3) Calculations and Drawings - for review.
- (4) Design Review - either scheduled or specifically targeted.
- (5) Development Test - performance testing on equipment or material under development.
- (6) Type Test - performance testing of the as-built component, assembly or system.
- (7) Routine Test - test every component, assembly or system.
- (8) First Article Inspection (FAI) - acceptances of the exact look and fit of equipment.
- (9) Inspection - formal inspection of the finished item.
- (10) In Service - for service demonstration requirements only.

3.5.2.7 After each Verification or Validation activity, a Verification Report shall be produced including, as a minimum, the following:

- (1) the Verification or Validation results stating whether the objectives and criteria of the Design Verification and Validation Plan have been met; and
- (2) the reasons for failure if there is a failure, and proposal for remedial actions.

3.5.3 **Factory Testing Plan**

3.5.3.1 The Contractor shall prepare and submit for review by the Employer's Representative the Contractor's Factory Testing Plan detailing and explaining how the Contractor will plan, perform, and document all inspections and tests that will

be conducted to verify and validate the Works prior to delivery to the Site. The plan shall consist of a narrative description supported by graphics, diagrams and tabulations as required.

The plan shall contain but not be limited to the following topics:

- (1) the Contractor's strategy for inspection and Factory Acceptance Tests of all constituent parts of the Works and how this relates to the sequence of delivery;
- (2) the sequencing and interrelationships of the inspections and tests including:
 - (a) all Quality Hold Points; and
 - (b) all Quality Control Points;
- (3) the type and extent of inspection and Factory Acceptance Tests to be undertaken and the parts of the Works to be proven by that testing;
- (4) the objective of each inspection or test, what particular design and operating criteria the test or inspection will prove and how the success of the test or inspection will be demonstrated or measured;
- (5) organisation chart and CV of key personnel in inspection and test team;
- (6) the plan for the production and submission of the inspection and test procedures to the Employer's Representative for review including the submission of the inspection and test reports and records; and
- (7) Type Tests, Routine Tests, First Article Inspections and any other tests constituting the Factory Acceptance Tests.

3.5.3.2 The Contractor shall arrange for all equipment and systems manufactured for incorporation into the Permanent Works to undergo a Factory Acceptance Test (FAT) before shipment from the place of manufacture. Any particular requirements for inspection and testing at the place of manufacture are prescribed in the PS.

3.5.3.3 The Contractor shall be responsible for re-inspecting and re-testing any failed inspection and Factory Acceptance Test including regression testing on previously passed items.

3.5.3.4 Inspections and tests that are to be witnessed by the Employer or the Employer's Representative shall be sensibly grouped and scheduled so that as many inspections and tests as possible may be witnessed during a single visit.

3.5.3.5 If required, Type Tests as detailed in clause 9.2.6 below shall be performed on all items of equipment to be installed as part of the Permanent Works under the Contract.. The Type testing shall be based on the environmental class of the sites into which the equipment will be installed. Refer to clause 1.11.2 for the different environmental classifications or otherwise as required in the PS.

3.5.3.6 For all production items a First Article Inspection shall be undertaken as detailed in clause 9.2.6.8 below. Routine production testing methods shall be detailed for review by the Employer's Representative. Routine testing shall ensure that all samples of a production item are within the tolerances required for complete interchange ability.

3.5.3.7 The Contractor shall prepare two copies of an inspection or test report immediately after the completion of each inspection or test whether or not witnessed by the Employer or the Employer's Representative. If the Employer or the Employer's Representative has witnessed the inspection or test, he will countersign the inspection or test report to indicate his review of the information and conclusions (i.e. whether or not the equipment being inspected or tested has passed satisfactorily) contained therein. If the Employer or the Employer's Representative has not witnessed the inspection or test (i.e. if a waiver has been granted, or the Employer or the Employer's Representative has not witnessed the inspection or test

for some other reason in accordance with the Contract), the Contractor shall forward two copies of the inspection or test report without delay to the Employer's Representative. The Employer's Representative will countersign the report to indicate his review of the information and conclusions (i.e. whether or not the equipment being inspected or tested has passed satisfactorily) and return one copy to the Contractor. Where the results of the inspection or test do not meet the requirements of the Specification, the Employer or the Employer's Representative may call for a re-inspection or re-test.

3.5.3.8 For standard equipment which is serial or bulk manufactured, manufacturer's type test certificates (or equivalent) may, subject to review by the Employer's Representative, be accepted.

3.5.3.9 Test equipment and instrumentation shall be subject to approved calibration tests within a properly controlled calibration scheme, and signed calibration certificates shall be supplied to the Employer's Representative in duplicate. Such calibration checks shall be undertaken prior to testing and, if required by the Employer's Representative, shall be repeated afterwards.

3.5.3.10 Materials and equipment shall not be released for shipment until all applicable inspections and tests including Factory Acceptance Tests have been satisfactorily completed.

3.5.4 Procurement, Manufacturing and Delivery Plan

3.5.4.1 The Contractor shall prepare procurement, manufacturing and delivery plans in respect of all items and goods. Separate parts of the plan shall be prepared for Contractor or sub-contractor off-Site activities. Each plan shall identify the scope of work to be applied. In relation to such scope of work, it shall, without limitation, define:

- (1) the organisation of the Contractor's staff directly responsible for the day-to-day management of the manufacturing activity on or off the Site;
- (2) the specific allocations of responsibility and authority given to identified personnel for the day-to-day management of the work with particular reference to the supervision, inspection and testing of the work;
- (3) the interfacing or co-ordination required with the Contractor's other related plans;
- (4) the specific methods of manufacture to identify any relevant method statements and develop those method statements to a degree of sufficient detail reviewed by the Employer's Representative; and
- (5) the list of procedures and work instructions to manage and control the quality of work during purchasing, manufacturing and delivery, including without limitation:
 - a) the purchasing of items and goods and ensuring they comply with the requirements of the Specification, including (without limit) purchasing documentation and specific Verification arrangements for Contractor/Employer's Representative inspection of material or manufactured product prior to release for use;
 - b) the manufacturing process so as to ensure compliance with the design;
 - c) the manufacturing process so as to ensure clear identification and traceability of material and manufactured parts;
 - d) the inspection and testing of incoming materials, in process and final product so as to ensure specified requirements for the material and/or manufactured product are met;
 - e) the identification of the inspection and test status of all material and manufactured products during all stages of the manufacturing process to ensure that only products that have

- passed the required inspections and tests are dispatched for use and/or installation;
- f) review and disposal of non-conforming material or product so as to avoid unintended use;
- g) the assessment and disposal of non-conforming material and manufactured product and approval for reworking or rejection as scrap;
- h) the identification of preventive action so as to prevent recurrence of similar non-conformance; and
- i) the handling, storage, packaging, preservation and delivery of manufactured product.

3.5.4.2 The Contractor shall prepare and submit the inspection and testing plans to manage and control any test and inspection activities in accordance with clause 3.5.3 above.

3.5.4.3 The Contractor shall propose a structured set of inspection hold points. The hold points shall be structured such that a formal hold point is allowed for each significant element of the manufacturing process. At each hold point, the Employer's Representative shall hold a formal inspection or advise that the inspection has been waived.

3.5.4.4 Once the inspection and any required remedial actions are completed to the satisfaction of the Employer's Representative, the Employer's Representative shall give a notice of no objection for unit shipment. The Employer's Representative will not withhold his notice of no objection for shipping unreasonably, provided all pre-delivery assembly and testing has been successfully completed.

Any unit delivered without the Employer's Representative's notice of no objection shall be rejected at the Site and all expenses thereby incurred shall be borne by the Contractor.

3.6 Construction and Installation Management Plan

The Construction and Installation Management Plan shall be configured as a family of "stand-alone" plans and associated documents each covering one of the subjects listed below.

The plans shall be co-ordinated with each other and shall collectively define, describe and encompass the Contractor's proposed methods, procedures, processes, organisation, sequencing of activities, etc. and shall show how these combine together to assure that the Works truly meet the requirements of the Specification in respect of the subjects listed.

3.6.1 Construction and Installation Plan

3.6.1.1 The Contractor shall prepare plans for the construction and installation activities on and off the site, as referenced in clause 14.1.1 below, and shall ensure that these are properly related to the subsequent testing and commissioning activity.

3.6.1.2 Separate parts of the plan shall be prepared for other contractor(s) or sub-contractor(s) off-site activities.

3.6.1.3 Each construction plan shall identify the scope of activity to be controlled. In relation to such scope of activity, it shall, without limitation, define:

- (1) the organisation of the Contractor's staff directly responsible for the day-to-day management of the activity on or off the Site;
- (2) the specific allocations of responsibility and authority given to identified personnel for the day-to-day management of the Works with particular reference to the supervision, inspection and testing of the Works;

- (3) the interfacing or co-ordination required with the Contractor's other related plans;
- (4) the specific methods of construction and installation to identify any relevant method statements and develop those method statements to a sufficient degree of detail reviewed by the Employer's Representative;
- (5) a detailed method statement which shall include but not be limited to:
 - a) description of main operations and sub-operations;
 - b) sequence of sub-operations;
 - c) quantities of the work and production rates to be achieved;
 - d) resources to be employed; and
 - e) quality checks to be carried out, supervision being exercised and safety precautions to be employed;
- (6) the list of procedures and work instructions to manage and control the quality of construction and installation works, including without limitation:
 - a) the inspection and testing activities of incoming materials, in process and final product so as to ensure specified requirements for the material and/or product are met;
 - b) the purchasing of materials and ensuring they comply with the requirements of the Specification, including purchasing documentation and specific Verification arrangements for Contractor/Employer's Representative inspection of material or manufactured product prior to release for use/installation;
 - c) the construction processes including Temporary Works so as to ensure compliance with drawings and Specification. In addition, any software to be used in the construction, installation and commissioning process shall be identified and details of the Verification and Validation processes for the software application shall be given;
 - d) the construction and installation process so as to ensure clear identification and traceability of material and manufactured product;
 - e) the identification of the inspection and test status of all material and manufactured products during all stages of the construction and installation process to ensure that only products that have passed the required inspections and tests are despatched for use and/or installation;
 - f) review and disposition of non-conforming material or product so as to avoid unintended use/installation;
 - g) the assessment and disposition of non-conforming material and product and approval for reworking or rejection as scrap;
 - h) the identification of preventive action so as to prevent recurrence of similar non-conformance; and
 - i) the handling, storage, packaging, preservation and delivery of product; and
 - (j) the security control of the Site and the works area for Contractor's accommodation, storage, car park and other works facilities, etc. in accordance with clause 15.10 below.

3.6.1.4 The Contractor shall prepare and submit the inspection and test plans to manage and control any test and inspection activities in accordance with clause 5.7.1 below.

3.6.1.5 Where all or part of the Works is within the JMRC Protection Zone, the Contractor shall follow the guidelines issued by the Employer's appropriate authority. The Contractor shall submit to the Employer's Representative for review his construction method statement and detailed design of any Temporary Works proposed to be erected within this zone adjacent to DMRC properties.

3.6.1.6 Health and Safety Documentation

3.6.1.7 The Contractor shall submit Health and Safety Documentation to fully comply with the requirements of the Project conditions and proposed work activities in accordance with Chapter 18 below.

3.6.1.8 The Contractor shall submit to the Employer's Representative the Health and Safety Documentation for review.

3.6.2 Environmental Qualities Management Plan

3.6.2.1 The Contractor shall submit an Environmental Plan based the Outline Environmental Plan submitted and adapted during the Tender period. The Environmental Plan shall comprise a set of Environmental Plans as detailed below:

- **Environmental Management Plan;**
- **Environmental Mitigation Implementation Schedule** (if required); and
- **Traffic Management Submissions.**(If applicable)

3.6.2.2 Environmental Plans shall include the Contractor's proposed means of complying with his obligations detailed and in the PS in regard to:

- a) The Site Environment as found; and
- b) System Environment as described in the Specification.

The Environmental Plan shall include as required detailed policies, procedures and applicable regulations.

3.6.3 Environmental Management Plan

3.6.3.1 The Contractor shall submit for review by the Employer's Representative, an Environmental Management Plan (EMP) which will set out in detail the approach for dealing with each of the potential environmental impacts arising from the various different construction activities.

3.6.3.2 The EMP shall address all the potential impacts outlined in the Employer's Final Assessment Report and shall follow the EMP Outline contained in Chapter

3.6.3.3 The Contractor shall submit the final EMP, for review by the Employer's Representative, prior to the commencement of construction activities.

3.7 Completion Management Plan

The Contractor shall organise the services required under the Contract to bring the Works into service under one plan. This co-ordinated approach shall allow the Employer's Representative the ability to review all aspects of the Works and services in an integrated manner.

The Completion Management Plan shall be configured as a family of "stand-alone" plans and associated documents each covering one of the subjects listed below.

The plans shall be co-ordinated with each other and shall collectively define, describe and encompass the Contractor's proposed methods, procedures, processes, organisation, sequencing of activities, etc. and shall show how these combine together to assure that the Works truly meet the requirements of the Specification in respect of the subjects listed.

3.7.1 Commissioning Plan

3.7.1.1 The Contractor shall ensure the timely preparation of the Commissioning Plan in a format and to a level of detail in accordance with clause 9.3 below. The

Contractor shall submit the first draft of the Commissioning Plan to the Employer's Representative within 180 days of the Commencement Date of the Works.

3.7.1.2 The Commissioning Plan shall consist of the following:

a. Factory Testing Plan (see clause 3.5.3 above)

b. On-Site Testing and Commissioning Plan

(i) Installation Test Schedule

The Contractor shall submit to the Employer's Representative a comprehensive schedule of Installation Tests as required by clause 9.4.3 below and the PS and in accordance with the Installation Programme as stated in clause 2.7 above. The schedule shall be submitted within the period of time laid down in the PS, or, if none is given, not later than two months in advance of the date for the commencement of the Installation Tests.

(ii) Partial Acceptance Test Plan

The Contractor shall submit to the Employer's Representative a comprehensive Partial Acceptance Tests Plan including all requirements detailed in clause 9.4.4 below and the PS. The plan shall be submitted within the period of time laid down in the PS, or, if none is given, not later than four months in advance of the date for the commencement of the Partial Acceptance Tests.

(iii) System Acceptance Test Plan

The Contractor shall submit to the Employer's Representative a comprehensive System Acceptance Tests Plan including all requirements detailed in clause 9.4.5 below and the PS. The plan shall be submitted within the period of time laid down in the PS, or, if none is given, not later than four months in advance of the date for the commencement of the System Acceptance Tests.

(iv) Integration Testing & Commissioning Plan

The Contractor shall submit to the Employer's Representative a comprehensive Integrated Testing & Commissioning Plan including all requirements detailed in clause 9.4.6 below and the PS. The plan shall be submitted within the period of time laid down in the PS, or, if none is given, not later than four months in advance of the date for the commencement of the Integrated Testing & Commissioning.

3.7.2 Operation and Maintenance Manuals Plan (If Applicable)

3.7.2.1 The Contractor shall develop an Operation and Maintenance Manuals Plan to suit staged commissioning of the system and to ensure the timely preparation of the Contractor's Operation and Maintenance Manuals and the 'As-Built' drawings in a format and to a level of detail reviewed without objection by the Employer's Representative and in accordance with Chapter 11 below.

3.7.2.2 The Contractor shall submit the Operation and Maintenance Manuals Plan by the date stated in the PS

3.7.3 Training Plan (if required)

3.7.3.1 The Contractor shall ensure the timely preparation of the Contractor's Training Plan in a format and to a level of detail reviewed without objection by the Employer's Representative and fulfilling the requirements of clause 10.1 below.

3.7.3.2 The Contractor shall submit the Training Plan by the date stated in the PS, or, if none is given, not less than three (3) months prior to the issue of the Taking Over Certificate for the Works and also to suit the staged commissioning of the relevant systems.

3.7.4 Spares Management Plan

3.7.4.1 The Contractor shall submit for review by the Employer's Representative a Spares Management Plan to furnish a priced, manufacturer-recommended list of spare parts necessary to support continuous operation of all such equipment for a minimum period of 12 months after the commencement of Revenue Operations, in accordance with Chapter 13 below.

3.7.4.2 The Contractor shall submit the Spares Management Plan by the date stated in the PS, or, if none is given, than prior to the issue of the Taking Over Certificate for the Works.

3.7.5 Defects Liability Management Plan

The Contractor shall submit for review by the Employer's Representative a Defects Liability Management Plan to repair, replace and perform any remedial item upon the Works identified by the Employer's Representative during the Defects Liability Period (DLP). The first submission of this plan is required upon 2 months before ROD. The Contractor shall:

- (a) endeavour to complete all necessary work in a timely responsible manner;
- (b) not proceed with any remedial work without the consent of the Employer's Representative;
- (c) submit a plan that details the methods and timing of any proposed work; and
- (d) update the plan monthly, showing progress of the work and the time to completion.

3.7.6 Supervision of Maintenance Plan

The Contractor shall prepare outline plans for the management of the maintenance function in accordance with the requirements of clause 12.2.1 below and submit them for review by the Employer's Representative at least 3 months prior to the scheduled commencement of **Service Trial** or ROD.

CHAPTER 4

4. DOCUMENTS SUBMISSION AND REVIEW**4.1 Documents, Submissions and Correspondence**

Copies of correspondence relevant to the execution of the Works and not of a confidential nature received from or despatched to Government departments, utility undertakings and Project Contractors employed by the Employer shall be submitted to the Employer's Representative for information as soon as possible but in any case not later than 7 days after receipt.

4.2 Submissions to the Employer's Representative**4.2.1 General requirements**

4.2.1.1 All submissions shall be made to the Employer's Representative in a format reviewed without objection by the Employer's Representative and in accordance with the requirements in:

- (1) the Contract;
- (2) the Computer Aided Design & Drafting (CADD) Manual; and
- (3) the Document Submittal Instructions to Consultants and Contractors.

4.2.1.2 Paper and drawing sizes shall be "A" series sheets.

4.2.1.3 The following software (versions quoted or higher) compatible for use with Intel-Windows based computers shall be used, unless otherwise stated, for the various electronic submissions required and software as specified add or latest:

<u>Document Type</u>	<u>Electronic Document Format</u>
Text Documents	MS Word, Ver. 7.0 or latest
Spread Sheets	MS Excel, Ver. 7.0 or latest
Data Base Files	MS Access, Ver. 7.0 or latest
Presentation Files	MS PowerPoint, Ver. 7.0 or latest
Programmes	Primavera for Windows, Ver. 2.0b or latest
AutoCAD Graphics	CorelDraw ,Ver. 7.0/ AutoCAD ver.14 or latest
Photographic	Adobe PhotoShop, Ver.4.0 or latest
Desktop Publishing	QuarkXPress, Ver.3.32 or latest
CADD Drawings	MicroStation SE/95 or latest

Media for Electronic File Submission

One copy shall be submitted unless otherwise stated.

Internet File Formats/Standards

The following guidelines shall be followed when the Contractor uses the Internet browser as the communication media to share information with the Employer.

All the data formats or standards must be supported by Microsoft Internet Explorer version 3 or above running on Windows.

The following lists the file types and the corresponding data formats to be used on Internet. The Contractor shall comply with them unless the Employer's

Representative has previously reviewed without objection the Contractors proposal to adopt an alternative:

File Type	Data Format
Photo Image	Joint Photographic Experts Group (JPEG)
Image other than Photo	GIF or JPEG
Computer Aid Design files (CAD)	Computer Graphics Metafile (CGM)
Project documents	refer to the document type in clause 4.2.1.3 above
Video	Window video (.avi)
Sound	Wave file (.wav)

The following states the standards to be used on Internet when connecting to database(s). The Contractor shall comply with them unless the Employer's Representative has previously reviewed without objection the Contractors proposal to adopt an alternative: Function to be Implemented	Standard to be Complied With
Database connectivity	Open Database Connectivity (ODBC)
Publishing hypertext language on the World Wide Web	Hypertext Mark-up Language (HTML)

- 4.2.1.4 The hard copy of all documents shall be the contractual copy.
- 4.2.1.5 If required, one copy of all internal and external orders placed by the Contractor for equipment or materials required for the Works shall be forwarded to the Employer's Representative at the time of issue. All orders shall state the Employer's Representative's requirements for inspection and testing, shall bear the Contract reference, Contractor's name and address and shall indicate, where applicable, the sub-section of the Works for which the equipment or material is required.
- 4.2.1.6 Distribution of copies of the orders shall be in accordance with the Employer's Representative's instructions.
- 4.2.1.7 The Contractor shall have the obligation to upgrade, at his own cost, all the relevant software to the latest version upon instruction by the Employer's Representative, after the new version of the relevant software has been launched for more than six months in Jaipur.
- 4.2.1.8 The Contractor shall submit a drawing register to the Employer's Representative in electronic copy and hard copy with each submission of drawings and at an interval agreed by the Employer's Representative. The drawing register shall be in a format submitted for review and agreed without objection by the Employer's Representative and shall include each document reference number, version, date, title and data-file name.
- 4.2.1.9 Specific additional requirements in respect of the numbering scheme shall be as defined in the PS.

4.2.2 Content

4.2.2.1 Unless otherwise specified or permitted by the Employer's Representative, each submission shall comprise:

- (1) for drawings - one A1 master (signed by the contractor), one paper A1 copy, two paper A3 copies and an electronic data copy of all drawings; and
- (2) for documents - the unbound original, one bound copy and an electronic copy when applicable.

4.2.2.3 Drawings required for RDSO/CMRS/Railway Board submission shall be arranged by contractor in A1/A0 size or as per requirement.

4.3 Records and Reports

4.3.1 Reports and records that are to be submitted to the Employer's Representative shall be in a format reviewed by the Employer's Representative. Reports and records shall be signed by the Contractor's agent or by a representative authorised by the Contractor.

4.3.2 Within 45 days of the Commencement Date of the Works, the Contractor shall submit a Project document control procedure to the Employer's Representative for review, which shall include but not be limited to the following:

- (1) a document approval system which shall specify the level of authority for approval of all documents and material before submission to the Employer's Representative;
- (2) a system of issuing documents to ensure that pertinent documents are issued to all appropriate locations;
- (3) a document change or re-issue system to ensure that only the latest revision of a document can be used; and
- (4) a submission identification system which identifies each submission uniquely by the following:
 - (a) contract number;
 - (b) discipline;
 - (c) submission number; and
 - (d) revision indicator.

4.3.3 Project records will eventually be used by the Employer to manage, operate and maintain the Works after the completion of the Project under construction and for future reference.

4.3.4 The Contractor shall submit the documents as required by the Employer's Representative as Project records in full and on time. The Employer's Representative shall determine the adequacy of the Project record.

4.3.5 Submission and review procedure

4.3.5.1 Except where specific procedures are given for certain items, all submissions shall be submitted and reviewed according to the procedure laid down in the following clauses.

4.3.5.2 Each submission shall be accompanied by a brief introduction to explain which sub-system, part or Section of the Works to which the submission refers, listing the documents enclosed with the submission, and describing in outline how all relevant requirements of the Specification are achieved by the proposals.

4.3.5.3 For each stage of submittal, the Contractor shall prepare a Submission Review Request (SRR) carrying the date of submission, the submission reference number as defined in clause 4.3.2 (4) above, the submission title, the stage of submission (e.g. preliminary design, final design, etc.), and the authorised signature of the

Contractor's responsible engineer in the format shown in Appendix 3 of this Specification, to confirm that, in the opinion of the Contractor, the submission:

- (1) complies with all relevant requirements of the Specification;
- (2) conforms to all interface requirements;
- (3) contains, or is based on auditable and proven or verified calculations or design criteria;
- (4) has been properly reviewed by the Contractor, according to the Contractor's QA system, to confirm its completeness, accuracy, adequacy and validity; and
- (5) has taken account of all requirements for approval by statutory bodies or similar organisations, and that where required, such approvals have been granted.

4.3.5.4 The Employer's Representative's response to the submission will normally be made within 30 calendar days of receipt of the submission, provided that the submission is made no later than the date shown on the Submissions Programme described in clause 2.5 above. The Employer's Representative may extend the review period depending on the amount of documentation accompanying the submission.

4.3.5.5 Throughout the design period, the Contractor shall attend monthly design review meetings with the Employer's Representative. At these Employer's Representative's review meetings, the Contractor shall present information, drawings and other documents to the Employer's Representative in respect of all submissions programmed to occur during the following five week period. The Contractor's presentations shall be in sufficient depth to enable the Employer's Representative to obtain a clear understanding of the Contractor's proposals and to discuss the methodology and process used in reaching the proposed design solutions. Unless directed otherwise by the Employer's Representative, all meetings shall be convened in Jaipur.

4.3.5.6 The Contractor shall record all of the Employer's Representative's observations and any agreed actions resulting from the Employer's Representative's review meeting and shall address each of these fully before submission of the respective documents for formal review.

4.3.5.7 If, in the Employer's Representative's opinion, following receipt of a submission there is benefit to be gained from a meeting with the Contractor to clarify or discuss any of the contents of the submission, he will notify the Contractor accordingly with not less than 5 days advance notice, and the Contractor shall attend at the time and place appointed by the Employer's Representative.

4.3.5.8 No submission may be made by the Contractor in respect of the Works or any sub-system, part or Section thereof unless a notice of no objection has been received for the previous stage of the same Works or any sub-system, part or Section thereof.

4.3.6 Employer's Representative's Response

4.3.6.1 The Employer's Representative will respond in one of the following three ways:

- (1) "Reviewed without Objection"
- (2) "Reviewed without Objection, Subject to"
- (3) "Rejected"

4.3.6.2 If the Employer's Representative, having reviewed the submission, has not discovered any non-compliance with the Contract, the SRR will be returned endorsed with the Employer's Representative's signature and the words "Reviewed without Objection". Receipt of such notice of no objection does not in any way imply the Employer's Representative's approval of the submission, nor does it remove any responsibility from the Contractor for complying with the Contract.

Issue of a “Notice of No Objection” entitles the Contractor to proceed to the next stage of the programme of work.

- 4.3.6.3 If the Employer’s Representative discovers minor non-compliance, discrepancies, omissions, etc. that, in his opinion, are not of a fundamental nature, he may return the SRR endorsed with the Employer’s Representative’s signature and the words “Reviewed without Objection Subject to”, and including a list of the features that are required to be amended, included or improved to comply with the Contract. Issue of a “Notice of No Objection Subject to” entitles the Contractor to proceed to the next stage of the programme of work provided that all of the Employer’s Representative’s comments are taken into account fully and implemented exactly.
- 4.3.6.4 If the Employer’s Representative issues a “Notice of No Objection Subject to”, the Contractor shall resubmit the affected parts of the submission, clearly demonstrating how the Employer’s Representative’s comments have been taken into account and resubmit amended or corrected material within 15 working days of issue of the Employer’s Representative’s comments, using the process described in clause 4.3.5 above.
- 4.3.6.5 If the Employer’s Representative discovers major non-compliance, discrepancies, omissions, etc. that, in his opinion, are of a fundamental nature, he may return the SRR endorsed with the Employer’s Representative’s signature and the word “Rejected”, and including a list of the features that are required to be amended, included or improved to comply with the Contract. Issue of a “Notice of Rejection” does not entitle the Contractor to proceed to the next stage of the programme of work until all of the Employer’s Representative’s comments are fully taken into account and a satisfactory re-submission has been made (i.e. one which results in a “Notice of No Objection” or “Notice of No Objection Subject to”).
- 4.3.6.6 If the Employer’s Representative issues a “Notice of Rejection”, the Contractor shall resubmit the complete submission, clearly demonstrating how the Employer’s Representative’s comments have been taken into account and resubmit amended or corrected material within 15 working days of issue of the Employer’s Representative’s comments, using the process described in clause 4.3.5 above.

4.4 Records

- 4.4.1 The Contractor shall establish and maintain a place for the storage and archiving of all the documents relating to the Works and not required to be submitted to the Employer’s Representative under clause 4.1 above which shall be:
- (1) the same place or office where the Contractor is performing the work and storing documents reviewed by the Employer’s Representative, or;
 - (2) at the Site or elsewhere in Jaipur, a records office, which contains all other, documents that the Contractor is required to maintain in accordance with the Contract.
- 4.4.2 All documents shall be filed, indexed and suitably stored to permit easy identification and necessary audits.
- 4.4.3 The Contractor shall maintain in Jaipur his archive of all documents in connection with and arising out of the Contract, until 28 days after the issue of the Final Certificate or until final settlement of all Disputes, whichever is later.

CHAPTER 5

5. QUALITY MANAGEMENT

5.1 Introduction

- 5.1.1 The Contractor shall maintain and implement a Quality Management System that shall remain in effect during the execution of the Works. The Contractor's Quality Management System shall be based on the International Standard ISO 9001:1994 "Model for quality assurance in design, development, production, installation and servicing." The Contractor shall submit its Quality Management System documentation for the Employer's Representative's review as specified in this Chapter.
- 5.1.2 The Contractor shall plan, perform and record all quality control activities to ensure that all work is performed in accordance with the requirements of the Contract and is detailed in the quality plans which are required under this Chapter. Such activities shall include, without limitation, the inspections and/or tests expressly or implicitly required by the Contract.
- 5.1.3 Without prejudice to such requirements, the Employer's Representative may from time to time instruct the Contractor in relation to such further or other inspections and/or tests as are in his opinion appropriate.
- 5.1.4 Quality audits will be conducted by the Employer's Representative to verify the Contractor's implementation and compliance with the quality management system as specified herein.

5.2 General Requirements

- 5.2.1 All quality system documents and plans to be submitted shall embrace all activities of the Contractor and sub-contractors of any tier, including its suppliers and any design consultants.

5.2.2 Quality Plans

- 5.2.2.1 The quality plans to be submitted by the Contractor shall comprise of:

- (1) a Management Quality Plan, for the control of all management related activities;
- (2) a Design Quality Plan, for the control of all design related activities for the Works, including Temporary Works; and
- (3) Site Quality Plan, for the control of activities within each category of work or discrete element of procurement, manufacturing, delivery, construction and installation of the Works, including Temporary Works.

- 5.2.2.2 Within 30 days of the Commencement Date of the Works, the Contractor shall submit for review by the Employer's Representative a Quality Plan.

- 5.2.2.3 The Contractor shall submit separate Site Quality Plan covering all elements of the Works. These shall be in accordance with the specific requirements of this Chapter and shall be submitted to the Employer's Representative for review prior to the commencement of the construction works covered by the quality plans. In addition, the Contractor shall prepare inspection and test plans for the management and control of the inspection and/or testing by the Contractor of the Works identified in each quality plan.

- 5.2.2.4 The Contractor shall promptly supply the Employer's Representative with one controlled copy of his quality manual, quality plans, inspection and test plans and related procedures/instructions/forms upon such documents being reviewed without objection by the Employer's Representative. The Contractor shall maintain such controlled documents throughout the duration of the Contract. For any amendment to quality system documentation, the Contractor shall as soon as reasonably practicable prepare and submit

the proposed amendment for review by the Employer's Representative.

5.2.2.5 The Contractor shall appoint (a) suitably qualified and experienced person(s) as Quality Manager(s), who shall be directly responsible to senior management level and is able to discharge his duties without hindrance or constraint, and provide such other resources as may be required to ensure effective implementation of the Quality Management System and all quality plans. Details of the qualifications, experience, authority and responsibility of the proposed Quality Manager(s) shall be submitted for review by the Employer's Representative.

5.2.2.6 During the Contract period, upon receipt of a Corrective Action Request (CAR) or similar document issued by the Employer's Representative as a result of quality audits, the Contractor shall submit a proposed corrective and preventive action plan within 14 days to the Employer's Representative for review.

5.3 Management Quality Plan

5.3.1 The Management Quality Plan shall define the Contractor's management structure for the execution of the Works and for the control of the quality of the Works and shall, without limitation, define:

- (1) 5.3.1.1 the appointment of a Quality Manager in accordance with clause 5.2.6 above;
- (2) 5.3.1.2 the organisation of the Contractor's managerial staff with particular reference to any joint venture partners and main sub-contractors. An organisation chart shall be produced to illustrate the sub-division of the Works into elements for effective technical and managerial control, the reporting structure and the interface relationship between all parties involved;
- (3) 5.3.1.3 the hierarchy of the overall quality management system documentation to be applied to the Works;
- (4) 5.3.1.4 the quality management system of the Contractor in monitoring and controlling sub-contractors and suppliers; and
- (5) 5.3.1.5 the list of quality system procedures and work instructions to be applied to manage the quality of the Works.

5.4 Design Quality Plan

5.4.1 The Contractor shall prepare a Design Quality Plan for its design works. The Design Quality Plan shall define the Contractor's policy for the design works and shall, without limitation, define:

- (1) the organisation of the Contractor's design staff;
- (2) the specific allocations of responsibilities and authorities given to identified design staff or sub-contractors for particular design work;
- (3) the hierarchy of quality management system documentation for managing and controlling design works, including design works of sub-contractors of any tier; and
- (4) the list of procedures and instructions to be applied to manage and control the quality of the design works.

5.5 Manufacturing Quality Plan

5.5.1 The Contractor shall prepare a Manufacturing Quality Plan for his manufacturing works. The Manufacturing Quality Plan shall, without limitation, define:

- (1) the organisation of the Contractor's staff directly responsible for the day-to-day management of the manufacturing activities on or off the Site;

- (2) the specific allocations of responsibilities and authorities given to identified personnel or sub-contractors for particular manufacturing work;
- (3) the hierarchy of quality management system documentation for managing and controlling manufacturing works, including manufacturing works of sub-contractors of any tier; and
- (4) the list of procedures and instructions to be applied to manage and control the manufacturing works, together with the procedures and instructions which have not been previously submitted for review.

5.5.2 The Contractor shall also prepare inspection and test plans to manage and control any test and inspection activities in accordance with clause 3.5.3 above.

5.6 Site Quality Plan

5.6.1 The Contractor shall prepare a Site Quality Plan for its construction and installation works. The Site Quality Plan shall, without limitation, define:

- (1) the organisation of the Contractor's staff directly responsible for the day-to-day management of the construction and installation activities on or off the Site;
- (2) the specific allocations of responsibilities and authorities given to identified personnel or sub-contractors for particular construction and installation work;
- (3) the hierarchy of quality management system documentation for managing and controlling construction and installation works, including construction and installation works of sub-contractors of any tier; and
- (4) the list of procedures and instructions to be applied to manage and control the construction and installation works together with the procedures and instructions that have not been previously submitted for review.

5.6.2 The Contractor shall also prepare inspection and test plans to manage and control any test and inspection activities in accordance with clause 4.7.1 below.

5.7 Inspection and Test Plans, Records and Reports

5.7.1 Inspection and test plans shall be produced for every activity requiring test and/or inspection. Each inspection and test plan shall identify the quality objectives and include, without limitation:

- (1) the personnel responsible for undertaking and certifying the inspection and/or test;
- (2) the procedure or instructions for the inspection and/or test;
- (3) the test method or a reference to the relevant standard of testing;
- (4) the inspection and/or test required prior to commencement of an activity;
- (5) the inspection and/or test during an activity and its frequency;
- (6) the inspection and/or test required to complete an activity;
- (7) all Quality Control Points, Quality Hold Points and any notices or other documents to be given to the Employer's Representative in relation to Quality Control Points and Quality Hold Points;
- (8) the compliance criteria;
- (9) the method of analysis of test data;
- (10) the procedure for correction or disposal of any work which fails the compliance criteria;
- (11) examples of the documentation to be used for reporting the results of inspections, tests and analysis of test data;
- (12) examples of the documentation to be used for recording the status of inspections and tests in accordance with clause 5.9.1 below; and

- (13) the procedure for the distribution, filing and storage of inspection reports, test reports and reports on analysis of test data.

- 5.7.2 Each report of the inspection and/or test shall be prepared in accordance with clause 9.6.6.1 below.
- 5.7.3 The Contractor shall ensure that a signed copy of each report of inspection and test is filed in his filing system within 3 (three) working days of the date of inspection and test.
- 5.7.4 In relation to all Quality Control Points and Quality Hold Points involving inspection and/or test by the Contractor, the Contractor shall give the Employer's Representative notice of when the relevant work will be inspected and/or tested in accordance with clause 9.8.1 below.

5.8 Review, Verification & Audit

- 5.8.1 The Contractor shall continuously monitor the performance of each quality plan related to the execution of the Works and shall include in each Monthly Progress Report the status of all quality system documentation, an up-to-date audit schedule and status and an up-to-date non-conformity register providing the status of all non-conformities identified by the Employer's Representative and the Contractor. The Contractor shall make an appraisal of such performance and identify in particular any non-conformities or other shortcomings in the quality management system, the actions being taken to dispose of these non-conformities, any necessary corrective action taken or proposed to be taken to prevent the re-occurrence of these non-conformities or shortcomings and, any other items as instructed by the Employer's Representative.
- 5.8.2 The Contractor shall ensure that audits of all the activities in each quality plan are carried out at quarterly intervals, or at such other intervals as the Employer's Representative may require, to ensure the continuing suitability and effectiveness of the quality management system. Reports of each such audit shall be submitted promptly for review by the Employer's Representative.
- 5.8.3 The Contractor shall ensure that the requirements for supervision and verification of work by the Contractor and/or his sub-contractors of any tiers are identified in the quality plans and adequate resources and trained personnel are provided for these activities.
- 5.8.4 The Contractor shall submit for review by the Employer's Representative details of the authority, qualifications and experience of personnel assigned to design verification and to audit activities.
- 5.8.5 The Employer's Representative may, by notice to the Contractor, require external audits of the Contractor's quality management system to be carried out either by the Employer's staff or by his representative. In such case, the Contractor shall afford to such auditors all necessary facilities and access to the records to permit this function to be performed.

5.9 Quality Control Register

- 5.9.1 The Contractor shall provide and maintain at all stages of the Works a quality control register or registers to identify the status of inspections, sampling and testing of the work and all certificates. Such registers shall be updated by the Contractor to show all activities in previous months and shall reach the Employer's Representative's office before the 7th working day of each month. Each register shall:
 - (1) list the certificates received for each batch of goods and materials incorporated in the Works and compare this against the certification required by the Contract and the Contractor's quality plans;

- (2) list the inspection and testing activities undertaken by the Contractor on each element of the Works and compare these activities against the amount of inspection and testing required by the Contract and the Contractor's quality plans;
- (3) show the results of each report of inspection and/or test and any required analysis of these results and compare these results against the pass/fail criteria; and
- (4) summarise any actions proposed by the Contractor to overcome any non-conformity identified in clauses 5.9.1 (1) (2) & (3) above.

5.10 Summaries of Inspection and/or Test

The Contractor shall submit to the Employer's Representative for his information summaries based on quality control register in accordance with the Summaries of Inspection and/or Test described in clause 9.6.11 below.

5.11 Notification of Non-conformities

- 5.11.1 If, prior to the issue of the Taking Over Certificate for the Works or the relevant Section, the Contractor has used or proposes to use or repair any item of the Works which does not conform to the requirements of the Contract, he shall immediately submit to the Employer's Representative such proposal, supplying full particulars of the non-conformity and, if appropriate, of the proposed means of repair which shall include any calculation analysis or other documentation to support the repair or acceptability of the non-conformity.
- 5.11.2 If the Employer's Representative issues non-conformity reports or similar documents to notify the Contractor of any item of the Works which he considers to constitute a non-conformity and which has not been reported in accordance with clause 5.11.1 above, the Contractor shall promptly investigate the matter and, within 14 days of notification by the Employer's Representative, submit to the Employer's Representative for review the remedial measures to be taken and stating the reasons for such measures.

CHAPTER 6

6. SOFTWARE MANAGEMENT AND CONTROL

6.1 Prescriptive Framework

The Software shall be designed, developed and tested according to the Software Quality assurance Plan, and the Software Lifecycle. The Contractor shall define within the Software Quality Assurance Plan what techniques and measures are to be applied for software development

6.2 Software Framework

Software produced or supplied for the project shall be subject to a defined quality framework.

6.3 Software Management Control

The Contractor shall ensure that a full time Software Project Manager and Software Quality Manager are appointed for software development, if software development and/or modification are required under the Contract.

6.4 Status Reporting

The Contractor shall include in the Monthly Progress Report details of the status of the software development/modifications 1 upgrade.

6.5 Auditing

The Employer's Representative shall audit the Contractor in line with Employer's procedures. Further external independent audits may also be arranged at the Employer's Representative's discretion.

6.6 Software Acceptance

Software acceptance shall be based upon the supply of software functioning in a manner reviewed without objection by the Employer's Representative supported by an Operational Safety Report (Software) reviewed without objection by the Employer's Representative. The report shall be provided by the Contractor and submitted to the Employer's Representative for review.

6.6.1 Not Used

6.7 Availability of Development Tools

For COTS, the Contractor shall provide all available documentation for the application and maintenance of that software.

6.8 Re-Use of Existing Software

6.8.1 Where existing software (defined to module level) is to be re-used without modification, the Contractor shall provide evidence acceptable to the Employer's Representative as to why that software is suitable for use in the proposed application. All software developed earlier and intended to be used for the Contract shall meet the requirements laid down in the PS.

6.8.2 The certified evidence of previous satisfactory use in a similar environment and application and cross acceptance from another railway authority shall be submitted. The Employer's Representative reserves the right to implement an assessment of the developed software by further validation or re-validation by an

outside agency nominated by the Employer.

6.9 Application of “Commercial Off The Shelf” Software (COTS)

COTS shall not be applied to any operation software at level SIL2 and above. Where COTS is used, the Contractor shall define within the SQAP, to the review of the Employer’s Representative, the software support period following delivery. The software support activities shall include but not be limited to, supply of software and supporting documentation, training and maintenance contracts.

6.10 Millennium Bug

6.10.1 Any software supplied shall:

- (1) correctly handle date information before, during, and after 1st January 2000 accepting date input, providing date output and performing calculation of dates or portions of dates;
- (2) function before, during, and after 1st January 2000 without changes in operation, according to the Specification and the documentation submitted by the Contractor;
- (3) store and provide output of date information in ways that are unambiguous as to century; and
- (4) correctly handle the leap year occurring in the year 2000 and subsequent leap years.

6.10.2 The Contractor shall also ensure that the Year 2000 problem will not have any adverse impact on the Works Programme by using software tools that are Year 2000 compliant.

6.10.3 The Permanent Works shall conform as a minimum to the Year 2000 requirements as described in BSI DISC PD2000-1 (A Definition of Year 2000 Conformity Requirements) published by the British Standards Institute.

6.10.4 The Tests on Completion shall conform to the requirements as described in the document “Definition of Year 2000 Software Product and System Testing Best Practice” published by the National Computer Centre, USA.

6.11 Test Software

All test software, with the exclusion of built-in test software, shall be produced in accordance with a quality system controlled under the requirements of ISO 9000-3.

6.12 Global Positioning System Week-counter Rollover

Any equipment or software that makes use of the Global Positioning System (GPS) shall not suffer from the GPS week-counter rollover problem, which causes the week counter to reset to 0000 every 1024 weeks.

CHAPTER 7

7. MATERIALS AND EQUIPMENT

7.1 Materials and Equipment Provided by the Employer

- 7.1.1 Materials and equipment which are to be provided by the Employer will be as stated in the Contract.
- 7.1.2 Materials and equipment provided by the Employer shall be collected by the Contractor from the locations stated in the Contract and delivered by the Contractor to the Site. The Contractor shall inspect the materials and equipment before taking receipt and shall immediately inform the Employer's Representative of any shortage or damage.
- 7.1.3 Materials or equipment provided by the Employer which are damaged after collection shall be repaired by the Contractor and submitted to the Employer's Representative for review. Materials or equipment which are lost or which in the opinion of the Employer's Representative are not capable of being or have not been repaired satisfactorily shall be replaced by the Contractor.
- 7.1.4 The Contractor shall dispose of crates and containers for materials or equipment provided by the Employer.
- 7.1.5 Equipment / materials provided by the Employer, surplus to the requirements of the Works shall be returned to the locations stated in the Contract.
- 7.1.6 The Contractor shall protect and maintain equipment provided by the Employer while it is on the Site and shall provide operatives, fuel and other consumables required to operate the equipment.

7.2 Materials

7.2.1 General

- 7.2.1.1 Materials for inclusion in the Permanent Works shall be new unless otherwise stated in the Contract or having been reviewed without objection by the Employer's Representative.
- 7.2.1.2 Certificates of tests by manufacturers, which are submitted to the Employer's Representative, shall relate to the material delivered to the Site. Certified true copies of certificates may be submitted if the original certificates cannot be obtained from the manufacturer. A letter from the supplier stating that the certificates relate to the material delivered to the Site shall be submitted with the certificates.
- 7.2.1.3 Materials, which are specified by means of trade or proprietary names, may be substituted by materials from a different manufacturer, provided that the materials are of the same or better quality and comply with the specified requirements and have been reviewed without objection by the Employer's Representative.
- 7.2.1.4 In addition to any special provisions in the Contract for the sampling and testing of materials, the Contractor shall submit samples of all materials and goods which it propose to use or employ in or for the Works. Such samples, if having been reviewed without objection, shall be retained by the Employer's Representative and shall not be returned to the Contractor or used in the Permanent Works unless reviewed by the Employer's Representative. No materials or goods of which samples have been submitted shall be used in the Works unless and until the Employer's Representative shall have reviewed such samples without objection.

7.2.1.5 The Employer's Representative may reject any materials and goods which in his opinion are inferior to the samples previously reviewed and the Contractor shall promptly remove such materials and goods from the Site.

7.2.1.6 If any material required for this Contract is not available in metric specifications from any known sources, at the time the material is required for the Contract, the Employer's Representative may, upon application from the Contractor, give permission to the use of an equivalent material in imperial specifications as a substitute, provided that:

- (1) no statutory specification shall be altered except in accordance with relevant legal provision, if any;
- (2) the Employer's Representative is satisfied that the Contractor has made every reasonable effort to obtain the material in metric specifications;
- (3) in the opinion of the Employer's Representative, the substitute material is suitable for the Works in all respects;
- (4) in the opinion of the Employer's Representative, the substitute material complies with all the specifications for the material substituted, allowing minor discrepancies between the specified metric measurements and the corresponding imperial measurements of the substitute, provided that such discrepancies can be effectively and satisfactorily compensated for by the provision of extra quantity of the material; and
- (5) the Contractor shall be responsible for all extra quantities of the material required for meeting design and specification requirements of the Works due to the use of the substitute.

7.2.1.7 Hardwood shall not be used for Site hoardings, shoring of trenches and pits, falsework or formwork.

7.2.2 Notice of place of manufacture and/or source of supply

The Contractor shall notify the Employer's Representative of the places of manufacture and/or the source of supply of all goods and materials previously reviewed without objection by the Employer's Representative to be incorporated into the Permanent Works. The Contractor shall give reasonable notice (which shall not in any event be less than 56 days) to the Employer's Representative before the start of any manufacturing and/or the supply of goods and materials.

7.2.3 Certificates for Manufactured Goods or Materials

The Contractor shall obtain certificates for each batch of goods and materials incorporated into the Permanent Works. Each certificate shall certify that the materials comply with the requirements of the Contract and shall include all reports of inspections and/or tests carried out at the place of manufacture.

7.3 Equipment

7.3.1 Identification labels

7.3.1.1 Each and every individual item of equipment forming part of the Permanent Works shall be fitted with permanent identification labels in accordance with a system based on the contract identification. In this respect, the term "individual item of equipment" refers to a complete assembly of components and to each removable sub-module within the complete assembly.

7.3.1.2 The proposed labelling system shall be submitted for review by the Employer's Representative at least 1 month before the scheduled date for the shipment of the first item of equipment to site.

7.3.1.3 The identification label shall be permanently attached in such a way that it shall not become detached or illegible during the lifetime of the system from any cause including wear and tear, environmental effects (such as rain, direct sunlight, etc.)

or any other influence. Preference shall be given to embossed or engraved metallic labels mechanically fastened by riveting or similar means to the item to which they refer.

7.3.1.4 All labels shall be easily cleaned to remove dirt and debris (including grease and oil) without disturbing the legibility properties.

7.3.1.5 All labels shall incorporate the inscription "Property of J.M.R.C".

7.4 Electronic Control Racks & Cabinets

7.4.1 Racks & Cabinets

7.4.1.1 Electronic control equipment shall be housed in 19" racking suitably enclosed in metal cabinets of a type acceptable to the Employer's Representative

7.4.1.2 The equipment shall be of modular construction to facilitate maintenance, repair and replacement of parts. Standard commercial parts shall be utilised to the maximum extent possible.

7.4.1.3 Cubicles, Equipment Racks, cable and wiring Termination Racks shall not be filled to greater than 80% of their capacity at the completion of the works.

7.4.1.4 There shall be a minimum walkway of 1000mm between equipment racks. However in case of space constraint requirement of minimum walkway may be revised by employer.

7.4.1.5 The equipment shall be suitable for the environment in which it is to be used and it shall be designed to prevent ingress of all vermin and to minimise the ingress of moisture, dust and dirt.

7.4.1.6 Outdoor equipment shall be sealed against the ingress of dust, moisture and vermin. A minimum IP rating of IP65 under IEC529 is essential.

7.4.1.7 No item of equipment which is removable as part of routine maintenance procedures shall be preferably mounted at more than 2.0m above floor level.

7.4.2 Cables

7.4.2.1 No joints or splices shall be permitted in cables or wires except at recognised termination points.

7.4.2.2 All multi-core cables shall allow 20%, as spares, unless otherwise specified in the PS.

7.4.2.3 All cable cores shall be terminated including all spare conductors, unless otherwise specified in the PS

7.4.2.4 Each cable shall be uniquely numbered and identified with a label giving details of the circuit carried.

7.4.2.5 Terminals carrying voltages exceeding 50 volts shall be uniquely identified and protected against accidental contact by persons, test equipment or other unintended physical contact. Similarly all bus bars shall be suitably identified and protected.

CHAPTER 8

8. PACKAGING, STORAGE, SHIPPING AND DELIVERY

8.1 Storage of Equipment

8.1.1 The Contractor shall provide and maintain acceptable storage facilities for the Permanent Works, equipment and materials of all kinds intended for use in carrying out the Works or for incorporation into the Works.

8.1.2 The Contractor shall prepare, protect and store in an agreed manner all Permanent Works, Contractor's Equipment, equipment and materials so as to safeguard them against loss or damage from repeated handling, from climatic influences and from all other hazards arising during shipment or storage on or off the Site.

8.1.3 Secure and covered storage shall be provided by the Contractor for all Permanent Works, Contractor's Equipment, equipment and materials which are other than those having been reviewed without objection by the Employer's Representative as suitable for open storage

8.2 General Precautions

8.2.1 Spare parts shall be tropicalised in their packing for prolonged storage in accordance with equivalent International /Indian standard and shall be suitably and individually labelled to indicate following (unless not required or applicable):

- (1) shelf life and date of manufacture;
- (2) type or condition(s) of storage and special handling information;
- (3) description of item and relevant part number;
- (4) serial number, if applicable;
- (5) inspection/test certificate number and batch number; and
- (6) Contract number, variation order number and item number.

8.2.2 Tubes, cable, conductor and rigid OHE ends and other similar openings shall be properly sealed and blanked off to prevent ingress of dirt or moisture. Flanged ends shall be protected by adhesive tape or jointing material covered by a properly secured wooden blank not smaller than the flange itself. Plain tube ends shall be closed off with bungs or plugs or suitable materials firmly fixed in position.

8.2.3 Appropriate precautions in accordance with the Contractor's safety regulations, the regulations of the Employer, and statutory regulations shall be taken in respect of all hazardous, toxic, inflammable, etc. materials.

8.3 Packaging Procedures

8.3.1 All required inspection/test certificates shall be supplied and packed together with individual material. All packaging materials and procedures shall be subject to review by the Employer's Representative.

8.3.2 All empty cases, crates or packages, whether or not returnable, shall be removed from the Site by the Contractor or stored by the Contractor in such a way that they do not interfere with the progress of the works of Project Contractors.

8.4 Shipping

8.4.1 Two copies of packing lists and quality certificates shall be attached to each case or package to be shipped. One copy shall be placed inside the package and the second

copy shall be enclosed in a watertight enclosure on the outside of each case or package. A copy of packing lists and quality certificates shall be sent to the Employer's Representative after each package of the Works, the equipment, spare parts and other items to be shipped have been shipped.

8.4.2 Without prejudice to any other provisions of the Contract, the Contractor shall be responsible for all legal requirements, duties, dues, taxes and other such requirements and expenditures required for the importation of the Works, the equipment, spare parts and other items to be supplied under the Contract into Jaipur.

8.4.3 The Contractor shall clear the Works, the equipment, spare parts and other items to be supplied under the Contract through Jaipur customs/Indian sea port in accordance with all Government of India Enactments.

8.5 Delivery

8.5.1 The Contractor shall deliver the Works and all items to be supplied under the Contract to the Site.

8.5.2 The Contractor shall unload the Works and all items to be supplied under the Contract at the designated delivery point and positioning or storing them.

8.5.3 Any part of the Works or any item to be supplied under the Contract that is damaged in transit shall not be considered as delivered until repairs or replacements have been made and all necessary spare parts or items have been delivered to the Site.

8.5.4 All documents, manuals, drawings and other deliverables shall be delivered to an address in Jaipur to be designated by the Employer's Representative in writing.

8.5.5 The Contractor shall store and secure the Works, equipment, spare parts and other items until the same have been inspected and are considered delivered at the designated point by the Employer's Representative.

8.5.6 The Contractor shall remove temporary fittings required for shipment and re-assembly of equipment and shall complete this prior to the equipment or parts thereof being inspected and before they are considered delivered.

8.5.7 An item shall be considered delivered when all damage has been repaired and all documentation and post-delivery preparation have been completed to the satisfaction of the Employer's Representative.

CHAPTER 9

9. TESTING AND COMMISSIONING

Testing and Commissioning shall comply with all the requirements of the GCC supplemented, amplified, modified or superseded as applicable by this Specification and the PS.

9.1 General

9.1.1 The Contractor shall perform all testing and commissioning activities to satisfactorily demonstrate the performance of the Works within the framework of the Completion Management Plan.

9.1.2 The Contractor's activities shall include but are not limited to the following:

- (1) provision of all labour and experienced supervision to perform all inspections and tests required to demonstrate the performance of the Works;
- (2) preparation of that portion of the Commissioning Plan that applies to the Works to a level of detail acceptable to the Employer's Representative;
- (3) performance of all duties and responsibilities, as specified in the Commissioning Plan;
- (4) participation in the Commissioning Team that shall develop, review and implement the Commissioning Plan. As a participant of the Commissioning Team, the Contractor shall provide personnel and technical support to the Employer and the Employer's Representative in the Commissioning of the Project;
- (5) performance of the testing and commissioning for all systems forming part of the Works in a manner which is fully co-ordinated with other Contractors, the Employer and the Employer's Representative;
- (6) provision of all required testing and specialised equipment and materials including consumables required to support the testing and commissioning pre-operations activities; and
- (7) removal and appropriate disposal of any toxic or other spoils (e.g. cable drums, depleted filters, oils, and fluids) created as a result of the Contractor's construction, testing and commissioning activities.

9.1.3 The Contractor shall provide full access for the Employer and Employer's Representative to witness any test or inspection.

9.1.4 The Employer and the Employer's Representative will bear their own costs for attendance at witnessed inspections or tests (other than re-tests) scheduled in accordance with the agreed Works Programme and subject to notice in accordance with the Specification.

9.2 Manufacturing Test Plan

9.2.1 The Manufacturing Test Plan is the Contractor's plan for carrying out the necessary procedures to ensure that the items presented for acceptance by the Employer and the Employer's Representative are in compliance with the requirements of the Specification.

9.2.2 During the process of procurement and manufacture of the system components the Contractor shall undertake such testing and inspection as is required by the Quality Plan referred to in clause 5.5 above.

9.2.3 The Employer and the Employer's Representative will not become involved in the Contractor's Manufacturing Tests except in respect of the following:

- **Type Test; and First Article Inspection.**

9.2.4 Before shipment of any items to Site the Contractor shall present the items for the first stage of Acceptance according to the Commissioning Plan as detailed in clause 9.3 below.

9.2.5 Inspection

9.2.5.1 The Contractor shall be wholly responsible for all inward inspection of items to be incorporated into the system as a whole.

9.2.5.2 Equipment issued by the Employer shall not be subject to Type Tests or **First Article Inspection** however the Contractor shall undertake **Inspection** as referenced in clause 7.1 above. Should the Employer's issued equipment be subsequently incorporated into another manufactured item then the whole item shall be subject to both **Type Tests** and **First Article Inspection**.

9.2.6 Type Tests

9.2.6.1 Type tests will not be required in those cases where the Contractor can produce certified evidence that the required type tests have been performed successfully on identical equipment or equipment which is, for practical test purposes, similar and produced in the factory where the equipment offered is to be manufactured.

9.2.6.2 Evidence to this effect submitted during the Tender period shall be resubmitted, this and any further submissions for waiver of Type Testing shall be submitted for review by the Engineer's Representative no later than two months before the scheduled date for shipment of the item to site.

9.2.6.3 Not Used.

9.2.6.4 Type tests are not required if previously independently witnessed tests have been successfully carried out. Where only some of the required tests have been carried out, the Employer's Representative may agree to selected type tests being carried out individually rather than as part of a sequence.

9.2.6.5 The Contractor shall conduct the tests in accordance with the reviewed test procedures, and shall enter the results in the result sheets. Full use shall be made during the tests of operator manuals and other documentation provided by the Contractor, to provide a series of tests of their accuracy.

9.2.6.6 Not Used.

9.2.6.7 For each test, the Employer's Representative will determine whether the item under test has passed or failed. In general, the test will be considered to have failed if either:

- The result of the test is not in accordance with the expected result described in the test procedure, or
- The result of the test is in accordance with the expected result described in the test procedure, but some other unexpected or unexplained event occurred which the Employer's Representative considers to be a fault.

9.2.6.8 If during Type Tests, any failure occurs or the equipment design is changed, it shall be reported to the Employer's Representative who may, at his discretion, require repetition of the previous tests at the Contractor's cost.

9.2.7 First Article Inspection

- 9.2.7.1 FAI shall be performed jointly by the Employer and the Employer's Representative and the Contractor on all major equipment items or sub-systems identified by the Employer's Representative.
- 9.2.7.2 Equipment shall be shipped from the point of manufacture only after a FAI has been completed or the requirement waived in writing by the Employer's Representative.
- 9.2.7.3 The Contractor shall provide a minimum of 15 working days notice to the Employer's Representative before any FAI. Other than the FAI, the Contractor shall give the Employer's Representative notice of all Quality Control Points and Quality Hold Points involving inspections and/or tests by the Contractor in accordance with clause 9.8.1 below.
- 9.2.7.4 At least 15 days prior to each FAI, the latest drawings, inspection and test procedures, specifications and quality documentation required for adequate inspection of the equipment under inspection shall be submitted to the Employer's Representative. The drawings shall be complete to the lowest level replaceable unit.
- 9.2.7.5 The Contractor shall ensure that he and his subcontractors are prepared for all FAIs. The Contractor shall not schedule more than one FAI on the same day without prior notice of No Objection by the Employer's Representative.
- 9.2.7.6 The FAI shall enable the Employer and the Employer's Representative and the Contractor to jointly establish the quality of workmanship for the balance of like components.
- 9.2.7.7 The FAI shall not be conducted until the design drawings of the equipment have been reviewed. If drawings with outstanding comments are used, the Employer's Representative's comments shall be satisfied at the FAI and represented by the inspected equipment.
- 9.2.7.8 Not Used.
- 9.2.7.9 The Contractor shall be responsible for the cost and scheduling, to the Employer and the Employer's Representative's convenience, of any repeat testing of items which fail FAI.

9.2.8 Factory Acceptance Test

- 9.2.8.1 Before shipment all manufactured items or systems shall undergo FAT in accordance with the requirements of the PS. The First Article Inspection Test can also be clubbed as part of FAT, if agreed by the Employer's Representative.

9.3 Commissioning Plan

- 9.3.1 The Commissioning Plan is the Employer and the Employer's Representative's tool for managing and co-ordinating the Testing, Commissioning, Training and Service Trial activities. The Commissioning Plan will be divided into the following sub-plans:

- (1) Factory Testing Plan (see clause 3.5.3 above and PS)
- (2) On-Site Testing and Commissioning Plan

9.3.2 Testing and Commissioning Phases

- 9.3.2.1 Testing and Commissioning activities shall be undertaken in the following phases:

- (1) **Factory Acceptance Test** (which requirements are specified in clause 3.5.3 above);
- (2) **9.4.3 Installation Tests;**

- (3) **9.4.4 Partial Acceptance Tests;**
- (4) **System Acceptance Tests;**
- (5) **Integration Testing & Commissioning; and**
- (6) **Service Trial.**

9.3.3 Items (3), (4), (5) and (6) as required by the PS constitute the Tests on Completion referred to in the GCC.

9.4 On-Site Testing and Commissioning Plan

9.4.1 The Contractor shall prepare and submit for review by the Employer's Representative the Contractor's On-Site Testing and Commissioning Plan detailing and explaining how the Contractor will plan, perform and document all tests and inspections that will be conducted to verify and validate the Works on Site. The On-Site Testing and Commissioning Plan shall consist of a narrative description supported by graphics, diagrams and tabulations as required.

9.4.2 The On-Site Testing and Commissioning Plan shall contain, but not be limited to, the following topics:

- (1) the Contractor's strategy for testing and commissioning all constituent parts of the Works and how this relates to the sequence of construction and installation;
- (2) the sequencing and interrelationships of the inspections and tests.
- (3) the interdependency and interaction with other Contractors and their commissioning programmes;
- (4) the type and extent of testing and commissioning to be undertaken and the parts of the Works to be proven by that testing;
- (5) the objective of each test, what particular design and operating criteria the test or inspection will prove and how the success of the test will be demonstrated or measured;
- (6) organisation chart and CV of key personnel in testing and commissioning team;
- (7) the plan for the production and submission of the testing and commissioning procedures to the Employer's Representative for review including the submission of the testing and commissioning reports and records; and
- (8) the On-Site Testing and Commissioning Plan shall be organised and submitted in the stages described in clauses 9.3.2 above, 9.4.3 below & 9.4.7 below.

9.4.3 Installation Tests

9.4.3.1 The Installation Tests phase is defined as being the final stage of assembly/installation before the start of commissioning itself. The Installation Tests are to be performed by the Contractor under the Contract and may be witnessed by the Employer or the Employer's Representative. During this phase, the Contractor shall perform static testing of components and/or systems in preparation for Partial Acceptance Testing.

9.4.3.2 The particular requirements for Installation Tests are prescribed in the PS. Where performance across interfaces to other Contractors or to other parties is required to be verified, the Contractor shall liaise with the interfacing party to co-ordinate the test procedures and programme in the manner prescribed in clause 3.3.2 above.

9.4.3.3 The Contractor shall prepare one copy of a test report immediately after the completion of each test whether or not witnessed by the Employer or the Employer's

Representative. If the Employer or the Employer's Representative has witnessed the test, he will countersign the report to indicate his agreement to the information and conclusions (i.e. whether or not the equipment being tested has passed satisfactorily) contained therein. If the Employer or the Employer's Representative has not witnessed the test (i.e. if a written waiver has been granted), the Contractor shall forward copy of the test report without delay to the Employer's Representative.

- 9.4.3.4 The Employer's Representative will countersign the report to indicate his agreement to the information and conclusions (i.e. whether or not the equipment being tested has passed satisfactorily). Where the results of the test do not meet the requirements of the Specification, the Employer or the Employer's Representative may call for a re-test.
- 9.4.3.5 Test equipment and instrumentation shall be subject to calibration test, if required by Employer's Representative, within a properly controlled calibration scheme, and signed calibration certificates shall be supplied to the Employer's Representative. Such calibration checks shall be undertaken prior to testing and, if required by the Employer or the Employer's Representative, shall be repeated afterwards.
- 9.4.3.6 The Contractor shall submit to the Employer's Representative a comprehensive schedule of tests as required by the PS giving full details and procedures for each test to be carried out under the Contract and including the pass / fail criteria (i.e. the standards or limits to be achieved).

9.4.4 Partial Acceptance Tests

- 9.4.4.1 Partial Acceptance Tests are defined as the performance of functional tests of sections, areas, or stages of a system. The Partial Acceptance Tests are part of the Tests on Completion to be performed by the Contractor under the Contract in order to achieve Employer's Taking Over of the Works. . On satisfactory completion of the Partial Acceptance Tests, the tested items will be considered available for Systems Acceptance Testing.
- 9.4.4.2 The particular requirements for Partial Acceptance Tests are prescribed in the PS.
- 9.4.4.3 The Contractor shall submit to the Employer's Representative a comprehensive Partial Acceptance Tests Plan including all requirements detailed in the PS. The plan shall be submitted on a logical section-by-section basis, using a "top-down" approach describing the testing and commissioning strategies and processes clearly showing how these serve to provide the full verification of the systems and equipment.
- 9.4.4.4 The Partial Acceptance Tests Plan shall identify a comprehensive list of specifications, standards, method statements, procedures, pass/fail criteria, sample records, resources to be made available, drawings and records to be submitted to the Employer's Representative, and a programme showing the dates for testing and for submission of each test procedure.
- 9.4.4.5 Test procedures shall be carefully planned to ensure that the work can be executed in the time available. If the available time is restricted, this planning shall include contingency plans to be implemented if testing proceeds slower than anticipated or if defects are discovered that necessitate rectification and subsequent repeat testing, etc.
- 9.4.4.6 If any working equipment is relocated or altered by the Contractor during the execution of the Works, thorough re-testing shall be performed to verify that the equipment remains fully functional and operates safely according to its specification. The testing to be performed shall be no less rigorous than the procedures used for the original testing and commissioning of the equipment.

- 9.4.4.7 Not Used.
- 9.4.4.8 The Contractor shall during the execution of the Works prepare such reports and records of design, manufacture, installation, erection and testing as may be required in order that any relevant licences or approvals (including any statutory approvals) may be issued or granted. Such records shall be adequate to enable the system or its respective part to be commissioned and to meet the requirements of the licensing authority or statutory body.
- 9.4.4.9 Immediately following the successful Partial Acceptance Testing of the system or any constituent part, the Contractor shall complete the appropriate Partial Acceptance Tests records in the agreed format and submit a signed copy to the Employer's Representative.
- 9.4.4.10 The Contractor shall include a complete schedule of all Partial Acceptance Tests records and their current status within the Monthly Progress Report.
- 9.4.5 System Acceptance Tests**
- 9.4.5.1 System Acceptance Tests are defined as the tests undertaken to demonstrate that the Works in its entirety is capable of functioning in accordance with the specified requirements in the Contract in all respects. The System Acceptance Tests are part of the Tests on Completion to be performed by the Contractor under the Contract in order to achieve Employer's Taking Over of the Works. The System Acceptance Tests may commence before remote operations capability (if any) is fully functional. . On satisfactory completion of the System Acceptance Tests, the tested items will be considered available for Integrated Testing & Commissioning.
- 9.4.5.2 The particular requirements for System Acceptance Tests are prescribed in the PS.
- 9.4.5.3 The Contractor shall submit to the Employer's Representative a comprehensive System Acceptance Tests Plan including all requirements detailed in the PS. The plan shall be submitted on a section by section basis to demonstrate how the System Acceptance Tests are to be carried out. The plan shall adopt a top down approach and describe the system completion strategy and process.
- 9.4.5.4 System Acceptance Tests shall comprise comprehensive testing of the assembled installation to ensure that it operates in accordance with the requirements of the PS.
- 9.4.5.5 The tests shall include, but not be limited to, the following:
- (1) tests of all functional and performance requirements for the system;
 - (2) tests of behaviour under failure conditions, e.g. changeover to redundant hardware; initiation of re-configuration functions or reverse modes of operation; and recovery of the equipment and system from failure.
- 9.4.5.6 The System Acceptance Test Plan shall identify a comprehensive list of specifications, standards, method statements, procedures, pass / fail criteria, sample records, resources to be made available, drawings and records to be submitted to the Employer's Representative, and programme showing the dates for testing and for submission of each test procedure.
- 9.4.5.7 Test procedures shall be carefully planned to ensure that the work can be executed in the time available. If the available time is restricted, this planning shall include contingency plans to be implemented if testing proceeds slower than anticipated or if defects are discovered that necessitate rectification and subsequent repeat testing, etc.

9.4.5.8 Immediately following the successful acceptance testing of the system, the Contractor shall complete the appropriate commissioning records in the agreed format and submit a copy to the Employer's Representative.

9.4.5.9 The Contractor shall include a complete schedule of all System Acceptance Test records and their current status within the Monthly Progress Report.

9.4.6 Integration Testing & Commissioning

9.4.6.1 Integrated Testing & Commissioning are defined as the final tests to be undertaken before the commencement of Service Trial. The Integrated Testing & Commissioning are part of the Tests on Completion to be performed by the Contractor under the Contract in order to achieve Employer's Taking Over of the Works. The Integrated Testing & Commissioning shall demonstrate the full compatibility between all interfacing systems. On satisfactory completion of the Integrated Testing & Commissioning, the tested items will be considered available for Service Trial.

9.4.6.2 The particular requirements for Integrated Testing & Commissioning are prescribed in the PS.

9.4.6.3 The Contractor shall submit to the Employer's Representative a comprehensive Integrated Testing & Commissioning Plan as required by the PS. The plan shall be submitted on a logical section-by-section basis, using a "top-down" approach describing the testing and commissioning strategies and processes clearly showing how these serve to provide the full verification of the systems and equipment in context of the complete railway system.

9.4.6.4 The Contractor shall co-ordinate with the Employer and the Employer's Representative and with all interfacing parties to ensure that the proposed test programme and schedule truly demonstrate that the full specified performance requirements are achieved.

9.4.6.5 The tests shall include, but shall not be limited to the following:-

- (1) test of all functional and performance requirements for the system;
- (2) test to demonstrate compliance with all interface specifications; and
- (3) test of behaviour under failure conditions (e.g. changeover to redundant hardware, initiation of re-configuration functions or reversionary modes of operation, recovery of systems and equipment from failure, demonstrations of planned emergency procedures, etc.)

9.4.6.6 The Integrated Testing & Commissioning Plan shall identify a comprehensive list of specifications, standards, method statements, procedures, pass/fail criteria, sample records, resources to be made available, drawings and records to be submitted to the Employer's Representative, and a programme showing the dates for testing and for submission of each test procedure.

9.4.6.7 Test procedures shall be carefully planned to ensure that the work can be executed in the time available. If the available time is restricted, this planning shall include contingency plans to be implemented if testing proceeds slower than anticipated or if defects are discovered that necessitate rectification and subsequent repeat testing, etc.

9.4.6.8 Immediately following the successful Integrated Testing & Commissioning of the system or any constituent part, the Contractor shall complete the appropriate commissioning records in the agreed format and submit a signed copy to the Employer's Representative.

9.4.6.9 The Contractor shall include a complete schedule of all Integrated Testing & Commissioning records and their current status within the Monthly Progress Report.

9.4.7 Service Trial

- 9.4.7.1 Service Trial is defined as the final test of the fixed equipment, the rolling stock, and the operational procedures including the final elements of the Tests on Completion to demonstrate that the system in its entirety can operate satisfactorily. The Service Trial is performed by the Employer with attendance by the Contractor under the Contract in order to achieve Employer's Taking Over of the Works. During this phase, the system will be run to the published timetable but without fare-paying passengers. This phase also allows for Validation of the training procedures in a real time environment.
- 9.4.7.2 The Commissioning Team in conjunction with the Employer will develop the Service Trial Plan. Operations Department and will serve to organise and co-ordinate all on-Site activities.
- 9.4.7.3 The particular requirements for tests to be undertaken during the Service Trial are prescribed in the PS.
- 9.4.7.4 The Contractor shall provide special and general attendance to the Employer and the Employer's Representative during the Service Trial period as required by the PS.
- 9.4.7.5 The Contractor shall co-operate with the Employer and the Employer's Representative and with all interfacing parties to ensure that the proposed Service Trial programme and schedule truly demonstrates that the full, specified performance requirements and operating parameters are achieved.
- 9.4.7.6 The Contractor shall review and comment on the Employer's Representative's Service Trial Plan and shall identify specifications, standards, method statements, procedures, pass / fail criteria, to the Employer's Representative for inclusion in the Plan.
- 9.4.7.7 The Contractor shall not interfere with the Service Trial tests and Validations in any manner. Any need for remedial works required to be performed by the Contractor shall be co-ordinated with the Employer and the Employer's Representative in advance.
- 9.4.7.8 Immediately following the successful tests of the system or any constituent part during Service Trial the Contractor shall complete the appropriate commissioning records in the agreed format, submit 3 signed copies to the Employer's Representative and may then apply for the Taking over Certificate in accordance with the requirements of the GCC.
- 9.4.7.9 The Contractor shall include a complete schedule of all Service Trial records and their current status within the Monthly Progress Report.

9.5 Activity of the Employer and the Employer's Representative

- 9.5.1 The Employer and the Employer's Representative will establish a Commissioning Team and a Site Co-ordination Team at appropriate stages of the Project. These teams will comprise representatives of all interested parties including not more than two representatives of the Contractor, subject to review by the Employer and the Employer's Representative. In accordance with the Commissioning Plan, the Commissioning Team shall advise and plan to co-ordinate the activities of the Contractor to ensure the Employer and the Employer's requirements are met.
- 9.5.2 The Contractor shall participate in the activities of the Commissioning Team and Site Co-ordination Team in addition to its own testing and commissioning or as directed by the Employer or the Employer's Representative.

9.6 Records and Reports

- 9.6.1 The Contractor shall submit to the Employer's Representative for review not less than three months before commissioning activities commence his proposed format for the commissioning records. The records shall be appropriately sub-divided to make provision for the various parts of the Permanent Works covered by the Contract.
- 9.6.2 The format of the records shall cover all mechanical and electrical tests, provide positive identification by serial number for assemblies and sub-assemblies of the Permanent Works and show modifications to Employer's Drawings and diagrams or "as built" data to be certified by the Employer or the Employer's Representative in the course of installation, testing and setting to work of the Works.
- 9.6.3 The Contractor shall, during the execution of the Works, prepare such reports and records of design, manufacture, installation and testing as may be required in order that a licence may be issued or statutory requirements may be met or approval given. Such reports or records shall be adequate to enable each part of the Permanent Works to be commissioned and to meet the requirements of the licensing authority or any standing statutory regulations, and shall be reviewed by the Employer and the Employer's Representative.
- 9.6.4 The Contractor shall obtain reports of each inspection and/or test. Such reports shall show the results of all the inspections and/or tests carried out and shall certify that the work has been inspected and/or tested in accordance with the requirements of the Contract and that the work complies with the requirements of the Contract.
- 9.6.5 Any analysis of the results required to confirm that the work complies with the requirements of the Contract shall be compiled and reported to the Employer's Representative in accordance with Chapter 4.
- 9.6.6 A representative of the Contractor who has been allocated the required authority under the relevant quality plans shall sign each report of inspection and/or test.
- 9.6.6.1 Each report of inspection and/or test shall include the appropriate details of:-
- (1) the description of the item or goods subjected to the test or inspection;
 - (2) if applicable, the batch from which the samples were taken for test, the size and description of samples and the method of sampling;
 - (3) the place of testing;
 - (4) the date and time of tests;
 - (5) the environmental conditions;
 - (6) the technical personnel supervising or carrying out the test or inspection;
 - (7) the properties tested or inspected;
 - (8) the method of testing or inspection;
 - (9) all relevant checklists and work sheets used during the inspection and/or test, including the readings and measurements taken during the tests; and
 - (10) the test results, including any calculations and graphs.
- 9.6.7 After Commissioning of a part of the Works, the Contractor shall complete each commissioning record in the agreed format and shall forward copies of the record to the Employer's Representative for review.
- 9.6.8 The Contractor shall submit within its Monthly Progress Report a complete schedule of his commissioning records showing completion dates, target completion dates and status.
- 9.6.9 Timing for Reports of Inspection and/or Test**

The Contractor shall ensure that a signed copy of each report of inspection and test is filed in his filing system within 3 (three) working days of the date of inspection and test.

9.6.10 Quality Control Register

The Contractor shall provide and maintain at all stages of the work a quality control register or registers to identify the status of inspections, sampling and testing of the work and all certificates in accordance with Quality Control Register in Chapter 5.

9.6.11 Summaries of Inspection and/or Test

The Contractor shall submit to the Employer's Representative for his information summaries based on each quality control register showing the type and amount of certification received and the inspection and/or testing undertaken on each element of the Works. Such summaries shall reach the Employer's Representative's office before the 7th working day of the month. The summaries shall identify and demonstrate the compliance of such certification, inspection and/or testing with the requirements of the Contract and shall identify any item which does not conform to the requirements of the Contract.

9.7 Test Equipment and Facilities

9.7.1 The Contractor shall provide all equipment and services required for testing.

9.7.2 All test instruments shall be subject to routine inspection, testing and calibration by the Contractor.

9.7.3 Details of all test instruments shall be submitted for review by the Employer's Representative and, if required by the Employer or the Employer's Representative, shall be calibrated at the expense of the Contractor by an independent standards laboratory.

9.7.4 All test equipment must be capable of operating from the mains supply (230V AC 50Hz).

9.7.5 Not Used.

9.7.6 The Contractor shall ensure that all inspection and test equipment is calibrated in accordance with the specified standards or, if such standards are not applicable to certain test and inspection equipment, with systems and programmes of calibration which have been reviewed without objection by the Employer's Representative.

9.7.7 The Contractor shall ensure that documented evidence of instrument calibration is maintained and made available to the Employer or the Employer's Representative on request.

9.8 Witnessing by the Employer and the Employer's Representative

9.8.1 Notice for Trial, Inspection and/or Test to the Employer's Representative

9.8.1.1 In relation to all Quality Control Points and Quality Hold Points involving inspection and/or testing by the Contractor, the Contractor shall give the Employer's Representative notice of when the relevant work will be inspected and/or tested using the form in Appendix 6 of this Specification. The period of notice shall be as stated in the PS or such period as in the opinion of the Employer's Representative is reasonable and notified to the Contractor. In the absence of any such statement or notice, a reasonable period of notice shall be given by the Contractor provided that:

- (1) in the case of on-Site work, such notice shall be given not less than 72 hours of normal working time before the work is to be inspected and/or tested;

- (2) in the case of work carried out off-Site in Jaipur, such notice shall be given not less than 5 days before the work is to be inspected and/or tested; and
- (3) in the case of work carried out outside Jaipur, such notice shall be given not less than 14 working days before the work is to be inspected and/or tested.

9.8.1.2 In relation to all inspection and/or testing notified by the Contractor, the Employer and the Employer's Representative may elect to witness such inspections and/or tests but the Contractor may proceed with the inspections and/or tests notwithstanding the absence of the Employer or the Employer's Representative or of any response to the said notice.

9.8.1.3 If the Contractor is in any doubt whether inspection and/or testing by the Employer's Representative is required as a Quality Hold Point, the Contractor shall request that the Employer's Representative clarifies his requirements prior to submitting the relevant inspection and testing plan for review, and in any event not later than 30 days.

9.8.2 Timing for Inspection and/or Test by the Employer and the Employer's Representative

9.8.2.1 The Contractor shall allow the Employer and the Employer's Representative a reasonable time to carry out any inspection and/or testing and to assess the result of any inspection and/or test before proceeding with the Works.

9.8.2.2 Unless the Employer's Representative's prior review without objection has been obtained, all inspections and/or tests to be carried out or witnessed by the Employer and the Employer's Representative shall be carried out between 0800 and 1800 hours.

9.8.3 Failure to Notify the Employer's Representative

The Employer or the Employer's Representative may reject the test and test results in question, and require the test to be repeated in the event of any failure by the Contractor to notify the Employer's Representative in accordance with clause 9.8.1.1 above.

9.9 Failures

9.9.1 The Contractor shall correct all faults found during testing, and shall arrange for the relevant tests to be repeated. The relevant tests shall only be repeated when the fault has been remedied and the equipment demonstrated to function correctly.

9.9.2 Where remedial measures involve significant modifications that might, in the Employer's Representative's opinion, affect the validity of earlier tests, the Contractor shall repeat the earlier tests and obtain results satisfactory to the Employer and the Employer's Representative before repeating the test in which the fault was first identified.

9.9.3 The Employer or the Employer's Representative shall have the right to order the repeat or abandonment of any test in the event that results demonstrate that the equipment is significantly non-compliant with the Contract.

9.9.4 The Employer or the Employer's Representative shall have the right to suspend any test in the event that errors or failures have become unacceptable. The Employer or the Employer's Representative shall also have the right to suspend any test if a fault was detected by the Contractor but not reported to the Employer's Representative within 24 hours of the detection. In this event, the suspension shall remain in effect until reporting has been brought up to date to the satisfaction of the Employer and the Employer's Representative.

9.10 Repeat Tests

9.10.1 The Contractor shall correct and re-test every fault detected during the tests.

- 9.10.2 If the test results in a failure of the item under test the provisions of GCC clause 7.5 shall apply.

9.11 Fault Categories

- 9.11.1 The Employer's Representative will allocate a category to each fault, which shall determine the future conduct of tests.

9.12 Fault Log

- 9.12.1 The Contractor shall maintain a fault log throughout each series of tests. Every fault detected during the tests will be entered in the log, together with the actions taken to clear and re-test the fault.
- 9.12.2 The fault log will be retained as part of the permanent quality assurance record for the system and be subject to regular inspection by the Employer's Representative.

9.13 Hardware Failure Reports

- 9.13.1 For each hardware failure that occurs at any stage of testing, the Contractor shall investigate the failure and prepare a report on its cause(s) and design implications, if any, resulting from such failure.
- 9.13.2 All such reports will be retained as part of the permanent quality assurance record for the system, which shall be subject to inspection by the Employer's Representative.

9.14 Software Failure Reports

- 9.14.1 For each software failure that occurs, once the software has been reviewed without objection for inclusion into the system and is subject to configuration control, the Contractor shall generate a software failure report.
- 9.14.2 All such reports will be retained as part of the permanent quality assurance record for the system, which shall be subject to inspection by the Employer's Representative.
- 9.14.3 The report shall clearly show:
- (1) the observed symptoms;
 - (2) the likely cause;
 - (3) the fault category (from Table 9.1); and
 - (4) the operator input.

9.14.4 The report shall also clearly show the following information which shall be entered when the failure has been investigated:

- (1) the actual cause of the failure;
- (2) the corrective action taken; and
- (3) all software modules affected.

CHAPTER 10

10. TRAINING

10.1 Training Requirements

10.1.1 The Contractor shall provide comprehensive training to the Employer's staff, IF PROVISION OF TRAINING IS IN THE SCOPE OF CONTRACTOR, to enable all of the systems and equipment supplied, installed or modified as part of the Works to be operated and maintained in the designed manner safely and efficiently so as to achieve the maximum reliability and economy, and to meet the requirements of the Employer's programme.

10.1.2 To achieve the objective, it will be necessary to train the Employer's staff, including Employer's Training Instructors (ETI). The Contractor shall submit to the Employer's Representative for review and critique the range of staff for which training is recommended and a Training Plan to be proposed by the Employer and as stated in PS in accordance with clause 3.7.4 above.

10.1.3 The recommendation shall include details of training equipment necessary and appropriate to achieve the training objectives.

10.1.4 The Training Plan shall provide a structured training programme to educate and train the personnel of the Employer in all aspects of the system operation and maintenance and shall include, but not be limited to, the following:

- (1) schedule of training courses;
- (2) objective, syllabus, format, class size and duration of each training course;
- (3) training facilities to be provided by the Employer;
- (4) list of training materials and documentation to be included with the training course;
- (5) method of pre- and post- testing to be utilised;
- (6) qualifications and experience level necessary for the trainees;
- (7) instructor's qualifications; and
- (8) course evaluation methods.

10.1.5 Courses offered shall be suitable for operations and maintenance staff classified below as distinct from engineering design staff:

- (1) first line and second line maintenance staff undertaking recovery/corrective and routine/preventive maintenance;
- (2) third line (high skill level) maintenance staff specialised in workshop repair and overhaul of equipment; and
- (3) technical support staff specialising in fault analysis and investigation techniques associated with the particular type of equipment.

10.1.6 Training shall, as a minimum, impart the following techniques to the Employer's staff of the appropriate grades:

- (1) all planned maintenance and overhaul of the systems and equipment supplied, installed or modified under the Contract;
- (2) fault finding and rectification techniques for the systems and equipment supplied, installed or modified under the Contract. These shall be developed from the Contractor's previous experience with similar equipment and also from the fault tree analysis and other analyses carried out as part of the reliability engineering studies undertaken by the Contractor;

- (3) normal and degraded modes of operation of the systems and equipment supplied, installed or modified under the Contract;
- (4) all rules, regulations, practices and procedures necessary for the safe and efficient operation of the systems and equipment supplied, installed or modified under the Contract; and
- (5) all contingency plans necessary to recover speedily and safely from any mishaps or emergencies that may arise with the systems and equipment supplied, installed or modified under the Contract.

10.1.7 Training shall be carried out in the medium of the English language and supplemented, if necessary, in the Hindi language.

10.2 Training Method

10.2.1 Training shall consist of classroom (theory) training, computer based interactive multi-media training (CBT), simulator training (if applicable), and practical (hands on) training.

10.2.2 The training shall take place in Delhi, unless there are prohibitive reason(s), and shall be related to Permanent Works that are to be or are being installed on the Project.

10.2.3 The training in Jaipur shall be supplemented, where appropriate, by training at the Contractor's own premises and the premises of the major sub-contractors during the manufacturing and factory testing phases of the Works. Maximum use shall be made of the opportunities presented during equipment testing phases of the Contract to demonstrate and practise fault finding and diagnostic techniques.

10.2.4 To meet this need, the Contractor shall supply competent trainers/instructors to carry out training to a high degree of proficiency in areas where the Contractor has the specialised knowledge.

10.2.5 In order to ensure that satisfactory standards are met, the Employer's relevant Operations/Maintenance Department in liaison with the Training Department will monitor all training.

10.2.6 During the Defects Liability Period, when the Contractor is responsible for faultfinding and repair, he shall provide practical hands on training to the Employer's maintenance staff to facilitate the successful handover of this function.

10.2.7 Where applicable, the Employer will pay all of his staff's salaries, travelling, subsistence and other related allowances.

10.3 Employer's Instructor Training

10.3.1 The Contractor shall provide training courses and training materials to train the Employer's Training Instructors (ETI) to a level of competence to allow the ETIs to subsequently train the Employer's staff in all aspects of operation and maintenance of the systems and equipment supplied, installed or modified as part of the Works.

10.3.2 For Maintenance Instructors, this shall include specific training in the use of maintenance documentation, all faultfinding guides and any special gauges, instrumentation or test equipment required in any maintenance or fault finding and analysis.

10.3.3 For Operations Instructors, this shall include training in the operation of the equipment and the various systems/sub systems under both normal and fault conditions.

10.4 Training Plant & Equipment

- 10.4.1 With the prior review of the Employer's Representative, the Contractor may use the Permanent Works being erected, tested or commissioned for the training of the Employer's staff. In general, the Contractor shall not use Contract Spare parts for this purpose.
- 10.4.2 Training course notes shall be entirely compatible, and, where appropriate, cross-referenced to the manuals supplied by the Contractor as part of the Operation and Maintenance documentation.
- 10.4.3 The Contractor shall provide such written or printed matter, functional equipment, samples, models, cutaway equipment, slides, films and other instructional materials as may be necessary for training. Such equipment and material shall remain the property of the Employer and shall be sufficient both for the persons trained by the Contractor and for those to be subsequently trained by the ETI.
- 10.4.4 The Contractor shall provide an instructor's guide for each training course. The guide shall include the course agenda, objectives, list of resources and facilities required, detailed lesson plans, presentation notes, discussion guides, training aids and job aids, test papers, criteria and methodology for testing and assessment, and all other things that will enable the ETI to carry out repeat or refresher courses in the future.
- 10.4.5 All training course notes and instructor's guides shall be submitted to the Employer's Representative for review 3 weeks prior to the commencement of the first training session of the course.
- 10.4.6 All training course notes and instructor's guides shall be in a form that allows for easy reproduction.
- 10.4.7 All training course notes and instructor's guides shall be in a standard format as set out by the Employer.

10.5 Testing and Assessment

- 10.5.1 The Contractor shall, at the conclusion of each training course, issue questionnaires to, and/or set practical tests for all trainees directed at determining the level of satisfaction with the course content and to assess the level of knowledge and understanding of the course content by each trainee.
- 10.5.2 The Contractor shall review the responses to questionnaires and the trainees' test results and forward a summary to the Employer's Representative.
- 10.5.3 If the Employer's Representative considers that the course has not achieved the required objectives, he will advise the Contractor who shall then organise and implement appropriate re-training.

10.6 Training Records

- 10.6.1 The Contractor shall, at the completion of each training course:
- (1) provide the Employer's Representative with a consolidated training record listing the training course title, date of training, name of all trainees, training result and other relevant information; and
 - (2) issue an appropriate certificate to each trainee who has successfully completed the course.

10.7 NOT USED

CHAPTER 11

11. OPERATION AND MAINTENANCE DOCUMENTATION

11.1 General

- 11.1.1 The Contractor shall supply Operation and Maintenance documentation in respect of the systems and equipment supplied or installed or modified under the Contract in accordance with the requirements of the following clauses, except where expressly specified otherwise in the Contract.
- 11.1.2 All Operation and Maintenance Manuals produced by the Contractor shall conform to the requirements of the Employer. The Contractor shall interface with the Employer for the requisite format.
- 11.1.3 The Contractor shall supply all documentation, including Operation and Maintenance Manuals and “as-built” drawings, necessary for operating, maintaining, repairing and modifying the systems and equipment supplied, installed or modified under the Contract.
- 11.1.4 Except where otherwise stated, the Contractor shall provide one electronic copy, 2 bound copies and one unbound copy of all documentation. The unbound copy will be used by the Employer for reproduction purposes. All documentation shall be in the English language.
- 11.1.5 The Operation and Maintenance Manuals shall be provided in the English language.
- 11.1.6 The Contractor shall fully co-ordinate and cross-reference interfaces and areas associated with interconnecting equipment and systems within the Contract. The Operation and Maintenance Manuals shall fully describe the overall operation of all systems incorporating all equipment.
- 11.1.7 The Operation and Maintenance Manuals shall contain no irrelevant or ambiguous information and shall relate specifically to this Contract.
- 11.1.8 The Contractor may use manufacturer’s data and handbooks for individual items of E&M equipment that are a sub-component of the overall system, including printed circuit boards, providing they meet the intent of the Specification, and are integrated by the Contractor into the description of his equipment, and are indexed accordingly in his own general index. All such documentation shall be contained in similar binders.
- 11.1.9 Where a sub-assembly item is of such a nature that local repairs in Jaipur/India cannot be made and it is necessary to be returned to the manufacturer as a unit for overhaul, the specific information concerning its repair and breakdown into component parts shall be provided.
- 11.1.10 The document shall be collated and numbered in proper order and correspond to the contents and index tables. Nomenclature or references to any items of equipment, diagrams, figure numbers or units shall be consistent throughout the text. In order to comprehend the text, diagrams, drawings, sketches and actual photographs shall be added where necessary. All manufacturers’ literature identification codes or stamp markings shall be omitted. Precautions and warnings regarding the safety of life and equipment shall be included where applicable.

11.2 Arrangement and Format of Manuals

11.2.1 The Contractor shall arrange all documentation in accordance with the Employer requirements.

11.2.2 The Contractor shall provide documentation for all hardware and software for computer systems and other associated electronic equipment to meet the following requirements. Such documents shall include but not be limited to:

- (1) manufacturers' documentation supplied as standard with the equipment;
- (2) hardware configuration with details of expansion capabilities and options;
- (3) programme loading instructions, including runtime environment configuration;
- (4) programme listing including comprehensive 'comment statements' in hard copy and soft format for source code, compilers and development tools necessary to modify and recompile software;
- (5) flow charts, data flow diagrams and state diagrams as appropriate;
- (6) description of software modules including purpose, linkage with other modules, error routines and any special considerations;
- (7) memory maps for both internal and peripheral memory showing description of all programmes, data files, overlay areas, memory available for expansion and the like;
- (8) loading and operating instructions for diagnostic programmes and specifically developed debugging tools; and
- (9) programming manuals relevant to operating systems & languages,

11.2.3 Not Used.

11.3 Drawings

11.3.1 The Contractor shall submit such drawings as may be required for the operation and maintenance and repair of the Permanent Works by the Employer.

11.3.2 Information contained on the drawings shall include but not be limited to:

- (1) arrangement drawings for all sub-systems and individual items of equipment;
- (2) installation and fixing drawings for all sub-systems and individual items of equipment;
- (3) interface drawings for all sub-systems and individual items of equipment;
- (4) schematic drawings for all electrical, pneumatic, hydraulic, water and drainage systems;
- (5) sizes, material and finish of all fixtures and threads;
- (6) manufacturer's code, drawing and reference numbers;
- (7) wiring diagrams including internal wiring of sealed unit items;
- (8) setting dimensions and tolerances; and
- (9) bill of materials.

11.3.3 Where instructed by the Employer's Representative, drawings shall be supplied with Hindi language notation in addition to English. The Employer's Representative will supply such Hindi notation to the Contractor.

11.4 Submissions

11.4.1 The Contractor shall deliver all documentation to the Employer's Representative by the date stated in the PS, or, if none is given, not later than two (2) months prior to the issue of the Taking Over Certificate for the Works (for the final draft version), and one (1) month prior to the issue of the Taking Over Certificate for the Works (for the final version). The delivery shall include a copy of the software and licence to operate the software to modify the manuals together with one set of

CADD drawing files. The final manuals shall incorporate comments made by the Employer's Representative on the draft manual.

11.4.2 Drawings shall be submitted to the Employer's Representative as stated in the PS. The submission shall be in accordance with stage commissioning requirements specified in the Works Programme and shall include Compact Disc (CD) for each drawing.

11.4.3 Following the Employer's Representative's review, the Contractor shall make a final submission of the complete Operation and Maintenance Manuals and as-built drawings in a form and in a quantity specified in the PS. The final submission shall be made not later than the date set by the Employer's Representative. The Contractor shall make such amendments to his submissions as may prove necessary during commissioning of the Permanent Works and the Defects Liability Period. Amendments found necessary during commissioning shall be completed within two months after the issue of the Taking Over Certificate for the Works. Subsequent amendments shall be completed two months prior to the issue of the Defects Liability Certificate.

11.5 Operation and Maintenance Manuals

The Employer shall have the right to reproduce any part or the whole of any Operation and Maintenance Manual as he wishes for his O and M requirements.

CHAPTER 12

12. SUPERVISION AND PLANNING OF MAINTENANCE

12.1 Scope

12.1.1 The Contractor shall be responsible for the supervision of maintenance of the equipment supplied under the Contract after the Employer's Taking Over of the Works or Part of the Works. The maintenance personnel shall be provided by the Employer.

12.1.2 The responsibility for the provision of supervision of maintenance shall be based on the number of man-months identified during the Tender period and incorporated into the Contract. The actual utilisation of these man-months shall be at the Employer's discretion and may be at any time up to within TWELVE months after the Employer's Taking Over of the whole of the Works or the last part of the Works.

12.1.3 The scope of maintenance activities shall include all scheduled and unscheduled maintenance required including all routine inspections and service overhauls at trackside, on trains and in workshops. Maintenance work shall include fault finding following report of incidents and repair of items of equipment changed out in the course of fault rectification but excluding any Contractor's liability for work to be carried out under the requirements of the Defects Liability Period.

12.2 Maintenance Planning & Management Staff

12.2.1 The Contractor shall undertake the necessary tasks in planning the maintenance activities, in consultant with JMRC's O&M department to ensure that the reliability of the operating railway is upheld including but not limited to:

- (i) Provide recommendations in respect of philosophy and procedures for repairs of electronic systems, and the scale of facilities required to be set up in the Depot and Workshops for this purpose.
- (ii) Preparation of detailed operational plan for the routine servicing of any equipment which requires such service. The plan shall ensure that all items in use receive maintenance within the required time cycle by suitably trained and qualified staff and under the personal safety regime appropriate to the location of the equipment being maintained.
- (iii) Preparation of a detailed staffing for each and every different inspection, overhaul and repair activity. The plan shall also identify and quantify resources required by staff and groups of staff in terms of tools, tackle, protective clothing, etc...
- (iv) Preparation of a detailed quality plan, covering all maintenance activities.
- (v) Efficient supervision of the maintenance, overhaul and repair activities of maintenance staff to ensure high quality work and productivity. This shall also include planning and supervision of ongoing training and re-training as required in the correct procedures using the training materials and courses supplied under the Contract. Where the supplied training courses are insufficient the Contractor shall develop additional training courses, manuals and materials to make good the deficiency as part of his Defects Liability responsibilities.

12.3 Supervisory Staff

12.3.1 The Contractor shall provide supervisory maintenance staff who are experts in the first and third line faultfinding, maintenance and repair of the various systems supplied under the Contract

- 12.3.2 The experts provided for supervision of maintenance shall have adequate qualifications and experience in the relevant discipline in the maintenance depots / workshops of existing metro type undertakings.
- 12.3.3 The deployment of the experts may not be continuous and they may be required to supervise the maintenance in short periods at the discretion of the Employer.
- 12.3.4 The experts shall be available in Jaipur at short notice to supervise the Employer's staff at any time during the Normal Operating hours and by arrangement to undertake extended investigations during Non-Revenue hours.

CHAPTER 13

13. SUPPLY OF SPARE PARTS

13.1 Details of supply

13.1.1 The Contractor shall supply to the Employer for the Permanent Works, in accordance with the provisions of this Chapter, as part of the Works:

- (a) spare parts including (but not limited) sub-assemblies and those to be supplied by its subcontractors of any tier ("Spare Parts");

13.1.2 The Spare Parts to be supplied by the Contractor shall consist of:

- (a) Contract Spares (as hereinafter defined);
- (b) Commissioning Spares (as hereinafter defined); and
- (c) Defects Liability Spares (as hereinafter defined).

13.1.3 The Contractor shall submit to the Employer's Representative for review, in the format of a contract spares schedule, in accordance with Chapter 4 above, a list of:

- (a) the Spare Parts to be supplied by the Contractor as part of the Works to suit stage, categorised into individual parts or sealed units; and

13.1.4 Not Used

13.1.5 The information supplied in respect of each spare part shall include, but not be limited to, the following:

- (i) manufacturer / brand name
- (ii) manufacturer's type/model number
- (iii) rating
- (iv) serial number if applicable
- (v) total number of the main assembly/ equipment supplied under the Contract
- (vi) lead time
- (vii) source of supply
- (viii) self-life

13.1.6 Not used

13.1.6.1 primary data

parts catalogue number drawing no.

13.1.6.2 secondary data

- (i) lead times stating whether for ex-stock or for product manufactured upon receipt of order.
- (ii) delivery schedule(s).
- (iii) supplementary information:

- a) special handling instruction, e.g. for fragile materials, hazardous substances, radioactive materials, etc.
- b) storage requirement, e.g. overall dimensions including special packing (if any) for bulky materials, materials with limited shelf life, etc.
- c) statutory requirements, e.g. licences, test certificates, etc.
- d) the source of the Spare Part or Special Tool and Test Equipment, including the manufacturer's name and address together with that of his Jaipur agent

13.2 Manufacture and delivery of Spare Parts

Supplementary sheets to be used for detailed information that is important to the Employer's future procurement.

- 13.2.1 The Spare Parts to be supplied under the Contract shall be manufactured at the same time as the Permanent Works. All Spare Parts shall be manufactured, works tested and inspected in accordance with the relevant quality system, suitably packed and labelled in accordance with Chapter 8 above, and delivered to the Employer by the Contractor. Before the Spare Parts are delivered to the Employer, the Contractor shall submit to the Employer's Representative a shipment advice notifying details such as date of despatch, date of arrival, vessel name, etc. as well as a packing list to indicate the contract number, variation order number, the lot size, quantity and weight. The Spare Parts shall be consigned to the Employer and delivered in accordance with The Employer's Representative's instructions to a programme which shall ensure that sufficient Spare Parts are delivered to facilitate normal routine maintenance of the Permanent Works by the Employer at all stages of completion. The Spare Parts shall be supplied in total not later than the date set out for stage commissioning of the system.
- 13.2.2 Spare Parts shall be fully interchangeable with their corresponding part. All Spare Parts shall be configured to the latest revision during the Defects Liability Period. For Spare Parts such as electronic components, lamps, fuses and other consumable and high-use items, the Contractor shall ensure that a minimum of two alternative sources of supply are available.
- 13.2.3 An adequate supply of Spare Parts shall be available throughout the design life of the Works, from the date of the Employer's Taking Over of the Works. The Contractor undertakes to notify the Employer at least 6 months prior to deleting any item used in the Works from general availability.
- 13.2.4 For any Spare Parts that the Contractor is unable to supply throughout the design life of the Works, or where the Contractor ceases availability support of that item before the end of such design life or if the Contractor ceases trading, the Contractor undertakes to transfer the relevant intellectual property rights, design rights and technology to the Employer and the Employer shall have the full right to manufacturing drawings, schedules, software and any other information needed to manufacture the relevant item. Such rights shall give the Employer complete freedom to manufacture the item in Jaipur or anywhere else world-wide. The Contractor shall also undertake to notify the Employer two years in advance of the intended cessation of spares availability of any item.
- 13.2.5 If any Spare Part is rendered obsolete by a design change or material change during the design life of the Works supplied under the Contract, the Contractor shall design a replacement item to match the identical mechanical and electrical interfaces as the former item.
- 13.2.6 If, as a result of changes in technology, any Spare Part is not completely interchangeable with the original item, or the performance of any Spare Part is different from the original item, then the Contractor shall purchase the same from the Employer, at a price agreed between the parties, such quantities of the obsolete Spare Part as the Employer may possess.

13.3 Contract Spares

- 13.3.1 The quantity of Spare Parts for particular items to be supplied by the contractor to the Employer shall be as detailed in the PS.
- 13.3.2 Notwithstanding the quantities defined in the PS the quantity of Spare Parts shall be enough for the full operation of the Permanent Works for the first one year following the expiry of the Defects Liability Period for the works ("Contract Spares").
- 13.3.3 The Contractor shall supply and deliver the Contract Spares on minimum one month before ROD or just after completion of the Systems Acceptance Test, as required by employer.
- 13.3.4 The Contractor shall submit the contract spares schedules for the Contract Spares in hard copies (including the illustrated parts catalogues) as well as soft copies to the Employer's Representative for review.
- 13.3.5 Not Used
- 13.3.6 All spares quantities shall be rounded up to the nearest deliverable unit e.g. cable shall be delivered in complete drums, liquids in complete sealed containers, small parts in complete packs.

13.4 Commissioning Spares

- 13.4.1 In addition to the Contract Spares, the Contractor shall keep on the Site throughout the installation, erection and commissioning periods, sufficient stocks of Spare Parts to enable immediate replacement of any item in the Permanent Works found to be defective or in any way in non-conformance with the Specification during the installation, erection and commissioning period ("Commissioning Spares").
- 13.4.2 The Contractor shall supply and deliver the Commissioning Spares on or before the commencement of any Partial Acceptance Tests (PAT) or as defined in the PS.
- 13.4.3 The Contractor shall submit to the Employer's Representative for review a list of all Commissioning Spares that shall be made available during the installation, erection and commissioning period.
- 13.4.4 The Contractor shall be entitled to use any of the Contract Spares to replace any item in the Permanent Works during the installation, erection and commissioning periods. However replacement of Contract Spares needs to be done before the completion of the System Acceptance Test.

13.5 Defects Liability Spares

- 13.5.1 The Contractor shall keep sufficient stocks of Spare Parts in an off-site location in Jaipur throughout the Defects Liability Periods to enable rapid replacement of any item in the Permanent Works found to require replacement as part of the Contractor's obligations during the Defects Liability Periods ("Defects Liability Spares").
- 13.5.2 The Contractor shall have the Defects Liability Spares on the commencement of the Service Trial or within 15 days after completion of Integrated Testing.
- 13.5.3 The Contractor shall submit to the Employer's Representative for review a list of all Defects Liability Spares that shall be maintained by the Contractor during the Defects Liability Periods.

- 13.5.4 The Contractor shall be entitled to use the Contract Spares to replace any item in the Permanent Works during the Defects Liability Periods. However replacement of Contract Spares needs to be done within one month of use.

13.6 Not used

13.7 Annual Maintenance Contract (AMC) Spares (If applicable as per Contract)

- 13.7.1 The Contractor shall keep sufficient stocks of Spare Parts in an off-site location in Jaipur throughout the AMC Periods to enable rapid replacement of any item in the Permanent Works found to require replacement as part of the Contractor's obligations during the AMC Periods ('AMC Spares').
- 13.7.2 The Contractor shall supply and deliver the AMC Spares at least 3 months before the commencement of the AMC period.
- 13.7.3 The Contractor shall submit to the Employer's Representative for review a list of all AMC Spares that shall be maintained by the Contractor during the AMC Periods.
- 13.7.4 The Contractor shall not be entitled to use any of the Employer's Spares to replace any item in the Permanent Works during the AMC Periods.

CHAPTER 14

14. THE WORKS AND CARE OF THE WORKS

14.1 Methods of Construction

- 14.1.1 The Contractor shall, as stated in the PS and in any case not less than 4 weeks before starting the construction of the Works on Site, submit to the Employer's Representative the Construction and Installation Plan as specified in Chapter 3 above.

14.2 Temporary Works

Upon receiving a written application from the Contractor, the Employer's Representative may at his absolute discretion consent to certain Temporary Works of a minor nature being exempted from the requirements of this Chapter. Such exemption shall not relieve the Contractor of any of his obligations under the Contract.

14.3 Normal Working Hours

- 14.3.1 Normal working hours shall be defined as the period between 0700 hours and 1900 hours on all days excluding General Holidays. Work outside normal working hours shall not be carried out unless reviewed without objection by the Employer's Representative and unless the Contractor has obtained any necessary permission or approval from Relevant Authorities.
- 14.3.2 The Contractor shall inform the Employer's Representative 24 hours, or such shorter period reviewed without objection by the Employer's Representative, in advance of any occasion when work outside normal working hours is proposed.
- 14.3.3 Work in the vicinity of existing Indian Railway tracks shall only be possible in non-traffic hours. Non-traffic hours are from the time of passage of the last train at the close of traffic, to the commencement time of running of the next first train.

14.4 Drawings and Schedules

Detailed manufacturing drawings for the Permanent Works will not normally be required to be submitted to the Employer's Representative for review but shall be available on the Contractor's or his sub-contractor's premises if required. The Contractor shall also maintain at the Site a comprehensive and up-to-date set of drawings properly indexed and catalogued, which shall include complete sets of detailed working and, where applicable, manufacturing drawings and shall permit free access to such drawings by the Employer's Representative at any reasonable time.

14.5 Notification and Inspection of Works

- 14.5.1 The Works will be the subject of a formalised system of written applications for inspection.
- 14.5.2 Work that is carried out without being appropriately sanctioned by the Employer's Representative could be classified as defective work.

14.6 Construction Restraints

- 14.6.1 The Contractor shall design and implement Temporary Traffic Management (TTM) (if applicable) in accordance with the provisions of the Enactments.

- 14.6.2 The Contractor shall ensure that the design, construction and performance of all Temporary Works and the design and construction of all Permanent Works shall be such that any ground movements in and around the Site will not result in settlement and/or subsidence of the ground that will cause damage to any buildings, structures, rail, roads, footpaths, slopes or utilities.
- 14.6.3 The Contractor shall ensure that the method of installation of any part of the Permanent Works (prior to dewatering and excavation) minimises settlements in the adjacent ground or buildings. Dewatering of an excavation will not be permitted unless a closed perimeter of impermeable wall is complete.
- 14.6.4 The Contractor's design of dewatering methods shall as far as possible avoid lowering of the water table outside the excavations. The reduction in piezometric pressure shall in no case be greater than 2 metres in adjacent ground, unless the Contractor can clearly demonstrate that buildings, structures, roads, footpaths and utilities within the influence of the dewatering will not be damaged by the proposed dewatering. Pumping shall be confined within the boundaries of the excavation and the water level within the excavation shall not be lowered by more than two metres below the formation level.

14.7 Protection from Water

- 14.7.1 Unless otherwise reviewed by the Employer's Representative, all work shall be carried out, as near as may be practicable in the circumstances, in dry conditions, except where the work is required to be carried out in or with water or other fluids.
- 14.7.2 The Permanent Works, including materials for use in the Permanent Works, shall, where necessary and as near as may be practicable, be kept free of water and protected from damage due to water. Water on the Site and water entering the Site shall be disposed of by temporary drainage or pumping systems or by other methods capable of keeping the Works free of water and protected from damage due to water. Traps shall be provided by the Contractor to intercept silt and debris before water is discharged from the Site.
- 14.7.3 The discharge points of the temporary drainage and pumping systems shall be as those having been reviewed without objection by the Employer's Representative. The Contractor shall make all arrangements with and obtain the necessary approvals and inspections from the Relevant Authorities for discharging water to drains water courses etc. The relevant work shall not start until the arrangements for disposal of the water previously reviewed without objection by the Employer's Representative have been implemented.
- 14.7.4 Measures shall be taken to prevent flotation of new and existing structures.

14.8 Protection from Weather

- 14.8.1 Work shall not be carried out in weather conditions that may adversely affect the work unless protection by methods reviewed without objection by the Employer's Representative is provided.
- 14.8.2 The Permanent Works, including materials for the Permanent Works, shall be protected by methods reviewed without objection by the Employer's Representative from exposure to weather conditions which may adversely affect the Permanent Works.

14.9 Protection of Work

Finished work shall be protected by methods reviewed without objection by the Employer's Representative from damage that could arise from the execution of adjacent work. Work shall be carried out in such a manner that work carried out by others, including Government departments, utility undertakings, Relevant Authorities and Project Contractors, is not damaged.

CHAPTER 15

15. SITE ESTABLISHMENT AND ATTENDANCE

15.1 Use of the Site

- 15.1.1 The Site shall not be used by the Contractor for any purpose other than for executing the Works or carrying out other work which is associated with the Works and having been reviewed without objection by the Employer's Representative.
- 15.1.2 Entry to and exit from the Site shall be obtained only at the locations stated in the Contract or other locations having been reviewed without objection by the Employer's Representative.
- 15.1.3 All materials and equipment stored on Site shall be adequately protected against loss or damage due to any cause such as climatic effects, vandalism, shock and vibration, etc. according to the nature of the articles stored and the local Site condition.
- 15.1.4 The particular use to which the Site is put shall be submitted to the Employer's Representative for review with the following particulars:
Drawings showing the layout within the Site of the Contractor's accommodation, access roads and major facilities required early in the Contract;

15.2 Survey of the Site

15.3 Fences and Signs on the Site

- 15.3.1 Hoardings, fences, gates and signs on and at the Site shall be maintained in a clean, stable and secure condition.

15.4 The Contractor's Site Accommodation

- 15.4.1 The Contractor's offices, sheds, stores, mess rooms, latrines and other accommodation on the Site shall be maintained in a clean, stable and secure condition. Living accommodation shall not be provided on the Site. The Contractor's personnel shall not be allowed to live on the Site. It will be the contractor's responsibility to ensure safety of the equipments and the office. For this proper arrangement of fencing and guards shall be done by the Contractor
- 15.4.2 The Contractor shall provide and maintain all necessary offices, sheds / stores, mess rooms, latrines and other accommodation and remove the same from the Site on the Employer's Taking Over of the Works. These shall be to the satisfaction of the Employer's Representative and shall be kept in a clean and sanitary condition. No structure shall be erected by the Contractor within the Site without the written consent of the Employer's Representative and such consent will not relieve the Contractor of the responsibility of siting temporary structures clear of the Works.
- 15.4.3 A copy of the plan showing the extent and position of all offices, stores, sheds, etc. shall be prepared by the Contractor and retained for inspection in the Site office.
- 15.4.4 Not Used
- 15.4.5 The Contractor shall not erect or operate canteen and kitchen facilities on the Site except with the consent of the Employer's Representative and, where appropriate,

the Relevant Authorities. Any such facilities shall, in particular but without limitation, conform to all regulations and standards to the extent required by the concerned city authorities of Jaipur.

15.5 Site Utilities and Access

15.5.1 The Contractor shall make all arrangements for Temporary water, electricity, telephone, sewerage and drainage facilities etc for his site office / storage space.

15.5.2 Access roads and parking areas shall be provided by the Contractor within the Site as required and shall be maintained in a clean, passable and stable condition.

15.6 Not Used.

15.7 Clearance of the Site

Temporary Works, which are not to remain on the Site after the Employer's Taking Over of the Works, shall be removed on the Employer's Taking Over of the Works or at such other time(s) as instructed by the Employer's Representative. The Site shall be cleared and reinstated to the lines and levels and to the same condition as existed before the Works started except as otherwise stated in the Contract.

15.8 Attendance

15.8.1 Not Used

15.8.2 Attendance on the Employer or the Employer's Representative

The Contractor shall provide all necessary assistance to the Employer or the Employer's Representative, including adequate and safe means of access to all parts of the Site to assist him in carrying out his duties and responsibilities under the Contract. Such assistance shall not include the provision of full-time attendance upon the Employer or the Employer's Representative

15.8.3 Attendance on the Commissioner of Rail Safety or other inspecting authorities

15.8.3.1 The Contractor shall afford all necessary attendance upon the Commissioner of Rail Safety or other inspecting authorities Inspectorate during their inspections including adequate and safe means of access to appropriate parts of the Site.

15.8.3.2 The Contractor shall provide all documents, drawings, manpower etc. necessary for inspection as are requested by the above authorities.

15.8.4 Attendance on the Fire Services Department

The Contractor shall afford all necessary attendance upon the Fire Services Department to enable them to carry out such tests and inspections as are required by the Jaipur fire service of Practice for Inspection and Testing of Installations and Equipment and the requirements of any Other Contractors. Such attendance shall include adequate and safe means of access to all parts of the Site.

15.8.5 Attendance on Other Contractors

15.8.5.1 The Contractor shall provide general and special attendance on Other Contractors who will be carrying out the execution of electrical and mechanical and other

works on the Site. Reference shall be made to the PS to determine the full extent of such attendance.

15.8.5.2 General attendance shall include but not be limited to providing for accepting deliveries, unloading and storing materials for the Other Contractors on the Site and allowing the Other Contractors space for their site offices, and all reasonable access and facilities for the proper execution of their work including the free use of access roads, craneage, scaffolding, ladders, stores, messrooms, sanitary and welfare facilities provided that these facilities are normally available on the Site at the time.

15.8.5.3 The Contractor shall allow the use of his Site services including ventilation, temporary water supply, temporary electricity supply, background lighting, pumping, watchmen, etc. by the Other Contractors. The Contractor shall ensure that his Site services referred to above shall be available for use by the Other Contractors until the commissioning of the relevant permanent installations or until the issue of the Taking Over Certificate for the Works, whichever is the later.

15.8.5.4 Special attendance shall include but not be limited to cutting of holes and other openings, forming chases, providing built-in sleeves, grouting in bolts, anchors, brackets, base plates, frames and the like, including making good to the disturbed work and cleaning after completion of the disturbed work.

15.8.6 Attendance by Other Contractors

15.8.6.1 Where provided for under the Contract, the Contractor shall receive attendance from Other Contractors. The Contractor shall ensure that by receiving such attendance, it does not hinder, obstruct or otherwise frustrate the Other Contractor that is providing the attendance in any way.

15.9 Contractor's Equipment

The Employer's Representative reserves the right to order the immediate removal and replacement of any Contractor's Equipment that, in his opinion, is unsatisfactory for its purpose.

15.10 Security

15.10.1 The Contractor shall be responsible for the security of the works area for Contractor's accommodation and shall provide and maintain fencing.

15.10.2 The Contractor shall provide adequate training to its security staff to ensure that they are able to discharge their security duties properly.

15.10.3 The Contractor shall establish and maintain contingency plans to cope with emergency situations such as fire, flooding, serious damage to the Works, etc.

15.10.4 The Employer's security staff will conduct inspections and security audits on the Site and the works area for Contractor's accommodation from time to time. The Employer's Representative will give recommendations for improvement arising from the inspections and security audits to the Contractor. However, managing the security of the Site and the works area for Contractor's accommodation remain the Contractor's responsibility.

CHAPTER 16

16. LIAISON WITH OTHERS

16.1 Liaison with Others

- 16.1.1 The Contractor shall make all necessary arrangements with and obtain the necessary approvals from Government departments, utility undertakings and other duly constituted authorities for the execution of the Works.
- 16.1.2 The Contractor shall maintain close liaison with Other Contractors and other contractors employed by the Employer, utility undertakings or other authorities who are carrying out work on or adjacent to the Site. The Contractor shall ensure as far as possible that the progress of the Works is not adversely affected by the activities of such other entities.

16.2 Work by Other Contractors

- 16.2.1 The contractor shall keep note of the works which may be proceeding on various adjacent areas by others include, but is not limited to, those listed in the PS. The Employer's Representative will keep the Contractor informed of forthcoming work by Other Contractors in the proximity of the Site.
- 16.2.2 The Contractor shall provide reasonable access to such contractors and any other adjacent contractors and shall where necessary liaise with the appropriate contractors, utility undertakings and other duly constituted authorities on details of interdependent phasing. The Contractor shall notify the Employer's Representative and other concerned entities at least 14 days in advance should he wish to alter these access arrangements during the course of the Works.

16.3 Interface Management

- 16.3.1 The Contractor shall co-ordinate with Relevant Authorities and Other Contractors in the execution of the Works.
- 16.3.2 The Contractor shall interface and liaise with Other Contractors to ensure the effective and compatible co-ordination of all aspects of the design, installation and testing of the Works. The Employer's Representative shall be kept fully informed at all stages of the Works.
- 16.3.3 The Contractor shall assign a person as the interface contact for each Other Contractor to actively manage the progress of each interface to ensure adherence to the jointly developed Interface Management Plan.
- 16.3.4 Throughout the design process, the Contractor shall liaise with Other Contractors to develop interface designs in conjunction and co-operation with the designers of interfacing systems. Interfacing systems include, but are not limited to, those listed in the PS. These interface designs will be monitored and reviewed by the Employer's Representative but the Contractor shall work directly with the Other interfacing Contractors to develop designs which are mutually acceptable to all parties. The Employer's Representative will provide details of the Other Contractors as contracts are awarded.
- 16.3.5 The Employer's Representative may, at his discretion, attend the Contractor's meetings with Other interfacing Contractors. The Contractor shall give the Employer's Representative a minimum of 7 days notice of all meetings to be held with any Other interfacing Contractors, or 14 days notice if the meeting is to be outside Jaipur. If insufficient notice is given to the Employer's Representative, he may require the meeting to be postponed to a later date to enable him to attend.

- 16.3.6 The Contractor shall provide the Employer's Representative with copy of the minutes of all meetings within 14 days of each meeting and also copy of all correspondence with any Other Contractor.
- 16.3.7 The Contractor shall attend co-ordination/design meetings chaired by the Employer's Representative at no greater than monthly intervals to discuss and ensure that designs are correct and that conflicts in E&M services requirements between the Contractor and Other Contractors are identified and resolved.
- 16.3.8 The Contractor shall co-ordinate his installation activities with the Other Contractors. The Contractor shall ensure that there is no interference to the work of the Other Contractors and shall maintain close co-ordination with Other Contractors working on or adjacent to the Works to ensure that their work can progress in a smooth and orderly manner.
- 16.3.9 The Contractor shall be given access to the various parts of the Site by the dates relative to the Works Programme defined in the ITT and the PS as Access Dates. The ITT and the PS specify certain Key Dates by which the Contractor shall complete certain parts of his Works to enable work to be undertaken by the Other Contractors. These dates may be subject to adjustment by the Employer's Representative in consultation with the Contractor and the Other Contractors to ensure the progress of the Project.
- 16.3.10 The Contractor's responsibility shall include provision of and receipt from Other Contractors or the Employer's Representative of information required for construction of the Works and the installation of the Works and Contractor's Equipment, insofar as that requirement is specified in or can reasonably be inferred from the Contract. Where the execution of work by a Other Contractor depends upon the Contractor's Site management or upon information to be given by the Contractor, the Contractor shall provide the Other Contractor with either the required services or the correct and accurate information required to enable the Other Contractor to meet his programme for the construction or installation of his works.
- 16.3.11 In the event of any disagreement as to the extent of services or information required to be exchanged between the Contractor and Other Contractor, the Employer's Representative shall determine the requirements and this determination shall be final and binding on the Contractor and the Other Contractor.
- 16.3.12 The Contractor shall co-ordinate his testing and commissioning activities with the Other Contractors. The Contractor shall ensure that there is no interference to the work of the Other Contractors and shall maintain close co-ordination with Other Contractors working on or adjacent to the Works to ensure that their testing and commissioning work can progress in a smooth and orderly manner.

CHAPTER 17

17. THE SITE

17.1 Access to Site

The Contractor will be given access to the Site in accordance with following conditions.

17.2 Site Restrictions

17.2.1 The particular use to which the Site is put shall be submitted to the Employer's Representative for review within 60 days of the Commencement Date of the Works and the Contractor shall:

- (1) confine his use of the areas of the Site to purposes having been reviewed without objection by the Employer's Representative who reserves the right to extend, amend or restrict the uses to which areas of the Site will be put;
- (2) where required under the Contract, provide and maintain fencing and lighting around and within the areas of the Site when or where necessary for the safety and convenience of the public or others or as directed;
- (3) refrain from depositing rubbish or causing nuisance or permitting nuisance to be caused and, except where reviewed without objection by the Employer's Representative, depositing earth on or removing earth from areas of the Site;
- (4) on the Employer's Taking Over of the Works, or earlier if so instructed by the Employer's Representative, remove all Temporary Works except where permitted and reinstate the areas of the Site to the extent, standards and details indicated in the Contract or as directed by the Employer's Representative;
- (5) refrain from obstructing manholes, utility access points and the like; and
- (6) refrain from felling trees, other than those specifically identified in the Contract to be felled, and refrain from depositing earth around the trunks of trees and protect all trees remaining on Site to the satisfaction of the Employer's Representative.

17.2.2 Work other than that necessary for completion of the Works shall not be carried out on the Site.

17.2.3 While the Contractor is being given access to the Site, he shall provide means of distributing loads imposed by Contractor's Equipment and prevent damage to utility services.

17.2.4 Except where otherwise provided, the Contractor shall not permit any person to reside on the Site.

17.2.5 Unless otherwise stated, the Contractor shall pay all rates and charges of any nature whatsoever arising out of his use of the Site and all work areas provided therein under the Contract.

17.2.6 The location and size of stockpile material, including excavated material within the Site, shall be submitted to the Employer's Representative for review. All stockpiles shall be maintained at all times in a stable condition.

- 17.2.7 The Contractor shall not allow animals to be brought onto or kept on the Site.
- 17.2.8 The Contractor's attention is drawn to the Waste Disposal Regulation currently prevalent in Jaipur, regarding storage, transportation and disposal of chemical waste. The Contractor's proposed methods and chemicals to be used in cleaning shall be submitted for review by the Employer's Representative.
- 17.2.9 No rock crushing or screening facilities shall be set up on Site unless reviewed by the Relevant Authorities and reviewed without objection by the Employer's Representative.

17.3 Site Services

- 17.3.1 Where required under the Contract, the Contractor shall provide all Site services as necessary and appropriate for the construction of the Works, which shall include, but not necessarily be limited to:

- (1) electricity; (see Chapter 22 below)
- (2) water;
- (3) compressed air;
- (4) Site communication facilities; and
- (5) temporary drainage and sewage disposal.

- 17.3.2 The Contractor shall provide such services for use solely in connection with the proper execution of the Works. The Contractor shall comply with all regulations of the utility companies and Government departments concerned. The Contractor shall provide and maintain installations associated with such services and in relation thereto and shall take all reasonable precautions to safeguard the safety and health of all persons and the security of the Site. The Employer's Representative may demand the immediate disconnection or alteration of such installations or portions thereof he considers as being prejudicial to safety, health or security. As soon as any or all of the Contractor's installations are no longer required for the execution of the Works, they shall be entirely removed to the satisfaction of the Employer's Representative.

- 17.3.3 All installations shall comply fully with all appropriate statutory requirements. Pipes, tubes, ducts or cables crossing highways, footpaths or rights of way shall be ramped over or recessed below the surface. Specific services shall comply with the following:-

(1) Electricity

The electricity supply shall comply with the requirements of Chapter 22 below.

(2) Water

An adequate supply of potable water shall be provided at the Site, including provision to the satisfaction of the Water Authority of any storage tanks so that sufficient potable water is always available for the execution of the Works.

(3) Compressed Air

(4) Site Communication Facilities

Where required under the Contract, the Contractor shall install efficient means of Site communications including messenger, telephone and, where appropriate, two-way radio to the satisfaction of the Employer's Representative.

(5) Temporary Drainage & Sewage Disposal

Where required under the Contract, adequate provision shall be made for the discharge or disposal from the Site of all water, surplus fluid sewage and waste products and the method of disposal shall be submitted to the Employer's Representative for review. The Site shall be kept well drained and free from standing water. Where

existing channels and gullies cannot be maintained, temporary drainage arrangements shall be provided.

17.3.4 Not Used.

17.4 Site Cleanliness

17.4.1 The Site shall be maintained in a clean and tidy condition. Materials, including materials required for Temporary Works shall be stored in an orderly manner. Rubbish, debris, cement bags, disused formwork and the like shall be disposed of at least once a day and the work area cleaned by flushing with water as necessary so that the Site is kept constantly clean and tidy

17.4.2 The Contractor shall ensure that no earth, debris, rock or empty cable drums are deposited on public or private rights of way as a result of the Works, including any deposits arising from the movement of Contractor's Equipment. All roads, both within and external to the Site which are affected by the Works shall be kept in a clean condition by the Contractor. All haul roads shall be regularly graded and watered, as necessary to minimise dust nuisance.

17.4.3 Where required under the Contract, the Contractor shall provide and maintain a patrol unit for the duration of the Contract. The unit shall comprise 1 foreman and 2 labourers whose services shall be allocated full-time to the unit. The main duties of the patrol unit shall include the upkeep of lighting, signage and security as well as other related duties as instructed from time to time by the Employer's Representative.

17.4.4 The patrol unit shall be required to work outside the Contractor's normal working hours if so required by the Employer's Representative.

17.4.5 The Contractor shall provide all necessary protective clothing, safety equipment, hand tools, ladders, trestles, power supply, replacement equipment and the like for the exclusive use of the patrol unit.

17.5 Engineering Conditions for Temporary Land Allocation

The Contractor shall comply with the obligations, requirements and restrictions described in the PS in respect of the Contractor's work areas if any.

17.6 Attendance by Civil Works Project Contractor

17.6.1 Where supplies of electricity, water, compressed air, temporary ventilation, temporary lighting, etc. are installed by the Civil Works Project Contractor for use during construction of the structural components of the Project, these services may be made available to the Contractor for his own use during erection, installation and testing of the Works in accordance with Chapter 22 below.

17.6.2 The Contractor shall supply the Employer's Representative with its requirements (if any) for such services within 90 days of the Commencement Date of the Works. Upon receipt of the Contractor's declaration, the Employer's Representative will ascertain whether any of these requirements can be satisfied by the installations installed by the Civil Works Project Contractor. The Employer's Representative will subsequently notify the Contractor of the result of these investigations.

17.6.3 Where services are required and are not available from the Civil Works Project Contractor, the Contractor shall provide, test, maintain and subsequently remove the services.

17.6.4 Background lighting to an average level of 50 lux at the walkway level will be provided in the tunnels by the Civil Works Project Contractor. The Contractor shall provide any additional lighting he may require to facilitate his own work or for reasons of safety.

17.7 Access to the Site by Other Contractors

Confidential

- 17.7.1 Due to the multi-discipline nature of the Project, several different parties may require access to the same portion of the Site during the construction phase for the installation, erection and testing of the Works. To facilitate the organisation and co-ordination of access and occupation requirements, including the use of Works Trains, if any, the Employer's Representative will issue and maintain a TRIP as referred to in clause 2.13 above.
- 17.7.2 The TRIP will be developed from the declared requirements of all Project Contractors and others having need of access and occupancy, at the weekly Works Train Meeting. The TRIP will be subject to revision and updating to reflect changing circumstances during the progress of the Project.
- 17.7.3 The Contractor shall work in accordance with the arrangements prescribed by the TRIP.
- 17.7.4 The Contractor shall ensure that his working arrangements on the Site conform to the agreements made with the Employer's Representative during establishment of the TRIP requirements. In particular, the Contractor shall ensure that his occupancy does not extend either physically or chronologically beyond the agreed boundaries.

17.8 Transportation to Site

- 17.8.1 The Contractor shall use such routes and rights of entry to the Site as may be decided by the Employer's Representative from time to time. Routes for very large or very heavy loads shall be discussed with the Employer's Representative in advance of the need arising and all arrangements there for shall be submitted for review by the Employer's Representative.
- 17.8.2 In this context, the definition of the terms "very large" and "very heavy" refer to articles that cannot be transported by normal road vehicles or be handled by readily available methods. Where doubt exists, it shall be the responsibility of the Contractor to notify and discuss the nature of the load in question with the Employer's Representative.
- 17.8.3 The Contractor shall comply with the requirements of the Commissioner of Transport and /or the Commissioner of Police and / or any other Relevant Authority regarding any special traffic arrangements that may be necessary. The Contractor's attention is drawn to the Road Traffic (Regulation and Licensing of Vehicles) Regulations and the Road Traffic (Construction and Use) Regulations currently in use at Jaipur.
- 17.8.4 Extraordinary traffic may be moved from docks and between areas of the Site over public highways only by police escort and on a route and at a time determined by the Relevant Authority. The Contractor shall be responsible for obtaining permission from the Relevant Authorities to move extraordinary loads and traffic and for arranging police escorts as necessary.
- 17.8.5 The Contractor shall make all arrangements and assume full responsibility for transportation to the Site of all Contractor's Equipment, materials and supplies needed for the proper execution of the Works.
- 17.8.6 While travelling to and from the Site, the Contractor shall observe all posted speed limits, traffic regulations, stop signs, etc., and adherence to the access route indicated on the Employer's Drawings or as instructed by the Employer's Representative. No employee of the Contractor shall trespass into any part of the Employer's premises other than the Site or the designated route of access.
- 17.8.7 The Contractor shall ensure that all roads and pavements, etc. leading to and around the Site are kept free from obstructions and shall not cause inconvenience or hindrance to traffic or persons either by its vehicles or by its workmen, scaffolding, plant, materials, equipment, etc.

- 17.8.8 The Contractor shall repair damage to existing roads, footpaths, steps, cables, sewers, live drains, etc. and shall reinstate any damage caused by the Contractor's actions.

17.9 Contractor's Own Rolling Stock

- 17.9.1 Where the Contractor is to provide rolling stock (either self-propelled or trailing) for use during the installation and testing of the Works, the requirements of clause 17.10 below shall apply. All the Contractor's own rolling stock shall not exceed the Construction Vehicle Load Gauge as shown in the Specification Drawings except with the Employer's Representative's written consent.
- 17.9.2 The Contractor shall submit full details of any rolling stock that is to be used during the installation and testing of the Works to the Employer's Representative for review within 120 days of the Commencement Date of the Works. Such details shall include a full description and drawings of the rolling stock, details of axle load, stopping distance, fail-safe braking system, kinematic envelope, and operating and maintenance instructions.
- 17.9.3 The Contractor shall maintain its own rolling stock during the installation and testing of the Works. The maintenance work shall be carried out by qualified and experienced personnel, whose qualifications have been reviewed without objection by the Employer's Representative, in accordance with the maintenance procedures that shall have been reviewed without objection by the Employer's Representative.
- 17.9.4 Prior to use, and following each maintenance examination, the Contractor's qualified engineer shall certify the Contractor's own rolling stock as fit-to-run. Thereafter, the Contractor's qualified engineer shall issue a registration tag. The expiry date, i.e. the date of the next inspection, shall be shown on the registration tag. The Contractor's own rolling stock shall not be used without a valid registration tag.
- 17.9.5 The Contractor shall establish a maintenance programme for his own rolling stock and shall submit the maintenance programme for review by the Employer's Representative prior to the delivery of his own rolling stock to the Site. The Employer's Representative will periodically inspect the Contractor's own rolling stock to ensure it is properly maintained to the standards set out in the maintenance programme.
- 17.9.6 If the Contractor's own rolling stock is found to be operating in an unsatisfactory or unsafe condition, it shall be immediately removed until it has been restored to an acceptable condition to the satisfaction of the Employer's Representative.

17.10 Defined Area Working and Works Train Operations

- 17.10.1 When the Project under construction has been made available for track related electrical and mechanical installation works, the area will be classified as a Defined Area within which Works Trains will be operated.
- 17.10.2 All persons whose duties require them to work within a Defined Area must observe safety rules and procedures to be provided by the contractor and reviewed without objection by the Employer's Representative. It shall provide procedures and guidance for the safety of all persons in the Defined Area.
- 17.10.3 The Contractor shall establish communicate the rules and procedures, which shall be published from time to time, to their workers and/or agents on Site, and to ensure all such rules and procedures are being observed in the course of all works and construction activities.
- 17.10.4 Persons working on or near tracks in a Defined Area, either by themselves or supervising a working party, must be suitably trained and qualified by the Employer

or his delegates in the safety provisions of the Works Train Manual. Persons who are not qualified shall not attempt to gain access to the railway tracks unless accompanied by a qualified person.

- 17.10.5 When overhead lines are energised, EMUs may be running at high speed for testing. No work may be undertaken on either the Up or Down tracks when test trains are running. Procedures for gaining access to the energised track will be detailed in the Works Train Manual. The Contractor shall make requests for gaining access to the energised track at the weekly Works Train Meetings.

17.11 Work in Vicinity of Operating Tracks

- 17.11.1 This Paragraph shall apply to works in the vicinity of the existing Indian Railway tracks after the commencement of revenue operations and all ancillary areas which form a part of the operating system, including all depots and sidings.

- 17.11.2 The following words and expressions shall have the meaning hereby assigned to them in this Paragraph:

- (1) "Railway" means the existing rail tracks of the JMRC (if any) and Indian Railway after the commencement of revenue operations and any ancillary areas such as the depots, sidings, stations, and terminus and traction power stations.
- (2) "Railway Representative" means a person, or persons, nominated by the Employer's Representative to liaise with the Contractor and the Employer's representative on matters affecting the operation of the Railway.
- (3) "Restriction" means speed restriction, which is a limitation of the normal permitted speed of rail traffic over a specified length of the Railway.
- (4) "Possession" means possession of the Railway, which is the closing of a specified length of the Railway to rail traffic.
- (5) "Isolation" means isolation and earthing of the electrical equipment, which is the disconnection of a section of such equipment from all sources of electricity supply and the connection of it to the Railway.

- 17.11.3 The Contractor shall have regard to the Specification for work within the vicinity of the Railway and shall comply strictly with the requirements as set out therein. The Contractor shall comply with any instructions given by the Employer or the Railway Representative through the Employer's Representative with regard to planning, methods of working, safety requirements and on any other matters which may affect the operation of the Railway, and also shall comply with all rules, regulations, procedures, manuals and notices which may be published from time to time by the Employer or the Railway Representative. Provided that if a situation occurs which in the opinion of either the Contractor or the Employer or the Railway Representative may give rise to or actually constitute an emergency and either the Contractor or the Employer or the Railway Representative considers that it is not practicable to communicate through the Employer's Representative then the Contractor and the Employer or the Railway Representative may communicate directly and the Employer or the Railway Representative may give a direct instruction to the Contractor and such instruction shall be regarded for the purposes of this Contract as an instruction from the Employer's Representative.

- 17.11.4 Should the Contractor be unwilling or unable at once to conform with a direct instruction from the Employer or the Railway Representative under the provisions of the paragraph above or to carry out any remedial or other work or repair, the Employer or the Employer's representative may by written order to the Contractor suspend the execution of the Works or of any part thereof or authorise the carrying out of such remedial work or other work or repair by a person other than the Contractor.

- 17.11.5 The Contractor shall notify the Employer's Representative as soon as possible of any direct instruction received from the Employer under the provisions of this Paragraph.
- 17.11.6 Where any part of the Works has to be carried out during the period of a Restriction and/or Possession and/or Isolation and the period of such Restriction and/or Possession and/or Isolation is prescribed in the Contract, the Contractor shall plan and execute that part of the Works so that such period is not exceeded and so that no further periods are required.
- 17.11.7 If no such period is prescribed, the Contractor shall before commencing any work hold discussions through the Employer's Representative with the Employer who will decide whether any part of the Works is to be carried out during a period of a Restriction and/or Possession and/or Isolation and the Employer's Representative will notify the Contractor accordingly.
- 17.11.8 After the method of carrying out the work has been agreed with the Employer (and taking into account any provisional arrangements which have been made) the Contractor shall in all cases other than for emergency works submit written notice of his programme of work, which shall include details of any Restriction and/or Possession and/or Isolation previously notified by the Employer as being necessary, to the Employer at least 10 (ten) weeks in advance of the proposed commencement of work on or near the Railway and shall at the same time submit a copy thereof to the Employer's Representative.
- 17.11.9 Where a Restriction and/or Possession and/or Isolation is necessary, the Contractor shall initiate the necessary action to obtain the requisite approval for such Restriction and/or Possession and/or Isolation from the Employer. The Contractor shall be solely responsible for all delays caused through failure to submit the necessary application for approval, late submission of any such application or submission of inadequate information.
- 17.11.10 The Contractor shall so organise the execution of the work during any period of Restriction and/or Possession and/or Isolation that he will be able to give up such Restriction and/or Possession and/or Isolation at the time prescribed in the Contract or agreed by the Employer. Should the Contractor in the opinion of the Employer or the Employer's Representative not make sufficient or adequate arrangements (including the provision of standby plant) for completing the whole or any stage of the work within the time allowed in the programme or agreed with the Employer, the Employer may in his discretion cancel the Restriction and/or Possession and/or Isolation, or the Employer may employ labour, plant and materials to assist the Contractor to finish the work or to carry out such work as is necessary, or may himself carry out such work as is necessary, to enable the Restriction and/or Possession and/or Isolation to end at the earliest possible moment.
- 17.11.11 A period of Restriction and/or Possession and/or Isolation cannot normally be extended. If the Contractor fails to carry out the work during any such period, then Contractor shall be required to re-apply to the Employer for a further period of Restriction and/or Possession and/or Isolation.
- 17.11.12 All expenses which in the opinion of the Employer's Representative are properly incurred by the Employer as a result of the Employer making necessary arrangements to assist the Contractor or carrying out any necessary work in accordance with clause 17.11.10 above shall be a debt due from the Contractor to the Employer.
- 17.11.13 The Contractor shall on demand pay to the Employer any loss of revenue and additional expenditure which in the opinion of the Employer's Representative has been incurred by the Employer by reason of the rescheduling of services by the Employer due to the Contractor obstructing the Railway or interfering with the control or signalling system or electrical equipment other than for a period for which a Restriction and/or Possession and/or Isolation has been given.

17.11.14 In the event that damage is caused by the Contractor to the Railway such that rescheduling/suspension of services by the Employer has to be made, then the Contractor shall on demand pay to the Employer any loss of revenue and additional expenditure which in the opinion of the Employer's Representative has been incurred by the Employer in making good the damage and in rescheduling/suspending the services.

17.11.15 The Employer shall have the right to cancel or alter the date and the timing of any agreed period of Restriction and/or Possession and/or Isolation if this proves necessary for the safety or uninterrupted running of rail traffic by notice to the Contractor which shall be deemed to be an instruction issued by the Employer's Representative, but in such an event the Employer's Representative shall make alternative arrangements as soon as practicable.

17.11.16 Not Used.

17.12 Rodent Control

17.12.1 The Contractor shall at all times take effective measures to prevent damage by rodents to the Permanent Works and constituent parts thereof, such as cables, electronic cards, etc., during the execution of the Works and shall advise the Employer's Representative of such measures taken accordingly.

CHAPTER 18

18. HEALTH AND SAFETY

18.1 Health and Safety Philosophy

18.1.1 The health, safety and welfare of all personnel working on the Project, the general public and the avoidance of damage to property are of paramount importance to the Employer. Prime consideration shall be paid to construction activities to ensure that all operations shall be conducted in such a manner as to eliminate the risks to persons and property. The Contractor shall treat safety measures as the first priority in all his activities with respect to executing the Works.

18.1.2 The Contractor will be issued with the following Metro documents: Corporate Safety Standards, Safety Policy, Safety Plan, Safety Procedure Rule Book and Joint Operating Procedure as they become available. These documents set out the minimum standards to be achieved by the Contractor but do not relieve the Contractor of his liabilities and obligations under the Enactment. Where there is a discrepancy in the documents or with this GS, the higher or stricter standards shall be applied.

18.2 Health and Safety Management

18.2.1 The Contractor shall be fully responsible for safety on the Site, for the Works, his personnel, sub-contractors' personnel, the public domain and all persons directly or indirectly associated with the Works, on or in the vicinity of the Site.

18.2.2 The Contractor shall submit reports, notices and information to Government bodies where there is a statutory requirement to do so.

18.2.3 The Contractor shall and will ensure that, his sub-contractors of any level, all persons employed by him on the Site and any person authorised by him to be on the Site shall comply in every respect with the provisions of relevant statutory requirements and the Employer's safety documents as listed in clause 18.1.2 above.

18.2.4 The provisions of the GS regarding health and safety shall apply to the Contractor and his sub-contractors of any level for any part of the Works.

18.2.5 The Contractor shall ensure that proper and adequate provisions to ensure compliance are included in all sub-contracts placed by him and into all sub-contract documentation.

18.2.6 The safety standards of the sub-contractors are to be properly assessed prior to the placing of contracts and the Contractor shall employ only sub-contractors with a track record of maintaining the highest safety standards.

18.2.7 The Employer's representative reserves the right to order the immediate removal and replacement of any item of Contractors equipment or temporary works, which in his opinion, is unsatisfactory for its purpose or is in an unsafe condition.

18.3 Legislation, Codes of Practice, Standards, etc

18.3.1 The Contractor shall comply with all current and future Enactments, Codes of Practice and Safety Guides approved by the Commissioner for Labour relating to the Works.

18.3.2 Where identified specifically in the GS, Indian Standards are also to be complied with.

18.4 Breach of Health and Safety Obligations

18.4.1 Serious or repeated breaches of the Employer's safety documents as listed in clause 18.1.2 above, statutory regulations, or other disregard for the health and safety of any person, may be reasons for the Employer's Representative to exercise his authority to require the removal from the Site of any employee of the Contractor or a sub-contractor of any level.

18.4.2 Once removed from the Site at the request of the Employer's Representative, that person shall not be re-employed on the Contract, allowed on the Site or on any other DMRC related project.

18.5 Contractor's Health and Safety Documentation

18.5.1 Sub-contractors documentation

18.5.1.1 The Contractor's and his Sub-Contractors health and safety documentation shall be consistent. As new sub-contractors are mobilised on site the Contractor shall ensure that each is issued with copies of the Corporate Safety Documents and each sub-contractor complies with the established health and safety documentation procedures.

18.5.1.2 The Contractor shall submit to the Employer's Representative for review a Works specific copy of his Health and Safety Manual and his Health and Safety Plan for review within 30 days of the Commencement Date of the Works.

18.5.1.3 The Contractor shall provide his sub-contractors with copies of the Health and Safety Manual and the Health and Safety Plan, risk assessments and method statements.

18.5.2 Health and Safety Manual

The Contractor's Health and Safety Manual shall contain the procedures required for carrying out the work activities on the Project and is to be regularly reviewed and up-dated to reflect changes to work practice and changes to Enactment. Copies of proposed changes are to be submitted to the Employer's Representative for review prior to inclusion and implementation.

18.5.3 Site Safety Plan

18.5.3.1 The Contractor shall devise and implement a Site Safety Plan developed from the Outline Safety Plan submitted and developed during the Tender period.

18.5.3.2 The Site Safety Plan shall fully comply with the Health and Safety requirements of the Project conditions and proposed work activities, the GS, the Employer's safety documents as listed in clause 18.1.2 above and all relevant Enactment, Regulations, Codes of Practice, Safety Guides and relevant Indian Standards. The plan shall be prepared and submitted to the Employer's Representative for review within 112 days of the date of Notice to Proceed.

18.5.3.3 The Site Safety Plan shall include a policy statement signed by the chief executive officer of the Contractor (or other senior officer) declaring that occupational health and safety shall be given the highest practicable priority in all aspects of the Contract and in the discharge of his contractual obligations. In the event that the Contractor is a consortium, partnership or joint venture, a policy statement signed by the chief executive officer (or other senior officer endorsed by the chief executive officer and agreed by the Employer's Representative), from each of the companies comprising the consortium, partnership or joint venture shall be submitted.

18.5.4 Risk Assessments

18.5.4.1 The Contractor shall carry out a detailed risk assessment covering the occupational health and safety aspects of the Works.

- 18.5.4.2 The documentation arising from this exercise shall contain a comprehensive schedule of all perceived risks and the proposed resolution or mitigation measures necessary to reduce these risks to a minimum.

18.5.5 Method Statements

- 18.5.5.1 In order to ensure that health and safety has been properly considered at the planning stage, the Contractor shall submit to the Employer's Representative for review, detailed method statements for each construction task as the Employer's Representative requires.
- 18.5.5.2 Method statements shall be logical construction guides designed for the use by the Employer's Representative on Site. They shall contain a detailed risk assessment, which shall include the task or operation, a hazard analysis and methods for preventing injury, including personal protective equipment and any pertinent safety measures to be adopted.
- 18.5.5.3 Detailed programme showing what method statements will be written and when they will be submitted shall be produced and submitted to the Employer's Representative within 30 calendar days of the Commencement Date of the Works or at a date reviewed by the Employer's Representative.
- 18.5.5.4 Method statements shall be reviewed by the Employer's Representative prior to any work commencing on the task described. Accordingly, the Contractor shall ensure that such statements are prepared in sufficient time to allow a review before the proposed programmed start date for the relevant task.
- 18.5.5.5 Before formal issue to the Employer's Representative, the engineer in charge of the described works and the Contractor's authorised representative shall sign the method statement.
- 18.5.5.6 After review by the Employer's Representative, a copy will be held in the safety office to facilitate monitoring of the work and a further copy shall be given to the engineer supervising the work. The original shall be retained in the Contractor's files for audit purposes.

18.6 Contractor's Safety Arrangements

18.6.1 Co-ordination of work activities

- 18.6.1.1 The Contractor shall ensure that work is to be co-ordinated throughout the Project to ensure that the activities of one group of workers does not affect the safety of another group, e.g., scaffolders working above cable layers, etc.
- 18.6.1.2 Daily meetings are to be held to co-ordinate the work activities and permits to work are to be issued as and when required.

18.6.2 Safety inspections

- 18.6.2.1 The Contractor shall conduct formal, documented Site safety inspections (at least once a month) which are to be attended by the Contractor's most senior Site staff and safety staff.
- 18.6.2.2 A report of each safety inspection shall be made and shall include the actions taken to resolve any problems or shortcoming discovered during the inspection. The report shall be made available for audit purposes and be discussed at the relevant meetings.
- 18.6.2.3 A comprehensive health and safety inspection check-list for the use of the Contractor's Site staff when inspecting the Site is to be formulated and submitted for review by the Employer's Representative.
- 18.6.2.4 The checklist shall indicate the standard to be achieved on any particular aspect of health and safety and be compiled in such a way that allows the inspector to enter his or her actual findings for comparison against the said statement and subsequent rectification.

- 18.6.2.5 When completed, the checklist shall be kept for record purposes and be made available to the Employer's Representative for audit purposes.
- 18.6.2.6 A grading system is to be established which grades the area inspected as either "Very Good", "Good", "Acceptable", "Poor" or "Un-acceptable".
- 18.6.2.7 Where an area receives a grading below "Acceptable", immediate action is to be taken to rectify the problems raised and a further audit shall be conducted after 7 days to assess the conditions.
- 18.6.2.8 The Contractor is to advise the Employer's Representative of the date of the monthly inspection. The Employer's Representative may send a representative to assess the thoroughness of the inspection.
- 18.6.3 Safety audits**
- 18.6.3.1 The Contractor will be subject to the Employer's Safety Performance Measurement Scheme, which is based upon a series of audits carried out or to be carried out, the extent, scope and at a frequency determined by the Employer's Representative, to measure the Contractor's compliance with the provisions of the Employer's safety documents as listed in clause 18.1.2 above, the Enactments, Contractor's Health and Safety Manual and Health and Safety Plan.
- 18.6.3.2 The Employer's audit will be graded as follows: "Very Good", "Good", "Acceptable" or "Un-acceptable".
- 18.6.3.3 Where the Contractor receives a grading of "Un-acceptable", immediate action shall be taken to rectify the problems raised and a follow up audit shall be conducted within 30 days to assess conditions and ensure that remedial action has been taken.
- 18.6.3.4 The Contractor shall continue to be audited, every 30 days, until such time as a grade of "Acceptable" or above has been achieved.
- 18.6.3.5 The Employer's auditors shall be used for the follow up audit(s) and the Contractor shall be liable for the full costs incurred of all additional follow up audits.
- 18.6.3.6 The Contractor shall conduct regular (at least every 3 months) internal safety audits on both the safety management system and the physical Site conditions. The internal safety audits shall be performed to the same criteria and using the same grading and benchmarking as the Employer's audits.
- 18.6.3.7 The internal safety audits shall be conducted by person(s) reviewed without objection by the Employer's Representative, who are qualified and competent to carry out safety audits. The documentation generated by the audit process, including score sheets, shall be made available to the Employer's Representative for audit purposes.
- 18.6.3.8 The internal safety audits shall include the work of sub-contractors of all levels.
- 18.6.3.9 The Contractor shall advise the Employer's Representative of the date of the internal safety audit. The Employer's Representative may send a representative to assess the thoroughness of the internal safety audit.
- 18.6.4 Reporting of accidents, incidents and dangerous occurrence**
- 18.6.4.1 The Contractor shall notify the Employer's Representative immediately of any dangerous occurrences or accidents, which result in death, serious bodily injury or incapacity for more than 3 days. Such initial notification may be verbal but shall in any event be followed by a preliminary written report, in a format reviewed without objection by the Employer's Representative, within 24 hours of the occurrence/accident and a detailed written report shall be submitted within 7 days. Copies of all accident, incident and dangerous occurrence reports shall be kept on file and made available for audit purposes.

- 18.6.4.2 The Contractor's attention is drawn to the reporting requirements set out in the Factories and Industrial Undertakings Regulations, Occupational Safety and Health Ordinance and the Mines (Safety) Regulations.
- 18.6.4.3 The Contractor shall deliver to the Employer's Representative, within 48 hours of the incident, a copy of any Form 2 or 2a or other statutory reports he submits to Government departments under these Regulations.
- 18.6.4.4 The Contractor shall submit to the Employer's Representative at the end of each week, a list of persons who are on sick leave following an accident. The list shall be circulated to other DMRC projects being carried out at that time to ensure that no person having been granted sick leave is working on another project during the duration of the said sick leave period.
- 18.6.5 Monthly reports**
- 18.6.5.1 The Contractor shall, as part one of each Monthly Progress Report, submit a Site Safety Report duly signed by the Contractor's director responsible for the Contract.
- 18.6.5.2 The Site Safety Report shall comprehensively address all relevant aspects of occupational safety and health and shall contain certain standard forms and information, as directed by the Employer's Representative, for statistical analysis.
- 18.6.5.3 The Contractor shall submit reports or accident analysis, in a format reviewed without objection by the Employer's Representative, as and when required by the Employer's Representative.
- 18.6.6 Safety staff**
- 18.6.6.1 The Contractor shall ensure that their safety staffs have the necessary authority given to them to suspend any work where there is imminent danger of accident or injury. He shall also in consultation with the Employer's Representative deploy adequate number of Safety Supervisors.
- 18.6.7 Safety promotion and incentive schemes**
- The Contractor shall actively promote and encourage the standards of health and safety on the Site and implement safety incentives and award schemes at all levels of management, supervisors, foremen, workers, etc. The Contractor shall be able to demonstrate to the Employer's Representative that this requirement is being carried out to the Employer's Representative's satisfaction.
- 18.6.8 Safety information**
- 18.6.8.1 The Contractor shall display in each of his Site offices, workshops and canteens a copy of the document on "A Guide to the Construction Sites (Safety) Regulations" published by the Government or a similar approved document. This document shall be translated into languages, which are understood by labour engaged by the Contractor or sub-contractors.
- 18.6.8.2 The Contractor shall ensure that safety, rescue and occupational health matters are given a high degree of publicity to all persons, regularly or occasionally on Site. Posters in English, Hindi and other languages understood by the workers, drawing attention to Site safety, rescue and occupational health, shall be made or obtained from appropriate sources and shall be displayed prominently in relevant areas of the Site.
- 18.6.8.3 Posters in both English and Hindi drawing attention to safety shall be obtained from the Labour Department and displayed prominently throughout the Site.
- 18.6.8.4 The Contractor shall keep on Site a complete and up-to-date set of all relevant occupational health and safety legislation, relevant Codes of Practice and any

relevant guides and safety pamphlets published by the Labour Department and the Occupational Safety and Health Council or similar authorities or reference.

18.6.8.5 The Contractor shall keep a working stock of all relevant statutory forms to be used in compliance with the occupational health and safety legislation.

18.6.9 Safety meetings

18.6.9.1 The Employer's Representative shall establish a monthly Site Safety Management Committee to formally review the safety management of the Contractor and monitor the implementation of the Health and Safety Plan. The Employer's Representative shall act as chairman of this committee with members of the Employer's Representative's staff attending as appropriate.

18.6.9.2 Attendance from the Contractor shall include, but not be limited to, the Senior Manager on Site and the Safety Manager/Officer/Supervisor.

18.6.9.3 The Contractor shall act without delay upon such decisions or recommendations as may be made by the committee on matters of health and safety.

18.6.9.4 The Employer's Representative as appropriate may invite representatives from third parties including statutory bodies.

18.6.9.5 The Contractor shall establish a tier of monthly safety meetings and shall ensure that all level of staff, all disciplines and all work areas are covered so that the dissemination of information is carried through to all levels of staff and workers.

18.6.9.6 The Contractor shall hold monthly meetings at which representatives from all sub-contractors shall attend.

18.6.9.7 Minutes of all tiers of Contractor safety meetings shall be issued to the Employer's Representative for information.

18.6.10 Safety training

18.6.10.1 The Contractor shall ensure that induction training courses shall be provided for construction site workers or equivalent.

18.6.10.2 The induction course shall be conducted by suitably qualified persons and repeated at six-month intervals.

18.6.10.3 All workers must receive induction training before they are allowed to commence work on the Site.

18.6.10.4 The Contractor is to issue all Site workers with a Site pass once they have attended the induction course. The pass is to include the worker's name, ID card no., photograph, types of courses attended and expiry date of the card (maximum 6 months). The pass is to be carried at all times when on the Site.

18.6.10.5 The Contractor shall keep records of such training for health and safety audit purposes. Upon completion of their training, the Contractor's Site staff shall sign a copy of their assigned safety responsibility statement, which shall be kept by the Contractor for audit purposes.

18.6.10.6 The Contractor is to report the number of training sessions and employees trained each month, at the Site Safety Management Committee meeting and in the Monthly Progress Report.

18.6.10.7 **Not Used**

18.7 Site Conditions

18.7.1 Emergency procedures and facilities

18.7.1.1 The Contractor shall establish and implement emergency procedures which detail the organisation of rescue and/or damage limitation teams to deal with emergency

situations on the Site such as, but not limited to, fire, loss of power, typhoon, flooding, stranding or the evacuation of a seriously injured person(s) from a remote or difficult Site location, etc. The emergency procedures shall specify what equipment is needed, where it will be located and who is responsible for its maintenance.

- 18.7.1.2 The Contractor shall carry out regular (at least every 3 months) emergency evacuation exercises from their offices and Site area. This requirement includes evacuation of tunnels as a joint Fire Services Department exercise where applicable.

18.7.2 First aid facilities

- 18.7.2.1 The Contractor shall provide, or have access to, sufficient first aid provisions, including trained personnel and facilities appropriate to the Site conditions as per Appendix 8 of this Specification. Arrangements for transporting the injured (ambulance, stretcher, etc.) shall be provided.

- 18.7.2.2 A trained First-Aider is required at all times at the Site of working, as detailed in Appendix 8.

- 18.7.2.3 The Contractor shall maintain a register of all persons attending the clinic or receiving first aid treatment. Records are to be in a comprehensive format as required by the appropriate authority and shall be kept for audit purposes.

- 18.7.2.4 First aid kits, up to the standards required by the appropriate authority shall be carried in supervisor's vehicles and made available where work is in remote areas.

18.7.3 Lifting appliances and lifting gear

- 18.7.3.1 The Contractor shall prepare and maintain an up-to-date Site register of lifting equipment containing test certificates of all lifting and hoisting equipment used on the Works. The register shall be available on Site, from the commencement of construction, for inspection by the Employer's Representative and Relevant Authorities.

- 18.7.3.2 A system is to be devised and implemented, such as colour coding, to identify the expiry of the certification of lifting appliances and lifting gear. This system is to be displayed in the cabs of all lifting appliances.

- 18.7.3.3 A trained banks man shall be in attendance at each lifting appliance or hoisting operation.

- 18.7.3.4 The banks man shall be equipped with a radio link to the crane or hoist operator and shall be easily identifiable from other workers.

- 18.7.3.5 Competent operators with certificates issued by a recognised training body shall be provided to operate all mechanical plant particularly all lifting and hoisting equipment.

- 18.7.3.6 The operators of shaft hoisting gear shall be in communication with the top and bottom of the shaft and each intermediate landing.

- 18.7.3.7 All crane hooks and other lifting devices used on or around the Site shall be fitted with a safety catch or other device to stop the lifting gear being detached.

- 18.7.3.8 The safe working load shall be clearly and indelibly marked on all lifting equipment, either by stamping or by the addition of permanently secured tag labels. Stamping shall not be permitted on any stress bearing part.

- 18.7.3.9 Slings, shackles and such-like equipment used in lifting shall be colour coded for identifying lifting gear which requires re-inspection or disposal.

18.7.4 Fire precautions

- 18.7.4.1 The Jaipur Fire Service Ordinance and any relevant regulations made there under and other requirements laid down in the Specification or as laid down from time to time by the Employer's Representative shall be observed at all times.
- 18.7.4.2 The Contractor shall thoroughly assess the risk of fire throughout the Site and shall develop a comprehensive fire control strategy as a part of the Health and Safety Plan, which will extend to all aspects of the Works. The fire control strategy shall be discussed regularly and reviewed with the Employer's Representative.
- 18.7.4.3 Adequate and suitable fire extinguishers are to be positioned throughout the Site, with particular attention paid to offices, flammable storage areas, tunnels, workshops, etc.
- 18.7.4.4 Adequate and suitable fire extinguishers are to be provided at all hot work locations.
- 18.7.4.5 The Contractor shall ensure that all persons on the Site are trained in and undergo regularly refresher courses in the use of fire extinguishers.
- 18.7.4.6 Fire points are to be clearly designated.
- 18.7.5 Dangerous goods, hazardous substances**
- 18.7.5.1 The Contractor shall obtain the requisite licenses for the manufacture, storage, handling and use of all dangerous goods.
- 18.7.5.2 The Contractor shall ensure that all explosives, compressed gases, petrol and other dangerous substances, shall be stored and handled in accordance with the relevant Ordinance.
- 18.7.5.3 Before being brought on to Site, any materials proposed by the Contractor shall be assessed by the Contractor for their occupational health and environmental compatibility. Any material that is toxic, explosive or inflammable or may otherwise create a hazard shall, whenever possible, be replaced by a less hazardous product. Where this cannot be done, the Contractor shall conduct a risk analysis and produce a method statement specifying the safe method of use and all associated precautions including personal protective equipment.
- 18.7.5.4 Not Used
- 18.7.6 Excavations and floor openings**
- 18.7.6.1 Before the commencement of any excavation work, sufficient information shall be obtained from the utility companies to identify the locations of buried services. Buried services are to be located using a cable detector, digging hand dug trial pits and by reference to the relevant drawings, before mechanical digging takes place.
- 18.7.6.2 Excavations shall be carried out by trained and experienced workers who shall be fully instructed on the possible dangers and safety precaution to be taken, before work is commenced.
- 18.7.6.3 The Employer's Representative shall be notified immediately of any damage or interruption to a utility.
- 18.7.6.4 A Permit to Dig system shall be established and implemented prior to excavation starting.
- 18.7.6.5 The Contractor shall ensure that all temporary covers/decking to the trenches and barriers at the edges of excavations are safe and securely installed at all times, especially during adverse weather conditions.
- 18.7.6.6 Where there is a danger to the public, extra care must be taken to properly cover all temporary openings and adequately barrier and sign the excavation. Flashing warning lights, signs and adequate lighting is to be installed where required.

18.7.7 Site transport

18.7.7.1 The Contractor shall ensure that all Site vehicles are regularly maintained and kept in a safe condition with fully working brakes, lights, exhaust, windscreen, windows and doors, etc.

18.7.8 Personal protective equipment (PPE)

18.7.8.1 The Contractor shall make available on Site at all times adequate provision of safety equipment including, but not limited to, safety helmets, goggles, ear protectors, safety belts, respiratory protection, safety equipment for working in sewers, drains and enclosed spaces, equipment for rescue from drowning, fire extinguishers, first aid equipment and other necessary safety equipment.

18.7.8.2 The Contractor shall ensure that safety footwear is worn at all times inside the tunnels and actively encourage the wearing of safety footwear on other areas of the Site. Where safety footwear is not worn, the Contractor is to ensure that strong shoes are worn.

18.7.8.3 High visibility vests shall be worn at all times when in the tunnels.

18.7.8.4 Not Used

18.7.9 Tunnel and underground work

18.7.9.1 The Contractor shall establish and implement a tagging system, which shall clearly and accurately record the number of persons entering and leaving the tunnel, their name, Company and ID card no.

18.7.9.2 All work associated with tunnels shall be performed in accordance with BS6164.

18.7.9.3 The Contractor shall ensure that there is sufficient clean airflow, to the requirements of BS6164, at all times.

18.7.9.4 Before entry into such areas, remote atmosphere monitoring shall be carried out to ensure that adequate ventilation and a breathable atmosphere exist.

18.7.9.5 No person shall enter such areas unaccompanied and without adequate ventilation being in operation.

18.7.9.6 All diesel-driven plant used underground shall be provided with efficient and properly maintained exhaust smoke washers.

18.7.9.7 Petrol driven plant or machinery shall not be used in any underground working.

18.7.9.8 No person under the age of 18 years shall enter or work in the tunnels or confined spaces.

18.7.9.9 Hot work will only be carried out under the control of a Hot Work Permit.

18.7.9.10 All vehicles and plant entering the tunnels and any machinery being used in the tunnels or underground work shall be fitted with a fire extinguisher of a suitable capacity and type.

18.7.10 Ladders, temporary access

18.7.10.1 The Contractor shall provide, register, maintain and use only ladders, which are purchased as proprietary products, on the Site. Site made ladders are not to be used under any circumstances.

- 18.7.10.2 All ladders shall be free from patent defects, secured against movement and installed in accordance with the relevant construction regulations and Codes of Practice.
- 18.7.10.3 Wooden access steps with handrails are to be installed and maintained as access where the uses of mobile access staircases are impractical.
- 18.7.10.4
- 18.7.11 Temporary electricity**
- 18.7.11.1 Temporary electricity supplies shall comply with Chapter 22 below.
- 18.7.11.2 Switchbox construction shall be robust, corrosion proof, water proof and be of coated metal and shall be mounted on an integral frame at least 1000mm off the ground. In coming cables shall be secured by a waterproof gland.
- 18.7.12 Housekeeping**
- 18.7.12.1 The Contractor shall clean the Site area on a daily basis and maintain it in a safe, tidy and sanitary condition.
- 18.7.12.2 Sufficient waste bins are to be provided throughout the area of work and a daily disposal regime is to be established and implemented.
- 18.7.12.3 The Contractor is responsible for enforcing the standards of housekeeping of its sub-contractors and their areas of work.
- 18.7.13 Site services**
- 18.7.13.1 The Contractor shall provide, maintain and ensure the installation to the required standards, of all services entering and being used on Site.
- 18.7.13.2 All Government and utility company regulations and requirements shall be complied with.
- 18.7.13.3 The Employer's Representative may require the immediate termination or alteration to an installation if he considers that they are prejudicial to safety or health.
- 18.7.13.4 The Contractor shall ensure that services used on the Site are designed so that there is no possibility of the users of such services surrounding the Site, being affected by loss of supply, contamination, power surges, etc.

CHAPTER 19

19. DAMAGE AND INTERFERENCE

19.1 Damage and Interference

19.1.1 Work shall be carried out in such a manner that, as far as is practicable, there is no damage to or interference with the following, other than such damage as is necessitated to enable the execution of the Works:

- (1) watercourses or drainage systems;
- (2) utilities;
- (3) structures, roads including street furniture, or other property;
- (4) public or private vehicular or pedestrian accesses;
- (5) trees, graves or burial urns; and
- (6) existing railways and railway systems.

The Contractor shall obtain prior approval of the concerned authority or party, if so required, for any work near properties under their ownership or management.

The Contractor shall inform the Employer's Representative as soon as practicable of any item, utility or thing which is not stated in the Contract as requiring diversion, removal or relocation but which the Contractor considers as requiring diversion, removal or relocation to enable the Works to be executed. The Contractor shall not divert, remove or relocate any such item, utility or thing without such diversion, removal or relocation having been reviewed without objection by the Employer's Representative.

19.1.2 Items which are damaged or interfered with as a result of the Works being carried out and items which are diverted, removed or relocated to enable the Works to be carried out, shall be reinstated to the same condition as existed before the Works started or to such condition as may be reviewed without objection or instructed by the Employer's Representative.

19.1.3 The Contractor shall excavate by hand where damage may be caused by the operation of mechanical plant adjacent to any utilities.

19.1.4 Except with the prior approval of the Jaipur Fire Services, no damage or interference with existing fire hydrants and valves shall be caused.

19.1.5 Prior to trench excavation, the Contractor shall carry out investigations to locate utilities by means of hand-dug inspection pits. The locations and number of inspection pits required in meeting the Contractor's obligations to establish the location of existing utilities and underground features shall be determined by the Contractor. The Contractor shall note that many existing pipes/ducts/cables may not be shown in the records kept by the utility undertakings, and may only be exposed as the excavation proceeds. The trench excavation shall be carried out by hand where there are utilities adjacent to or within the excavation works and the Contractor shall have allowed in his programme the time required for the exposing, temporary support and diversion of these recorded or unrecorded utilities. Should any pipes/ducts/cables or cover tiles be exposed, the respective utility undertaking shall be contacted to determine if all the utilities have been located. Cover tiles and utilities shall only be removed by the utility undertakings concerned.

19.1.6 Where the Employer's Representative has conducted utility and ground investigation on behalf of the Employer, the Contractor may obtain the data obtained from the investigations from the Employer's Representative in accordance

with clause 1.6.2 above and subject to the condition of clause 19.3 below.

19.2 Watercourses and Drainage Systems

- 19.2.1 Existing watercourses and drainage systems shall be temporarily diverted as required to enable the Works to be carried out. Particulars of the proposed diversions shall be submitted to the Employer's Representative for review at least 14 days before the relevant work starts. Diversions shall be constructed to the satisfaction of the Employer's Representative with such alignment and in such manner that the flow is discharged adequately and effectively without causing flooding or erosion to the adjacent area. The diversions shall be maintained while the work is being carried out and shall be reinstated, including the removal of any obstructions to flow, as soon as practicable after the work is complete.
- 19.2.2 Measures shall be taken to prevent excavated material, silt or debris from being deposited in existing drainage systems, watercourses or the river.
- 19.2.3 Not Used

19.3 Utilities

- 19.3.1 The details of existing utilities are given by the employer for information only and the accuracy of the details is not guaranteed. The Contractor shall make his own enquiries and shall carefully excavate trial holes to locate accurately the utilities indicated to him by the utility undertakings.
- 19.3.2 Temporary supports and protection to utilities shall be provided by methods reviewed without objection by the Employer's Representative. Permanent supports and protection shall be provided if instructed by the Employer's Representative.
- 19.3.3 The Contractor shall inform the Employer's Representative and the utility undertakings without delay of the following:
- (1) damage to utilities;
 - (2) leakage of utilities;
 - (3) discovery of utilities not shown on any drawings; and
 - (4) diversion, removal, repositioning or re-erection of utilities which is required to enable the execution of the Works.
- 19.3.4 The Contractor shall take all steps necessary to enable the utility undertakings to proceed in accordance with the programme agreed between the Contractor and the utility undertakings under clause 2.2.2 above. The Contractor shall maintain close liaison with the utility undertakings and shall inform the Employer's Representative of any delays in works by the utility undertakings.
- 19.3.5 The Contractor shall keep records of existing utilities encountered on the Site and a copy provided for the Employer's Representative. The records shall be submitted for review by the Employer's Representative and shall contain the following details:
- (1) location of utility;
 - (2) date on which utility was encountered;
 - (3) nature and size of utility;
 - (4) condition of utility; and
 - (5) temporary or permanent supports provided.
- 19.3.6 The Contractor shall co-ordinate the activities of the utility undertakings in connection with the diversion of utility services necessary for the execution of the Works.

- 19.3.7 The Contractor shall set up and manage a Utilities Liaison Group for the duration of the Contract, if utilities are required to be diverted. The Group shall meet at a frequency to be as instructed by the Employer's Representative but at least once a month, and shall discuss and resolve matters associated with utility undertakings on programming, co-ordination and action. The Contractor shall ensure that all relevant utility undertakings and the Employer's Representative are represented at the meetings.
- 19.3.8 The Contractor shall inform the Employer's Representative of the date, time and place of every meeting with utility undertakings and he shall copy all correspondence and minutes of meetings to the Employer's Representative.
- 19.3.9 The programme for any section of work to be carried out by a utility undertaking shall be confirmed in writing by the Contractor to the utility undertaking no more than four weeks and no less than one week before the agreed scheduled start date for that section of Works, such confirmation to be notified to the Employer's Representative.
- 19.3.10 The Contractor shall monitor the progress of utility undertakings against the agreed programmes and shall notify the Employer's Representative of any slippage to these programmes. The agreed programmes shall mean those programmes agreed in writing by the Contractor and the various utility undertakings described in 19.3.9 above.
- 19.3.11 In the event of any such slippage, the Contractor shall prepare and execute a plan of action with the relevant utility undertaking to redress the slippage. Such a plan may, if necessary, include provision of Contractor's labour resources, materials and/or plant to the utility undertaking.
- 19.3.12 Not Used.
- 19.3.13 Hand digging method shall always be employed where there are utilities adjacent to or within the trench excavation works. Portable mechanical tools may be used but shall be restricted to the breaking of the pavement surface. Due care shall be exercised to prevent damage to the underground cables, water pipes, gas pipes or other utility installations.
- 19.3.14 Exposed utility installations shall be adequately supported and protected from accidental damage.
- 19.3.15 Smoking and use of naked flames shall be prohibited if gas pipes are present, or pipes the uses of which are not identified are present.

19.4 Structures, Roads and Other Property

- 19.4.1 The Contractor shall immediately inform the Employer's Representative of any damage to structures, roads or other property that is not required for the execution of the Works.

- 19.4.2 Not Used

19.5 Access

Alternative access shall be provided if interference with existing public or private vehicular or pedestrian access is necessary to enable the execution of the Works. The arrangements for the alternative access shall be as reviewed without objection by the Employer's Representative. The permanent access shall be reinstated as soon as practicable after the work is complete and the alternative access shall be removed as soon as practicable after it is no longer required.

19.6 Spoil Disposal

- 19.6.1 The Contractor shall make his own enquiries and arrangements regarding the location and the availability of spoil disposal areas and reclamation and shall pay all costs of complying with all regulations and requirements of Relevant Authorities in connection with the use of such areas. These areas are not within the control of the Employer and no claims will be entertained in respect of non-availability of a particular areas or changes in the costs of arrangements for the use thereof.
- 19.6.2 The Contractor shall be responsible for all necessary liaison to ensure compliance with the requirements of unproductive disposal of any surplus excavated rock or soft material which is suitable for filling

CHAPTER 20

20. ENVIRONMENTAL PROTECTION REQUIREMENTS

20.1 GENERAL

20.1.1 The Contractor shall conform to the Indian Environmental Laws and codes as applicable. The current national standards established by the Ministry of Environment and Forest, Government of India and other government agencies for control of environmental pollutants such as air, water, noise and visual impacts/aesthetics shall be followed for compliance during project construction.

20.1.2 The Contractor shall comply with all enactment which shall include but are not limited to:

1. Environment Protection Act, 1986
2. Air (Prevention and control of Pollution) Act, 1981
3. Water (Prevention and Control of Pollution) Act, 1974
4. Requirements of Urban Arts Commission and Central Vista Committee

20.1.3 The provisions listed herein regarding Environmental Protection shall apply to and be binding upon the Contractor for any works on the site and the persons employed by sub-Contractors. The Contractor shall ensure that proper and adequate provisions to this end are included in all sub-contracts placed by him.

20.1.4 The provisions of this Chapter however, shall not be applicable in the case of emergency works necessary for saving of life and property or safety of the Works.

20.1.5 The Contractor has been issued with the Employer's Environmental Quality Management Manual. Within 20 weeks of notification of acceptance of the Tender, the Contractor shall submit for review by the Employer's Representative, a draft of his own contract specific Site Environmental Plan based on the Employer's Environmental Quality Management Manual and his construction methodology. He shall submit a final version prior to the commencement of the works (along with "Design Co-ordination Submission").

20.1.6

20.1.7 This contract specific Site Environmental Plan of the Contractor, as referred to in Chapter 3 above, shall be consistent with the provisions of the Environmental Management Plan outline, as given in the Employer's Environmental Quality Management Manual. The Contractor is however not required to undertake air monitoring.

20.1.8 The Contractor shall ensure that audits of all the activities detailed in his Site Environmental Plan are carried at such intervals as the Employer's Representative may require ensuring the continuing effectiveness and compliance with the Site Environmental Plan. The Contractor shall make available on request any document, which relates to his recent internal audits.

20.1.9 Not Used

20.2 NOISE

20.2.1 General

- (1) The Contractor shall consider noise as an environmental constraint in his design, planning and execution of the Works. The Contractor shall, at his own expense, take all appropriate measures to ensure that work carried out by the Contractor

and by his sub-Contractors, whether on or off the Site, will not cause any unnecessary or excessive noise which may disturb the occupants of any nearby dwellings, schools, hospitals, or premises with similar sensitivity to noise.

- (2) Without prejudice to the generality of the foregoing, noise level reduction measures shall include the following:
 - (a) the Contractor shall ensure that all powered mechanical equipment used in the Works shall be effectively sound reduced using the most modern techniques available including but not limited to silencers and mufflers.
 - (b) the Contractor shall construct acoustic screens or enclosures around any parts of the Works from which excessive noise may be generated.
- (3) The Contractor shall ensure that noise generated by work carried out by the Contractor and his sub-Contractors during day time and night time shall not exceed the maximum permissible noise limits, as given in the Employer's Environmental Quality Management Manual , In the event of a breach of this requirement, the Contractor shall immediately re-deploy or adjust the relevant equipment or take other appropriate measures to reduce the noise levels and thereafter maintain them at levels which do not exceed the said limits. Such measures may include without limitation the temporary or permanent cessation of use of certain items of equipment.
- (4) The noise monitoring requirements are given in the Employer's Environment Quality Management Manual.

20.2.2 Construction material should be handled and transported in such a manner as not to create unnecessary noise as outlined below.

CHAPTER 21

21. NOT USED

CHAPTER 22

22. TEMPORARY ELECTRICITY SUPPLY

22.1 The Contractor shall make his own arrangement for Temporary Electrical supply, for Installation & Preliminary Testing.

22.2 Applicability

22.2.1 Where the Contractor is required to provide temporary electrical supplies, or to use, extend or expand on temporary supplies installed by others, all such activity shall be executed in accordance with clauses 22.3 to 22.20 inclusive.

22.2.2 When the Contractor makes use of temporary electrical supplies provided by other, viz. Project (Civil) Contractors, he will observe and comply with the requirements of this Chapter, and pay directly to the provider for the electricity consumed.

22.3 Work on Site

22.3.1 The Contractor shall nominate a representative whose name and qualifications shall be submitted in writing to the Employer's Representative for review not later than 4 weeks before the appointment and who shall be solely responsible for ensuring the safety of all temporary electrical equipment on Site. The Contractor shall not install or operate any temporary Site electrical systems until this representative is appointed and has commenced duties.

22.3.2 The name and contact telephone number of the representative having been reviewed without objection by the Employer's Representative shall be displayed at the main distribution board for the temporary electrical supply so that he can be contacted in case of an emergency.

22.3.3 The Contractor shall submit schematic diagrams and the details of the equipment for all temporary electrical installations, and these diagrams together with the temporary electrical equipment shall be submitted to the Employer's Representative for review.

22.3.4 Not Used.

22.4 Electrical General

Temporary electrical Site installations and distribution systems shall be in accordance with:-

- (1) Indian Electrical Regulations;
- (2) The Power Companies' Supply Rules;
- (3) Electricity and its subsidiary Regulations;
- (4) IEE Wiring Regulations (16th Edition);
- (5) Any other applicable national standards

22.5 Materials, Appliances and Components

All materials, appliances and components used within the distribution system shall comply with BS 4363 and BS 7375 Appendix A.

22.6 Design Considerations

22.6.1 Distribution equipment utilised within the temporary electrical distribution system shall incorporate the following features:-

- (1) flexibility in application for repeated use;
- (2) suitability for transport and storage;
- (3) robust construction to resist moisture and damage; and
- (4) safety in use.

22.6.2 All cabling shall be run at high level whenever possible and firmly secured to ensure they do not present a hazard or obstruction to people and equipment.

22.6.3 The installation on Site shall allow convenient access to authorised and competent operatives to work on the apparatus contained within.

22.7 Mains Voltage

22.7.1 The Site mains voltage shall be as the Electricity Companies' Utility supplies, 415V 3-phase 4 wire system.

22.7.2 Single-phase voltage shall be as the Electricity Companies' Utility supplies, 230V supply.

22.8 Types of Distribution Supply

22.8.1 The following voltages shall be adhered to for typical applications throughout the distribution systems:

- (1) fixed plant - 415V 3 phase;
- (2) movable plant fed by trailing cable - 415V 3 phase;
- (3) installations in Site buildings - 230V 1 phase;
- (4) fixed flood lighting - 230V 1 phase;
- (5) portable and hand held tools - 115V 1 phase;
- (6) Site lighting (other than flood lighting) - 115V 1 phase; and
- (7) portable hand-lamps (general use) - 115V 1 phase.

22.8.2 When the low voltage supply is energised via the Employer's transformer, any power utilised from that source shall be either 415V 3 phase or / 230V single phase as appropriate. The contractor shall carry out any conversion that may be necessary to enable him to use power from that source.

22.9 Protection of Circuits

22.9.1 Protection shall be provided for all main and sub-circuits against excess current, residual current and earth faults. The protective devices shall be capable of interrupting (without damage to any equipment or the mains or sub-circuits) any short circuit current that may occur.

22.10 Earthing

22.10.1 Earthing and bonding shall be provided for all electrical installations and equipment to prevent the possibility of dangerous voltage rises and to ensure that faults

are rapidly cleared by installed circuit protection.

22.10.2 Earthing systems shall conform to the following standards:-

- (1) IEE Wiring Regulations (16th Edition);
- (2) BS Standards ;
- (3) IEEE Standard 80 Guide for Safety in AC Substation Grounding.

22.11 Plugs, Socket Outlets and Couplers

Low voltage plugs, sockets and couplers shall be colour coded in accordance with BS 7375, and constructed to conform to BS EN 60309. High voltage couplers and 'T' connections shall be in accordance with BS 3905.

22.12 Cables

22.12.1 Cables shall be selected after full consideration of the conditions to which they will be exposed and the duties for which they are required. Supply cables up to 3.3KV shall be in accordance with BS 6346. The cable armouring shall be used as the earth return in conditions where the cable is continuously extended and not subject to continuous movement after installation.

22.12.2 For supplies to mobile or transportable equipment where operation of the equipment subjects the cable to flexing, the cable shall conform to one of the following standards appropriate to the duties imposed on it:

- (1) BS 6708 flexible cables for use at mines and quarries;
- (2) BS 6007 rubber insulated cables for electric power and lighting; and
- (3) BS 6500 insulated flexible cords and cables.

22.12.3 Where low voltage cables are to be used, reference shall be made to BS 7375. The following standards shall also be referred to particularly for underground cables:-

- (1) BS 6346 for armoured PVC insulated cables; and
- (2) BS 6708 Flexible cables for use at mines and quarries.

22.12.4 All cables which have a voltage to earth exceeding 65 V (except for supplies from welding transformers to welding electrodes) shall be of a type having a metal sheath and/or armour which shall be continuous and effectively earthed. In the case of flexible or trailing cables, such earthed metal sheath and/or armour shall be in addition to the earth core in the cable and shall not be used as the sole earth conductor.

22.12.5 Armoured cables having an over-sheath of polyvinyl chloride (PVC) or an oil resisting and flame retardant compound shall be used whenever there is a risk of mechanical damage occurring.

22.12.6 For resistance to the effects of sunlight, overall non-metallic covering of cables shall be black in colour.

22.12.7 Cables which have applied to them a voltage to earth exceeding 12 V but not normally exceeding 65 V shall be either one of the type or alternatively of a type insulated and sheathed with a general purpose or heat resisting elastomer.

- 22.12.8 All cables that are likely to be frequently moved in normal use shall be flexible cables.

22.13 Lighting Installation

- 22.13.1 Lighting circuits shall be run separate from other sub-circuits and shall be in accordance with BS 7375 and BS 4363.
- 22.13.2 Voltage shall not exceed 55 V to earth except when the supply is to a fixed point and where the lighting fixture is fixed in position.
- 22.13.3 Luminaries shall have a degree of protection not less than IP 54. In particularly bad environments where the luminaries are exposed to excesses of dust and water, a degree of protection to IP 65 shall be employed.
- 22.13.4 Where the Employer's Representative requires Site inspection of the Works, the Contractor shall upgrade the lighting level to a minimum of 200 lux by localised lighting in all areas.
- 22.13.5 Use of wire guards or other such devices shall provide mechanical protection of luminaries against damage by impact whenever risk of damage occurs.

22.14 Electrical Motors

- 22.14.1 Totally enclosed fan cooled motors to BS 4999: Part 105 shall be used.
- 22.14.2 Motor control and protection circuits shall be as stipulated in BS 6164. Emergency stops for machinery shall be provided.

22.15 Inspection and Testing

Electrical installations on Site shall be inspected and tested in accordance with the requirements of the IEE Wiring Regulations (16th Edition).

22.16 Identification

Identification labels of a type reviewed without objection by the Employer's Representative shall be affixed to all electrical switches, circuit breakers and motors to specify their purpose.

22.17 Maintenance

Strict maintenance and regular checks of control apparatus and wiring distribution systems shall be carried out by an electrician (duly qualified to carry out the said checks) to ensure safe and efficient operation of the systems. The Contractor shall submit for review by the Employer's Representative details of his maintenance schedule and maintenance works record.

22.18 Maintenance Record

All portable electrical appliances shall be permanently numbered (scarf tag labels or similar) and a record kept of the date of issue, date of the last inspection carried out and the recommended inspection period.

22.19 METERING

- 22.19.1 For the purposes of the clause 22.19 above, “construction works” shall mean the Works excluding both the Contractor’s on and off Site, fabrication facilities, workshops, work-yards, offices and stores.
- 22.19.2 The Contractor shall install a separately metered and invoiced supply or supplies of electricity for:-
- (1) Site fabrication facilities;
 - (2) Site workshops and work-yards; and
 - (3) Site offices and stores.

22.20 INABILITY TO SUPPLY

Wherever, the Project Contractor is not in a position to supply construction power and water supply to the system wide Contractor, he (the system-wide Contractor) shall arrange for his own separate construction power and water supply.

Appendix 1

1. MONTHLY PROGRESS REPORT

1.1 Topics

1.1.1 The Monthly Progress Report required under clause 2.17 of the GS shall include as a minimum the following sections and topics:

- (1) Executive Summary, highlighting any matters of concern and explaining corrective action to be taken
- (2) Safety and Quality issues (including any necessary corrective action taken or proposed to prevent the re-occurrence of the non-conformities)
- (3) Programme and overall progress
- (4) Physical progress report (see Paragraph 2.19 of the General Specification)
- (5) Achievement of Key Dates and Milestone Dates
- (6) Design status
- (7) Design and design co-ordination progress
- (8) Design submission and Employer's Representative's response status (list of all design submissions showing current status to be appended)
- (9) Manufacturing status
- (10) Materials ordered / in process
- (11) Equipment manufactured / procured
- (12) Factory acceptance test status report
- (13) Delivery status
- (14) Shipping / transportation activity
- (15) Deliveries to DMRC (including release certificate reference)
- (16) Free issue items (where applicable)
- (17) Installation / erection on Site
- (18) Site surveys (where applicable)
- (19) Equipment installation and erection
- (20) Completion of remedial works / Site acceptance
- (21) Safety audit and safety report
- (22) Test and Commissioning
- (23) Commissioning activity
- (24) Planned vs. Actual Table
- (25) Remedial works
- (26) System integration tests
- (27) Documentation

- (28) Functional design
- (29) Operation manuals (if applicable)
- (30) Maintenance manuals (if applicable)
- (31) Training manuals (if applicable)
- (32) As-built drawings
- (33) Spares / Test equipment
- (34) Training (if applicable)
- (35) Employer's Taking Over of Works (part or whole of Works)
- (36) Taking Over Certificate
- (37) Maintenance issues
- (38) Defects Liability
- (39) Contractual / Commercial
- (40) Payments / invoices
- (41) Employer's Representative's instructions and variation orders
- (42) Claims / potential claims
- (43) Contractor's resources (details of all staff and sub-contractors engaged on the Works)
- (44) Progress photographs
- (45) Labour Law Compliance Status.

1.2 Details

- 1.2.1 The programmes shall show current status to provide a comparison between the Works Programme and reported progress.
- 1.2.2 Actual progress shall be reported for each activity in the Works Programme in the following terms:
 - (1) the percentage of the work which is complete;
 - (2) the remaining duration of the work;
 - (3) the actual start date; and
 - (4) the actual completion date.

1.3 Copies

- 1.4 The Contractor shall submit 1 unbound original and 1 bound hard copies of all Monthly Progress Reports and of the accompanying documents plus one copy in electronic format on PC compatible.

Appendix 2

2. CONTRACT SYSTEMS SAFETY MANAGEMENT

2.1 Safety Assurance Programme

- 2.1.1 The Contractor shall within 60 days of Notice to Proceed, submit his proposed Safety Assurance Programme Plan for review and acceptance by the Employer's representative.
- 2.1.2 The Safety Assurance Programme Plan shall cover design, manufacture, testing, integrated testing, and commissioning to ensure safe routing, spacing, movement and control of trains and meet the requirements as stipulated in the PS.
- 2.1.3 The Safety Assurance Programme Plan shall also address reliability, maintainability and availability of the system. This shall ensure the system has a high degree of reliability and minimise down time during routine and failure repair.
- 2.1.4 The Safety Assurance Programme Plan shall include an EMC/EMI Control Plan that shall evaluate the requirements for electro-magnetic compatibility and interference, in this specification for all appropriate elements of the system, and ensure they are met.
- 2.1.5 The Safety Assurance Programme Plan shall include a Fire Control Plan which shall evaluate and ensure *inter-alia* that the fire loading of the materials proposed to be used, and potential sources of combustion in case of failure are compatible with currently accepted international practice.
- 2.1.6 The Safety Assurance Programme Plan shall describe procedures required to perform the specific tasks necessary to achieve safety, reliability and maintainability requirements. These procedures shall be incorporated within the Contractor's Quality Assurance System, and shall be subject to review by the Employer's Representative

2.2 Hazard Analysis

- 2.2.1 The Contractor shall take the lead role in the interface Hazard Analysis for trackside equipment, to which the system is interfaced, provided by other contractors.
- 2.2.2 The Contractor shall produce the Hazard Analysis Schedule for his complete system including all interfacing systems and shall interface principally with the Rolling Stock, Signalling, Communication, Power Supply, Civil and Depot Contractor as well as any other Designated Contractors to obtain the information necessary, from their hazard analyses, to complete the analysis.
- 2.2.3 The Contractor shall, as part of the safety analysis, prepare analyses to identify Hazards and ensure their satisfactory resolution. The analyses shall be prepared and submitted by the Contractor for the Employer's representative acceptance.
- 2.2.4 Not Used.
- 2.2.5 The Contractor shall compile a list of critical and catastrophic items identified as a result of hazard analysis.

- 2.2.6 All hazard resolution by procedural control shall be cross-referenced from the Critical and Catastrophic Items List to the appropriate manuals.
- 2.2.7 The qualitative measures of hazard severity are defined as follows:
- (i) Hazard Category I - Catastrophic: Operating conditions such that personnel errors, environment, design deficiencies, subsystem or component failure or procedural deficiencies may cause death or system loss. The safety target shall be based on internationally accepted standards.
 - (ii) Hazard Category II - Critical: Operating conditions such that personnel errors, environment, design deficiencies, subsystem or component failure or procedural deficiencies may cause severe injury to personnel, severe occupational illness or major system damage. The safety target for the occurrence of all Category II hazards summed together shall again be based on internationally accepted standards.
 - (iii) Hazard Category III - Marginal: Operating conditions such that personnel errors, environment, design deficiencies, subsystem or component failure or procedural deficiencies, may cause minor injury to personnel, minor occupational illness or minor system damage.
 - (iv) Hazard Category IV - Negligible: Operating conditions such that personnel errors, environment, design deficiencies, subsystem or component failure or procedural deficiencies will not result in injury to personnel occupational illness or damage to the system.
- 2.2.8 The Contractor shall prepare a Fire Safety Design Report for review and acceptance by the Employer's representative. This shall be submitted within 2 months after Notice to Proceed and revised and updated for the completion of the preliminary, pre-final and final design stages. Materials used in the Permanent Works of the system shall conform to fire safety requirements of international standards, subject to the acceptance of the Employer's Representative.

2.3 Results

- 2.3.1 Source of all failure rates employed shall be indicated in the Hazard Analyses.
- 2.3.2 All hazard analyses submitted to the Employer are to be standardised by the Contractor such that format and forms employed by all sub-contractors are the same.
- 2.3.3 The following targets shall be employed for the Fault Tree Analysis
- (i) No single point failure shall lead to death.
 - (ii) No combination of undetected failure and double point failures shall result in death.
 - (iii) No combination of undetected failure and single point failure shall result in major injury.
- 2.3.4 The procedures for Operation, Maintenance, Training and the Contractor's Quality Assurance manuals shall incorporate resolution of hazards identified from this hazard analysis.

Appendix 3

3. SUBMISSION FOR REVIEW REQUEST FORM

SUBMISSION FOR REVIEW REQUEST

Reference No. _____ (see Paragraph 4.3.2) Date: _____

Programme reference and scheduled date: _____

Submission stage _____ (see paragraph 3.5.1.1)

Title _____

We hereby submit for review by the Employer's Representative the documents or articles listed below:

(Introduction and list of items submitted – see Paragraph 4.3.5.2 - continue on separate sheet if necessary)

I confirm that the material is in full compliance with contract.

Signed _____ (Contractor's responsible engineer)

Employers Representative Response Dated _____

The material submitted has been review and the following decision is given:

"No objection" / "No Objection Subject To"(See below)/ "Rejected" (see below)

The following comments are made and a re-submission is to made by the contractor within 10 working days demonstrating fully how all of these are taken into account:

(Employer's Representative's comments)

Signed _____ (Employer's Representative)

Appendix 4

4. SCHEDULE OF ITEMS TO BE SUBMITTED BY CONTRACTOR

This Appendix lists the principal items to be submitted by the Contractor for review by the Employer's Representative. This list is not exhaustive and the Contractor is reminded to satisfy itself of the requirements for all submissions whether or not they are included within this Appendix.

Article	Reference Paragraph(s)	To be submitted
Availability, Reliability and Maintainability deliverables	1.9	In accordance with RAM deliverables described.
Initial version of the Works Programme	2.4.1.1	Within 30 days of the Commencement Date of the Works
Works Programme	2.4.1.2	Within 60 days of the Commencement Date of the Works
Design Submissions Programme	2.5.1	Within 30 days of the Commencement Date of the Works
Design, Procurement and Manufacturing Programme	2.6.1	Within 60 days of the Commencement Date of the Works
Material Control Schedule	2.6.5	As stated in the PS
Factory Testing Programme	2.6.8	Factory Testing Programme shall support all aspects of the Factory Testing Plan.
Installation Programme	2.7.1	As stated in the PS or as directed by the Employer's Representative
Testing & Commissioning Programme	2.7.7	As stated in the PS or as directed by the Employer's Representative
Monthly Progress Report and supporting documentation	2.10.1	The 5 th day of each month.
Physical Progress Report (baseline)	1.1.1.1	Within 30 days of the Commencement Date of the Works (LOA).
Contractor's Project Plan	3.3.1	As stated in the PS, or if none is given, within 60 days of the Commencement Date of the Works (LOA).
Particulars of agent/ Contractors Manager	3.3.1.6(6)	30 days before the Commencement Date of the Works
Interface Management Plan	3.3.1.7(b)	Within 60 days of notification from the Employer's Representative of the identity of each Project Contractor
Detailed Interface Document	3.3.1.7(d)	Within 60 days of notification from the Employer's Representative of the identity of each Project Contractor
EMC Management Plan	3.4.6	As stated in the PS or along with Preliminary Design Documents
Software Quality Assurance Plan	3.4.7	As stated in the PS or along with Preliminary Design Documents
Design Plan	3.5.1	As stated in the PS
Design Verification and Validation Plan	3.5.2	As stated in the PS

Article	Reference Paragraph(s)	To be submitted
Contractor's Factory Testing Plan	3.5.3	As stated in the PS
Test Reports	3.5.3.7	Immediately after the completion of Factory Testing
Procurement, Manufacturing and Delivery Plan	3.5.4	As stated in the PS
Contractor's Health and Safety Documentation	3.6.1.6	Within 30 days of the Commencement Date of the Works
Environmental Management Plan	3.3.1.6 (6)	30 days prior to the commencement of construction activities
Commissioning Plan	3.7.1.1	First draft within 35 weeks after the issuance of LOA
Installation Test Schedule	3.7.1.2 b.(i)	As stated in the PS or if not given, not later than two months in advance of the Date scheduled for commencement of respective tests
Partial Acceptance Tests Plan	3.7.1.2 b.(ii)	As stated in the PS or if not given, not later than four months in advance of the Date scheduled for commencement of Partial Acceptance Tests
System Acceptance Tests Plan	3.7.1.2 b.(iii)	As stated in the PS or if not given, not later than four months in advance of the Date scheduled for commencement of System Acceptance Tests
Integration Tests & Commissioning Plan	3.7.1.2 b.(iv)	As stated in the PS or if not given, not later than four months in advance of the Date scheduled for commencement of Tests on Completion
Operation & Maintenance Manuals Plan	3.7.2	As stated in the PS or if not given, not later than Two months prior to the issue of the Taking Over Certificate for the Works
Defects Liability Management Plans	3.7.5	Two months before the ROD.
Project Document Control Procedure	4.3.2	Within 45 days of the Commencement Date of the Works
Quality Manual	5.2.2.2	Within 30 days of the Commencement Date of the Works
Quality System Procedures	5.2.3	Within 30 days of the Commencement Date of the Works
Details of Quality Manager	5.2.6	Quality Manager(s), who shall be directly responsible to senior management level
Proposed Corrective & Preventive Action Plan	5.2.2.6	Within 14 days of issue of CAR
Management Quality Plan	5.2.2.1(1)	The Management Quality Plan shall define the Contractor's management structure for the execution of the Works
Design Quality Plan	5.4	The Contractor shall prepare a Design Quality Plan for its design works
Manufacturing Quality Plan	5.5	The Contractor shall prepare a Manufacturing Quality Plan for his manufacturing works
Site Quality Plan	5.6	The Contractor shall prepare a Site Quality Plan for its construction and installation works

Article	Reference Paragraph(s)	To be submitted
Reports of Quarterly Quality Audits	5.8.2	Every Three months
Quality Control Register	5.9	7 th working day of every month
Software Deliverable	6.1	As stated in the PS
Operational Safety Report (Software)	6.6	Software acceptance shall be based upon the supply of software functioning in a manner reviewed without objection by the Employer's Representative
Packaging Materials & Procedures	8.3.1	As stated in the PS
Latest drawings, test procedures, specifications and quality documentation for inspection of equipment	9.2.7.4	At least 15 days prior to each First Article Inspections (FAI)
Installation Tests Reports	9.4.3.3	Immediately after the completion of each test
Partial Acceptance Tests Records	9.4.4.9	Immediately following the successful Partial Acceptance Tests
System Acceptance Tests Records	9.4.5.8	Immediately following the successful System Acceptance Tests
Integration Tests & Commissioning Records	9.4.6.8	Immediately following the successful Tests on Completion of the system
Service Trial Records	9.4.7.8	Immediately following the successful Service Trial of the system
Summaries of Inspection and/or Test	9.6.11	7 th day of the following month
Construction & Installation Plan	14.1.1	As stated in the PS
Particular Uses of Site	17.2.1	Within 60 days of the Commencement Date of the Works
Method Statements Programme	18.5.5.3	Within 30 days of the Commencement Date of the Works or at a date reviewed by the Employer's Representative
Detailed written report of accidents, incidents and dangerous occurrence	18.6.4.1	Within 7 days of occurrence/accident
Name and qualification of safety representative for temporary site electricity	22.3.1	Not later than 4 weeks before appointment

Appendix 5

5. TYPICAL TYPE TEST REQUIREMENTS

5.1 Electronic and Electrical Equipment

The initial visual inspection shall be carried out to ensure that the equipment is of sound construction and, so far as can be ascertained, meets the requirements of the Specification.

5.1.1 Initial Performance Test

- i. The initial performance tests shall consist of a comprehensive series of measurements of the characteristics of the equipment to demonstrate that its performance is in accordance with its functional requirements, including detailed requirements of the Specification.
- ii. This test shall normally be performed at an ambient temperature of 40°C +5°C while supplied at its normal voltage and frequency, if relevant.
- iii. This test shall extend to demonstrating compliance with any limitation on self-generated vibration or interference as stated in the Specification.

5.2 Mechanical Tests

5.2.1 Drop Test

- i. The drop test is intended to be carried out on units and sub-assemblies that are portable. It is not intended that it be carried out on complete racks of equipment.
- ii. Casings or dust covers, which have to be removed for servicing, shall be removed after subjecting equipment to this test to inspect for damage. The test is designed to reveal any weakness of assembly and to ensure that the component mountings are of adequate strength. It is not designed to check whether doors or windows made of glass will fracture and to this end meters, glass windows, etc., may be removed.
- iii. The equipment shall not be deemed to have failed the drop test if externally accessible components such as control knobs or connectors are damaged. The Employer's Representative however reserves the right to ask for some form of guard, to prevent such damage, to be fitted at the Contractor's cost.

5.2.2 Vibration Test

The vibration test is designed to reveal any parts or components of the equipment that may be prone to any resonance severe enough to cause

possible damage or malfunctioning.

5.3 Environmental Tests

5.3.1 Dry Heat Test

- i. The dry heat test shall be carried out on each complete piece of equipment or assembly, with all doors and covers being in place and closed as in normal operation.

5.3.2 Low Temperature Test (in case applicable for Jaipur ambient temperature range)

The low temperature test shall be carried out on each complete piece of equipment or assembly, with all doors and covers being in place and closed as in normal operation.

5.4 Electrical Tests

5.4.1 Supply Variations

Measurements of equipment performance and maximum VA consumption shall be made, for supply voltage and frequency variations in all possible combinations of upper limit, normal and lower limit as detailed in the Specification. Throughout these tests, the equipment shall function in accordance with the Specification.

5.4.2 Supply Interruptions

- i. The supply input to the equipment under test shall be interrupted for periods of 10 ms.
- ii. The tests shall be performed ten times at random for ac supplies and three times at random for dc supplies.
- iii. The equipment shall be capable of withstanding these interruptions of supply input without damage, interruption or resetting by the operator and shall continue to function and operate correctly in accordance with the Specification.

Appendix 6

6. REQUEST FOR INSPECTION OF WORKS FORM**JAIPUR METRO RAIL CORPORATION****CONTRACTOR****REQUEST FOR INSPECTION OF WORKS**

To the)	Date
Employer's) will be ready for your inspection	
Representative) on	
*Description of Works) at	prior to
) on	at
		hrs
Signed	for Contractor.	Received by
		For Employer's
		Representative
		date
		Time
Filled in by Engineer	Mr.	Please arrange inspection
	Mr.	Please check setting out
	Signed	
Filled in by Inspector	The above work was inspected and permission was given/not given to proceed with next operation.	
	<ul style="list-style-type: none"> The following remedial works were required Contractor informed verbally (to MR _____ By Mr _____ on _____ at _____ hrs) Remedial works inspected and permission given to proceed with next operation on _____ at _____ hrs) 	
	as supervised by	
	Signed	
	Date	Time

Verbal or written permission by the Employer's Representative or his staff shall in no way relieve the Contractor of his responsibilities under the Contract.

*To be completed if applicable.

Appendix 7

7. NOT USED

Appendix 8

8. FIRST AID REQUIREMENTS

8.1 Not Used

8.2 Provisions by the Contractor

- 8.2.1 The Contractor shall supply portable first aid boxes maintained fully equipped at each local site offices and any work locations where 20 or more persons work at a time.
- 8.2.2 In each site office and work location at least one of the Contractor's employees shall be trained in first aid and should be available at all working hours for purpose of attending to emergencies.
- 8.2.3 The Contractor shall be responsible for making his employees aware of the location and access route to the nearest first aid base and if necessary shall provide facilities for evacuating a workman by stretcher from the worksite.
- 8.2.4 The Contractor shall keep the first aid base personnel informed of the number and identity of staff working within the area of responsibility of each first aid base.

Appendix 9

9. Not Used



Procurement of Works

JAIPUR METRO RAIL CORPORATION LIMITED

BIDDING DOCUMENT

for

Procurement on Direct Contract Mode

of

DC No.- JP/JS15 (Phase-1B)

**BID DOCUMENTS FOR DESIGN, MANUFACTURE, SUPPLY,
INSTALLATION TESTING & COMMISSIONING OF TELEPHONE
SYSTEM FOR JMRC PHASE 1B**

PART-II REQUIREMENTS

Section 6 – Employer's Requirements

Volume – II Particular Specifications

JAIPUR METRO RAIL CORPORATION LTD.

Khanij Bhawan, Tilak Marg,

C- Scheme, Jaipur (Rajasthan) PIN-302005

Country: India

**DESIGN, MANUFACTURE, SUPPLY, INSTALLATION, TESTING AND
COMMISSIONING**

OF

PUBLIC ADDRESS SYSTEM

PASSENGER INFORMATION DISPLAY SYSTEM,

AND

MASTER CLOCK SYSTEM

JP/JS15B

PARTICULAR SPECIFICATIONS

CHAPTER 1

General Requirements

LIST OF DEFINITIONS

In this Particular Specification, the following defined terms shall have the meanings ascribed to them below:

Availability	The probability that an item will be in a state to perform a required function under given conditions, at a given instant in time or over a time interval, assuming that the given external resources are provided
Corrective Maintenance	Maintenance performed to correct the occurrence of an equipment or system fault
Dark Fibre	An available, un-switched optical fibre
Engineer's Train	A specially run non-passenger train used for engineering purposes
Integrated Training Facility (ITF)	An additional training system integrating separate functional training simulators to provide a "realism" training environment in the area of incident training
Line Replaceable Unit (LRU)	Equipment that can be replaced as a single complete unit and can be handled by a single person
Main Line	Lines other than those within the depot
Maintenance Track	Maintenance tracks are those tracks within the depot on which first, second and third line maintenance will be carried out
Man Machine Interface (MMI)	The visual interface between the Controller and the control system. The MMI consists of the computer screens, displayed objects, icons, and equipment as well as the facilities by which the Controller executes control
Mean Time To Restore (MTTR)	The average time to restore equipment, subsystems, systems to full functionality
Mimic	A graphical representation of the railway and its global operating status
Non-Passenger Train	A special train run without passengers, such as engineer's trains or freight trains
Operating hours	MRTS Operating hours shall be 07:00 to 21:00 (tentative) , 7 days per week
Possession	Taking a section of the line out of service for engineering purposes
Preventative Maintenance	Periodic or regular maintenance performed in order to pre-empt the occurrence of equipment faults in the future. This shall include First, Second and Third Line Maintenance
Reliability	The measure of ability to rely upon equipment and systems to perform their intended function. The measure of reliability is MTBF
Safety-Critical	Failure of the system, sub-system or equipment will directly lead to a situation with the potential to cause harm, injury, damage to property, plant or equipment, damage to the environment, or economic loss

Stopping Position	The specified point within a station at which the train is to stop
Sub-system	Any one of the Seven systems comprising the System; i.e. Fibre Optic Transmission system, Radio system, Public Address system, Passenger Information Display system, Closed Circuit Television system Telephone system and Uninterrupted Power Supply System.
System	The Permanent Works described in the Particular Specifications
Train Description	An alphanumeric sequence uniquely identifying a running train
Train Operator/Driver	The person on the train responsible for its operation
Workstation	The collection of processors, screens and input devices necessary to provide one Controller with the necessary System displays and Commands
Station Control Room	A room for the Station Manager to monitor the running of trains and also the surveillance of the entire station for proper security and working.

LIST OF ABBREVIATIONS**MEANING**

• AAL	• ATM Adaption Layers
• ACC	• Assistant to Chief Controller
• ADPCM	• Adaptive Pulse Code Modulated
• AFC	• Automatic Fare Collection
• AGC	• Automatic Gain Control
• ALARP	• As Low As Reasonably Practicable
• ASS	• Auxiliary Sub Station
• ASTM	• American Society for Testing and Materials
• ATM	• Asynchronous Transfer Mode
• BCC	• Backup Operation Control Centre
• BER	• Bit Error Rate
• BS	• British Standard
• BSHR	• Bidirectional Self Healing Ring
• BSNL	• Bharat Sanchar Nigam Limited (PSTN Company)
• CBR	• Constant Bit Rate
• CC	• Chief Controller
• CCD	• Charge Coupled Device
• CCIR	• International Radio Consultancy Committee
• CCITT	• International Telegraph and Telephone Consultative Committee
• CCTV	• Closed Circuit Television
• CD	• Compact (Optical) Disk
• CDRS	• Centralised Digital Recording System
• CENELEC	• European Committee for Electrotechnical Standardisation
• CER	• Central Equipment Room in OCC
• CMSS	• CCTV Management Software System
• CODEC	• Coder/Decoder
• CSS	• Communication System Supervisor
• CTU P	• Central Terminal Unit (Traction) Power
• CTU T	• Central Terminal Unit Telecommunication
• DAT	• Digital Audio Tape

MEANING

• DCC	• Depot Control Centre
• DCE	• Data Communication Equipment
• DDF	• Digital Distribution Frame
• DDP	• Digital Distribution Panel
• DID	• Direct Inward Dialing
• DOT	• Department of Telecommunication
• DTC	• Depot Traffic Controller
• DTE	• Data Terminal Equipment
• DTMF	• Dual Tone Multi Frequency
• DVA	• Digital Voice Announcer
• EIA	• Electrical Industries Association
• EMC	• Electromagnetic Compatibility
• EMI	• Electromagnetic Interference
• EMU	• Electric Multiple Unit
• EPABX	• Electronic Private Automatic Branch Exchange
• FCP	• Fire Control Panel
• FOTS	• Fibre Optic Transmission System
• FSD	• Fire Services Department
• GPS	• Global Positioning System
• GS	• General Specification
• GUI	• Graphic User Interface
• HCL	• Hydrochloric Acid
• HQ	• Headquarters
• HV	• High Voltage
• HVAC	• Heating Ventilation Air Conditioning
• ICAO	• International Civil Aviation Organisation
• IDC	• Insulation Displacement Connector
• IEC	• International Electro-technical Commission
• IEE	• Institute of Electrical Engineers
• IEEE	• Institute of Electrical and Electronic Engineers
• ISDN	• Integrated Services Digital Network

MEANING

• ISO	• International Organisation for Standardisation
• IT	• Information Technology
• ITU-R	• International Telecommunications Union - Radio
• ITU-T	• International Telecommunications Union – Telecommunications
• IVRS	• Interactive Voice Response System
• JMRC	• Jaipur Metro Rail Corporation
• JPEG	• Joint Photographic Expert Group
• KB	• Key Board
• LAN	• Local Area Network
• LCD	• Liquid Crystal Display
• LCX	• Leaky Coaxial Cable
• LED	• Light Emitting Diode
• LSOH	• Low Smoke Zero Halogen
• LV	• Low Voltage
• MDF	• Main Distribution Frame
• MMI	• Man-Machine Interface
• MCK	• Master Clock System
• MRTS	• Mass Rapid Transport System
• MRTS HQ.	• Mass Rapid Transport System Head Quarter office
• MTBF	• Mean Time Between Failures
• MTTR	• Mean Time To Repair
• NFPA	• US National Fire Protection Association
• NMS	• Network Management System
• NTSC	• National Television Standards Committee
• NVR	• Network Video Recorder
• O&M	• Operations and Maintenance
• OAM&P	• Operations, Administration, Maintenance & Provisioning
• OCC	• Operations Control Centre
• ODF	• Optical Distribution Frame
• OLTE	• Optical Line Terminating Equipment
• PAL	• Phase Alternation Line

MEANING

• PAS	• Public Address System
• PB	• Police Booth
• PCM	• Pulse Code Modulation
• PIDS	• Passenger Information Display System
• PPIO	• Program Planning and Investigation Office
• PS	• Particular Specification
• PSB	• Platform Supervisors Booth
• PSE	• Power Supply Equipment
• PSTN	• Public Services Telephone Network
• PTT	• Press To Talk
• PTZ	• Pan/Tilt/Zoom
• QA	• Quality Assurance
• QRA	• Quantified Risk Assessment
• RAMS	• Reliability, Availability, Maintainability and Safety
• RDSO	• Research Design and Standards Organisation (IR)
• RFI	• Radio Frequency Interference
• RSS	• Receiving Sub Station
• SCADA	• Supervisory Control And Data Acquisition
• SCR	• Station Control Room
• SDH	• Synchronous Digital Hierarchy
• SMS	• Station Management System
• SP	• Sectioning Post
• SSP	• Sub Sectioning Post
• STM	• Synchronous Transport Module
• TC&S	• Train Control & Signalling
• TER	• Telecommunications Equipment Room in Stations and Depots
• TMN	• Telecommunications Management Network
• TOT	• Transfer of Technology
• TPC	• Traction Power Control
• TSS	• Traction Sub Station
• UG	• Under Ground

MEANING

• UHF	• Ultra High Frequency
• UPS	• Uninterruptible Power Supply
• UTC	• Universal Co-ordinated Time
• UV	• Ultra Violet
• VDU	• Visual Display Unit
• VHF	• Very High Frequency
• VRLA	• Valve Regulated Lead Acid

1. INTRODUCTION

1.1 Scope and Purpose

1.1.1 This Specification covers the design, manufacturing, delivery, installation, testing, commissioning and support for the Public Address System, Passenger Information Display System and Master Clock System to be supplied under this Tender.

1.1.2 Not Used.

1.1.3 The Particular Specification is divided into Five chapters:

CHAPTER	TITLE
1	General (This Chapter)
2	Public Address System
3	Passenger Information Display System
4	Master Clock System
5	Appendices

TABLE 1-1 Chapters of the Particular Specification

1.1.4 Chapter 1 covers scope of the works, system design, verification of testing, commissioning, packing, shipping, storage, delivery, installation, operation, power distribution, maintenance support, spares, special tools, test equipment, training, documentation and programme requirements of all sub-systems.

1.1.5 Chapter 2 of this Particular Specification specify the particular scope of works and performance, functional and design requirements and interfaces of the Public Address System.

1.1.6 Chapter 3 of this Particular Specification specify the particular scope of works and performance, functional and design requirements and interfaces of the Passenger Information Display System.

1.1.7 Chapter 4 of this Particular Specification specify the particular scope of works and performance, functional and design requirements and interfaces of the Master Clock System.

1.1.8 Chapter 5 of this Particular Specification includes Appendices on Interface Specifications, Key Dates & Access Dates, Cable Specifications, List of Contract Spares, Section details, Provision of MMI schedule, Earthing policy etc.

1.2 Relevant Documents

1.2.1 This Particular Specification (PS) shall be read in conjunction with the General Conditions of Contract (GCC), the General Specification (GS), and any other document forming part of the Contract.

1.2.2 In the event of a conflict between the GS and the PS, the requirements of the PS shall prevail.

1.2.3 In the event of a conflict between the PS and any other standards or specifications quoted in the PS, the requirements of the PS shall prevail.

1.2.4 Notwithstanding the contents of Sections 1.2.2 and 1.2.3 above, the Contractor shall always immediately seek advice from the Employer's Representative in the event of conflicts between specifications.

1.3 Employers Drawings

1.3.1 Employer's drawings are as in Section 6 of this Contract which includes Reference Drawings for typical stations. All drawings are conceptual design drawings and details shown on the drawings are for information only. The accuracy of preliminary details shown on the drawings can't be guaranteed and should be treated accordingly.

1.3.2 In stations, except in Telecomm Equipment Room and Signalling Equipment Rooms, no false ceiling is planned. Hence JP/JS15B shall note this for arrangement of any loudspeaker installation from the ceiling.

1.4 Relevant Codes and Specifications.

1.4.1 The Sub-system and its constituent parts shall comply with the relevant latest version of British Standards, International Electromechanical Commission (IEC) standards, International Organization for Specification (ISO) Standards, European Standard (EN), Indian Standards or UL Standards (Underwriters Laboratory) etc. as specified below:

Safety of information technology equipment, including electrical business equipment.	EN 60950-1:2006
Power Transformers	IEC 60076, EN 60076
Protection Class for Components	As specified for individual equipment in this PS.
Surge Protective Devices	IEC 61643-1
EMC – Immunity	IEC 60801, EN 60801
EMC – Emission	VDE 0875, IEC 60555, EN 60555
Electromagnetic compatibility Testing and Measurement Techniques	IEC 61000-4, EN 61000-4, BS EN 50121
RFI Suppression	EN55022A or VDE 0878
Level measuring systems utilizing ionising radiation with continuous or switching output	IEC 60982

Sound Level of Noise Source	ISO 3746, BS 4196–6
Flammability Tests	IEC 60707
Valve Regulated Sealed Lead Acid Rechargeable Single Cells	IRS: S93-96, DOT: TQ510G 92
Low-voltage Switchgear and Control gear Assemblies	IEC 60439 – 1, EN 60439–1
Low-voltage Switchgear and Control gear	IEC 60947, EN 60947, IEC947-3, IEC 60898 or EN 60898
Specification for contactors	IEC60947 – 4, EN 60947-4
Code of practice for Earthing	IEEE1100, NFPA 780, IEC1024
Transient Protection	MIL-STD-7041A
Lightning Protection	BS-6651
Quality	ISO9001
International Standard MPEG-4 Video	ISO/IEC 13818-2:2002 or later edition
Specification for Safety of Information technology equipment including electrical business equipment.	BS EN 60950-1:2006
Electromagnetic Compatibility (EMC) : Generic standards immunity for Industry environments.	BS EN 61326 (Annex A)
Specification for safety requirements for equipment to be connected to telecommunication networks.	BS EN 41003:1999
Safety requirements for electrical equipment for measurement, control & laboratory use. Part 1: General requirements.	BS 61010-1:2003/A2:1995
Secondary protectors for Communication Circuits.	Underwriters Laboratory safety std 497A

1.5 General Overview of Telecommunications System

- (1) For efficient railway management and operation, it is essential to have a well organized telecommunication network covering strategic locations like

OCC, passenger stations, and it is equally essential to have reliable links between the strategic locations and moving trains or working staff along the railway track/Tunnel.

- (2) The FOTS telecommunication system being provided under FOTS Contract shall provide all necessary communication channels for carrying voice, data, and video signals for railway management and operation from Station TER to OCC CER.
- (3) A Master Clock System shall be provided under Master Clock System Contract to distribute time signal to all the clocks at stations. Master Clock System shall also provide reference timing signals for all telecom and other systems for network synchronization.
- (4) This backbone transmission network, which shall provide the necessary communication channels in the MRTS, shall be of adequate high quality, and shall have high reliability, availability and expandability. On this backbone network in the MRTS, a private telephone exchange network shall be constructed to provide basic telephone communication within the MRTS; it shall be used for MRTS management, personnel management, facility maintenance, train operation and passenger guidance.
- (5) The telecommunication system shall also consist of a direct line telephone communication network exclusively for the train operation and maintenance functions.
- (6) The Train Radio system shall enable communication between the fixed strategic locations and the moving trains as well as the moving working personnel along the railway track/Tunnel. The train radio system shall also be used for depot operation. Train Radio communication shall also be used for making PAS announcements from OCC to the passengers on the train.

A Centralized Digital Recording System is provided in CERs at the OCC for multichannel voice recording of direct line communication, two way radio conversations, emergency or fire messages broadcast on station PAS and train borne PAS initiated from OCC.

- (7) At the stations a suitable Public Address System shall be provided for making announcements to passengers regarding train arrival / departure and shall work as the primary means of communication with passengers and staff during emergencies. In the normal case, audio-broadcast shall be made from Station Control Room or Platform Supervisor's Booth and in a train by the driver. However, it shall also be possible for the OCC to make announcement to any station, group of stations or all stations.
- (8) A Passenger Information Display system triggered by TC&S system shall automatically provide real time visual information about train arrival/departure throughout the station. The PIDS display shall be co-ordinated with PAS for real time passenger audio broadcasts for train arrival/departure. PIDS shall enable the operator in SCR and OCC to display routine and special emergency messages for passengers and

staff in stations. Display boards shall be provided for each platform side at all stations and in concourse at all stations of JMRC phase-1B.

- (9) A CCTV station surveillance system shall be built through contract for supervising strategic operational locations like Station car park, AFC gates, ticketing offices and lobby, escalator, Lifts and staircase exits and platform operational area and PF ends to ensure safe operation of the Metro and security locations at stations. It shall be supervised from the station control room and Police booth at each station simultaneously, and these video signals shall also be transmitted to the OCC at Mansarovar both as live and as recorded from the stations for remote supervision. In case more than 1 police booths are provided at some stations, the same shall also be provided with MMI for viewing and control.
- (10) An Uninterrupted Power Supply System (3 phase 415V AC Supply) shall be built through UPS contract for providing UPS Supply for Telecom, AFC and Signaling contractors with on-line redundant configuration with back up plan for four hours for Telecommunication, S&TC and AFC equipment at Stations and OCC.

2 Not Used

3 SCOPE OF THE WORKS

3.1 General Requirements

The scope of the works includes but not limited to design, design coordination with other Contractors, design submission, design approval, supply, manufacture, FAT inspection, packing, shipping, transportation, storage, delivery, handling, insurance, installation, interfacing, interfacing with other project contractors and interface design submission, integration with other systems, testing at Site & commissioning, Integrated testing with Other Project Contractors, including integration of new stations with existing PA/PIDS/MCK system at OCC, maintenance support, spares, test equipment, training, Maintenance supervision assistance, documentation and providing DLP warranty (Defect Liability Period) for the entire Public Address System, Passenger Information Display System and Master Clock System.

3.2 Scope of Supplies

3.2.1 The scope of supply shall include all necessary hardware, software, firmware, accessories, materials and documentation. The detailed requirements shall be as given in the Chapter 2, 3, 4 and 5 of Particular Specifications. JP/JS15B to please note that **Table-I of Section 4- Bidding Forms** gives the minimum BOQ to be covered as part of the scope of work and any other item or enhancement of the listed items required to complete the JP/JS15B Contract shall also be provided as part of this lump sum Contract.

3.2.2 Not used

3.3 Scope of Services

3.3.1 The detailed requirements of the services to be provided by the Contractor shall be as given in the GS and PS.

3.3.2 The scope of services to be performed by the Contractor shall include, but not be limited to, the following:

- (1) Design, manufacture, delivery, system assurance, installation, testing and commissioning of the Public Address System, Passenger Information Display System and Master Clock System presentations, reviews and audit support as specified in the Specification
- (2) Project management of the implementation of the System
- (3) Quality and safety management
- (4) Overall site supervision and management
- (5) Decommissioning, removal and disposal of Temporary Works
- (6) Operation and maintenance support services
- (7) Preparation and submission of documentation

- (8) Training for Employer's Training Instructors, operations staff, maintenance staff and engineering staff(if applicable)
- (9) Recommendation and provision of spares
- (10) Interface management
- (11) Manpower resources
- (12) Prototypes, mock-ups, emulation and simulation as required(There are no mockups, prototypes or samples to be provided by the Contractor within the scope of this contract except in the case of equipment, which differs in design from that supplied under Phase 1A).

3.4 Sections and Key Dates

Reference be made to the Appendix B under Chapter 5 of the PS for Key Dates and Access Dates and to Appendix C for Sections.

3.5 Not Used

3.6 The Site

The site for the Permanent works shall include two underground stations, &OCC, as detailed in ITB. It will cover equipment rooms at stations, tunnels, viaducts, bridges at grade tracks & also all the ancillary buildings along the alignment setc, parking areas and OCC TER/Theatre for integration of new stations and updation of PAS/PIDS MMI, NMS etc..

3.7 Employer's Facilities

The contractor shall submit to the Employer's Representative details and notice of intention to use any of the Employer's facilities like works area and the period of usage. This shall be submitted in accordance with the provisions in the GS. The Contractor shall note that the works areas may have to be relocated from time to time to suit the requirements of the Employer.

3.8 Contractor's Premise (Project Office/Storage Space)

The JP/JS15B Contractor shall make use of its existing provided Project Office and Storage Space at MSVD, set up during phase 1-A. The contractor shall be responsible for all costs of running his site office, including but not limited to utilities, consumables, office supplies, cleaning & maintenance. JP/JS15B shall necessarily have to station throughout the contract period, the key personnel for implementation, co-ordination & execution.

4. PERFORMANCE REQUIREMENTS

4.1 General

- 4.1.1 The Contractor shall ensure that all equipment and material used is able to meet the specified availability throughout its service life as required to minimise disruption to the railway operation and to minimise the ongoing maintenance costs.
- 4.1.2 The System shall be so designed as to have a minimum of 15 years of service life operating continuously. The life of all the cables shall not be less than 25 years.
- 4.1.3 The system shall be designed to facilitate normal train and station operation, management of incidents and abnormal operations as well as of emergencies.
- 4.1.4 The System shall, to the extent practicable, have no credible failure mode, which will directly cause an interruption to security surveillance or delay in the train services. The Contractor shall demonstrate that the probability of occurrence of the credible failure mode, if any, has been reduced to ALARP (as low as reasonably practicable) and no further cost-effective means of improving reliability can be identified.

4.2 Reliability Requirements

- 4.2.1 The inability to perform a required function, the occurrence of unexpected action by the equipment, or the degradation of performance to below the required specifications shall constitute a failure.
- 4.2.2 The Mean-Time-Between-Failures (MTBF) figure requirements for major equipment of each sub-system shall be as given in Chapters 2, 3, & 4 of this Particular Specification. These MTBF figures specify the minimum reliability requirement of all major equipment. If higher MTBF figures are required to achieve the required level of System availability, the Contractor shall adopt suitably higher MTBF figures in equipment selection.
- 4.2.3 Reliability calculations shall be based on data from past experience where such data is available for similar applications. Where there is no such information available, parts- count data or other generic data sources shall be used. The order of preference for data reliability prediction shall be as below:
- (1) Data from operation of identical equipment in a similar railway environment, under similar conditions of usage, maintenance and climate
 - (2) Data from operation of similar equipment in a railway environment
 - (3) Specific test data carried out in simulated conditions appropriate for Metro Rail.
 - (4) Data from operation of similar equipment in a non-railway environment
 - (5) Data based on parts-count analysis or any other generic data sources

- 4.2.4 The Contractor shall assure reliability throughout all aspects of the design, manufacturing, installation and testing as necessary to satisfy the reliability requirements.
- 4.2.5 The Contractor shall submit Reliability Plan to the Employer's Representative for review in accordance with RAMS Plan.
- 4.2.6 The Reliability Plan shall describe the analytical methods to be used during design and development to demonstrate compliance with reliability requirements and identification of reliability-critical items in the System offered.
- 4.2.7 The Reliability Plan shall identify a comprehensive list of reliability-related submissions such as specifications, standards, method statements, procedures, drawings and records to the Employer's Representative for review. The Reliability Plan shall include the dates of the submissions.

4.3 Availability Requirements

- 4.3.1 Detailed availability requirements are given in Chapters 2, 3 & 4 of this Particular Specification.
- 4.3.2 The Contractor shall submit calculations with reliability block diagrams for each sub-system to demonstrate the compliance with required availability figures. The availability calculation shall take all possible failure modes into consideration. The calculation shall be based on the Contractor's submitted equipment MTBF figures, MTTR figures and the configuration of each sub-system.
- 4.3.3 The Contractor shall predict the system failure rate or MTBF figures of each sub-system from the availability calculations.
- 4.3.4 Equipment duplication, hot-standby protection, parallel-run, path diversity, etc. shall be adopted whenever necessary and appropriate to meet the required availability.
- 4.3.5 Error detection and correction mechanism shall be included in the communication links as appropriate depending on the nature and functional criticality of the data conveyed.
- 4.3.6 Switchover between redundant equipment, or between redundant routings, shall occur automatically and immediately upon failure and shall be transparent to the users. Toggling in switchovers shall be prevented.
- 4.3.7 The Contractor shall conduct analysis and propose methods, if any, for further improvement of the availability of each sub-system beyond the minimum required availability figures mentioned above.

4.4 Maintainability Requirements

- 4.4.1 The System shall be designed such that the MTTR figures for restoring the operation of the System from fault condition shall not be more than four hours (excluding time of travel).

- 4.4.2 The MTTR figure shall be calculated from the individual equipment weighted by the failure rate of the equipment.
- 4.4.3 The MTTR figure shall be the total time calculated from the moment the occurrence of the fault at site is reported to the maintenance personnel to the time when the System is fully restored to normal operation.
- 4.4.4 The Contractor shall provide the history records from past works showing the achievement of MTTR figures declared. Where such records are not available, the Contractor shall provide simulation of faults to demonstrate that the declared MTTR figures are indeed achievable.
- 4.4.5 All plug-in modules shall permit hot swapping so as not to affect the normal or emergency operation of the System.
- 4.4.6 All line replaceable items shall not exceed the size and weight, which an average individual person can handle.
- 4.4.7 The System shall be suitably designed to minimise the need for frequent preventive maintenance.
- 4.4.8 The System shall be so designed as to avoid the need for a total shutdown for preventive maintenance. In the event that a total shutdown is inevitable, the preventive maintenance shall not require the System to be non-operational for more than two hours.
- 4.4.9 The System shall be so designed as to prevent failures or breakdown due to invalid or incorrect inputs.
- 4.4.10 Built-in self-diagnostics, power-up self test and sufficient test points shall be provided in the System to minimise the time required to locate a fault. The contractor shall submit the details to Employer's representative as part of detailed design.
- 4.4.11 All components, materials, software and supports required for repair and servicing of the System shall be available during the entire lifetime of the System. The contractor shall submit the details of life cycle of all major sub-components to Employer's representative as part of detailed design.
- 4.4.12 The Contractor shall submit Maintainability Plan to the Employer's Representative for review in accordance with RAMS Plan.
- 4.4.13 The Maintainability Plan shall describe the analytical methods to be used during design and development stages to demonstrate compliance with maintainability requirements specified herein and to identify the maintainability-critical items of the System.
- 4.4.14 The Maintainability Plan shall identify a comprehensive list of maintainability-related submissions such as specifications, standards, method statements, procedures, drawings, and records to the Employer's Representative for review. The Maintainability Plan shall include the date of submission.

- 4.4.15 Alarms, health status & displays generated by the System shall be shown locally, as well as at remote location in OCC.

4.5 System Safety Requirements

- 4.5.1 The Contractor shall perform the mandatory safety activities as detailed in Appendix 2 of the GS.
- 4.5.2 The Contractor shall support other Project Contractors with the provision of information and relevant analysis where the availability and usability of the Telecommunications System is a contributing factor to the overall system risk.
- 4.5.3 Not Used.
- 4.5.4 All Man-Machine-Interfaces shall be designed with the risk of Repetitive Strain Injury (RSI), eye strain and radiation-induced illness (both non-ionising and ionising radiation) taken into consideration.

- 4.5.5 The design of the System shall minimise the risk of fire.

- 4.5.6 The design of the System shall minimise the build-up of static, as well as the effects of static discharge during maintenance.

- 4.5.7 No toxic or asbestos-containing materials shall be used anywhere in the System.

4.6 Electromagnetic Compatibility (EMC)

- 4.6.1 Not Used.

- 4.6.2 The Contractor shall ensure and demonstrate that the System is adequately protected against electromagnetic interference (EMI) among the systems. The Contractor is required to conduct type tests as well as full EMC tests (if previous type test results are not available). Tests to be conducted shall include but not limited to satisfying standards (their latest version) as following:

- (1) Overall compliance of EN50121-1 & EN50121-4 and
- (2) Specific Standards of Immunity : IEC1000-4

- 4.6.3 The maximum levels of out-of-band emission shall be such as to ensure that the sub-systems perform in conformity with the criteria given in the respective Chapters of the PS.

- 4.6.4 The maximum levels of radiated and conducted EMI of the System shall not exceed the levels specified in EN50081-1.

- 4.6.5 Any equipment consisting of sensitive electronic components that is likely to be handled or touched by any person shall be protected against electrostatic discharge and shall be tested as defined in IEC61000-4-2.

- 4.6.6 Not Used

- 4.6.7 All tests shall be conducted to meet EMC severity levels specified by the relevant international standards, as a minimum, the EMC severity levels for industrial equipment shall apply.
- 4.6.8 The cost incurred in the suppression of electromagnetic or electrostatic interference including any hardware shall be deemed to be included within the contract.
- 4.6.9 The contractor shall ensure that all Intra system EMI are taken care of through proper design and other measures. All major subsystems shall be tested for emissions and immunities in accordance with the appropriate international standards for equipments operating in Railway environments.
- 4.6.10 Inter-system EMC**
- The contractor shall ensure that all equipments are design and constructed in accordance with latest versions of EMC standards including but not limited to latest version EN50082, EN50121, EN 50123, EN50155, IEC571, IEC1000 or equivalents to ensure proper functioning
 - Adequate safety margins between the immunity levels of the Telecommunication Systems and the emission levels of other electrical and electronic equipment must be maintained.
 - The design of the software shall take into consideration that with the interference injected into the system, it is possible to produce an abnormal condition. For example, the program may become "locked up" awaiting a signal which will never arrive (system hang). It is important therefore that the various possible failures are analysed and appropriate actions are taken when failures are detected.
 - The probabilities of various conditions which could lead to an unreliable operation must be determined wherever applicable.
- 4.6.11 Relevant EMC certificates as above for all system components of PIDS/PAS/MCK systems including standard off-the-shelf products shall be submitted to the Employer's Representative for review.

5. FUNCTIONAL REQUIREMENTS

5.1 General

The Contractor shall design the System such that operation of the System shall be in line with the provisions in the GS under normal and emergency conditions.

5.2 Operation

5.2.1 General

5.2.1.1 This part of the document only covers the general operational requirements of the System.

5.2.1.2 The particular operational requirements and modes of individual Sub-systems shall be as given in Chapters 2, 3 & 4 of this PS.

5.2.1.3 Any modifications, up gradation or update in OCC/ existing station shall not degrade the inherent safety and functionality of the system.

5.2.2 Man-Machine Interfaces (MMI)

5.2.2.1 The Contractor shall provide user-friendly Man-Machine Interfaces for JMRC staff to operate, control, monitor and maintain the Systems. The MMI/Workstation shall provide all the functions similar to those designed on Phase 1A.

6. DESIGN REQUIREMENTS

6.1 General

6.1.1 Design Approach

6.1.1.1 The Contractor shall adopt a structured, modular and top-down approach for the design and exercise proper design control to ensure that the designs are in accordance with the requirements given in the Specifications.

6.1.1.2 The technologies adopted for the design of the System shall be:

- (1) Field proven with past successful applications references
- (2) Conforming to open international standards

6.1.1.3 The System shall be designed for continuous unattended operation for extended periods of time.

6.1.1.4 All of the Contractor's key design staff shall be located in Jaipur. The Contractor's design staff shall be competent with sufficient experience in the individual responsibility areas.

While the supply of equipment may be done from the OEM of the equipment, competent and sufficiently experienced technical representative of the OEM (qualification and experience to be approved by JMRC) shall be available at Jaipur for design reviews/discussions and for installation supervision of the Public Address System, Passenger Information Display System and Master Clock System during the implementation of the project.

6.1.1.5 The Contractor shall submit a Design Plan with requirements as stipulated in the GS and PS.

6.1.2 Design Verification and Validation

6.1.2.1 The Contractor shall submit detailed design calculations and supporting drawings, documents, etc., for the system to the Employer's Representative for review.

6.1.2.2 The design calculations shall demonstrate that the Contractor's design fully complies with the requirements given in the Specification. The design calculations shall further demonstrate that the ratings, capacity and quantity of the proposed equipment are adequate.

6.1.2.3 The Contractor shall furnish the following calculations and analysis for System as a minimum:

- (1) Estimation of the power consumption and heat dissipation per equipment location.
- (2) Prediction of the reliability and availability of the system,

6.1.2.4 The requirements on design calculations specific to the systems shall be as given in Chapters 2, 3& 4 of this PS.

6.1.3 Design Review

6.1.3.1 Not Used

6.1.3.2 The Contractor shall ensure that all design submissions are accurate, fully compliant relevant and of good quality before they are submitted to the Employer's Representative for review.

6.1.3.3 The Contractor shall ensure that all comments of the Employer's Representative have been properly incorporated or otherwise resolved before resubmission.

6.1.3.4 The Contractor shall exercise adequate control to ensure that the number of resubmissions is minimum.

6.1.3.5 In addition to the Contractor's own design reviews, the Contractor shall carry out design review meetings with the Employer's Representative at the appropriate design stages with at least one slated prior to the conclusion of the preliminary design and the final design. Competent and sufficiently experienced staff of the OEM (the supplier of the major equipment) shall also be present during design review meetings with the Employer's Representative. The Contractor shall include presentation of his design at the meeting and demonstrate how his design complies fully to all aspects of System requirements. The Employer's Representative's comments thereto shall be recorded and duly incorporated in the design.

6.1.3.6 The following issues shall be addressed during each of the design review meetings:

- (1) Reliability, Availability, Maintainability and Safety (RAMS)
- (2) Ergonomics and Human Factor Engineering
- (3) Design Progress
- (4) Interface Issues

6.1.4 MMI Design

6.1.4.1 The MMI shall provide all the functions similar to those designed on Phase 1A. Further for MMI's specially designed or customised for this 1B extension and differ from earlier supplied, then Contractor shall provide and organise prototypes for demonstration and submission to the Employer's Representative for review prior to implementation.

6.1.4.2 Another Project Contractor shall carry out an ergonomic study for the MMI and console furniture design. The Contractor shall co-ordinate with the Project Contractors of 1B to ensure that the latter's recommendations are properly reviewed, commented upon and the agreed items incorporated in the Contractor's MMI design.

6.1.5 Submission of Samples

6.1.5.1 To assist the Employer's Representative in his evaluation of the Contractor's design submission, the Contractor shall submit samples to the Employer's Representative for review, when so required and instructed by the latter. Please note no mockups,

prototypes or samples to be provided by the Contractor within the scope of this contract except in the case of equipment, which differs in design from that supplied under Phase 1A.

- 6.1.5.2 If necessary the Contractor shall arrange site visits and/or videos for illustration if the items are bulky or impracticable for submission.
- 6.1.5.3 Samples of installation or mounting accessories shall be properly mounted on a board, wherever feasible, prior to their submission to the Employer's Representative for review.
- 6.1.5.4 The Contractor shall provide samples of individual types of cables to the Employer's Representative prior to the commencement of cable installation. The samples shall be properly protected with transparent housing for independent cable components including sheath, armour, insulation, cable cores, etc. for ease of identification as well as inspection. Each sample shall be properly labelled with description of the cable type.
- 6.1.5.5 All samples submitted to the Employer's Representative shall become the property of the Employer.

6.2 Equipment Design

6.2.1 General Considerations

- 6.2.1.1 Specific equipment design requirements for Public Address System, Passenger Information Display System and Master Clock Systems are given in Chapters 2,3&4 of this PS. However, design shall be in accordance with the approved design of Phase 1A except otherwise stated in the Particular Specifications. In case of conflict between any of them the contractor shall seek the advice of Employer's Engineer.
- 6.2.1.2 The equipment will be the same equipment as used for Phase 1A. If offered equipment is different from equipment utilized earlier in phase 1-A, then it shall be field proven with past history of successful performance.
- 6.2.1.3 For all excess heat dissipating equipment including power amplifiers, the Contractor shall provide the following as necessary and applicable:
 - (1) Local warning signs
 - (2) Local over-temperature alarm indications
 - (3) Remote over-temperature alarm monitoring
 - (4) Facilities for remote power ON/OFF
- 6.2.1.4 All active equipment shall have LED/Lamp indications indicating:
 - (1) Normal power supply
 - (2) Summary alarm conditions

- 6.2.1.5 All equipment shall be designed and constructed to operate without degradation in quality, performance or loss of function in the electromagnetic environment prevalent in a standard Mass Rapid Transit Railway System including underground segments. The traction system of MRTS is 25 KV AC, 50 Hz for elevated and underground sections.

6.2.2 Fire and Smoke Precautions

- 6.2.2.1 The cable routes shall be suitably designed to prevent trapping of rubbish which could later become a fire hazard.
- 6.2.2.2 Every possible precaution must be taken to prevent the flow of fault currents through the cables, especially from the traction power system. Communication cables must be kept away from high tension power supply cables.
- 6.2.2.3 All necessary measures shall be adopted to prevent the creation of hazardous conditions arising out of overheating and/or ignition of cables. All cables used must therefore, meet the following stipulations, unless otherwise specified:
- (1) The cables meant for underground installation shall be made from fire-retardant, low-smoke, halogen-free materials only.
 - (2) The cables meant for all other areas shall be made from fire-retardant, low-smoke, materials.
- 6.2.2.4 Not Used.
- 6.2.2.5 Cabling in the elevated Sections may be exposed. Outer sheathing material for the cable specified shall be selected so that it is resistant to exposure to direct sunlight.
- 6.2.2.6 All of the above requirements shall be fully complied to, without compromising any of the mechanical or electrical properties of the cables.

6.3 Environmental Conditions

- 6.3.1 All equipment shall be protected from damage or degradation in performance due to shock or vibration as experienced in railway environment.
- 6.3.2 Unless otherwise specified, all telecommunication equipment installed under this Contract inside rooms with controlled environment shall be designed for operation in temperatures of 0°C to + 40°C. All equipment installed outside these areas shall be rated for continuous operation up to + 50 deg C.
- 6.3.3 No equipment other than display boards, Slave clocks, Loudspeakers, Noise Sensors, PAS control panels (in PSB), field switches and cables and their junction boxes shall be placed outside the TER/CER unless the equipments are rated for temperatures up to +50 deg C at 90% RH.

6.4 System Expansion

- 6.4.1 The Contractor shall design the System with sufficient capacity such that the System can operate properly under peak load or traffic conditions and with sufficient

margins in performance to ensure normal operation for any change in design assumptions and operating conditions.

- 6.4.2 The Contractor shall adopt a modular approach for design to enable System expansion with minor modifications such as parameter changes or addition of modules without the need for substantial equipment replacement or software rewrite.

7. INTERFACES

7.1 Interfaces between Subsystems

7.1.1 The details of interfacing with other telecom Subsystems shall be as described in Chapters 2, 3 & 4 and Appendix A under Chapter 5 of this Particular Specification.

7.1.2 The Contractor shall provide the description of the interfacing between Subsystems with sufficient details so as to enable the Employer to modify or expand the interfaces between the Subsystems.

7.2 Interfaces with Project Contractors

7.2.1 The particular requirements between Public Address System, Passenger Information Display System and Master Clock Systems and the relevant Project Contractors shall be as given in the Interface Specifications in Appendix A under Chapter 5 of this PS.

7.2.2 The requirements specified in the Interface Specifications are by no means exhaustive. The Contractor shall submit an Interface Management Plan and Detailed Interface Documents to the Employer's Representative for review in accordance with the requirements given in the GS. The Contractor shall ensure that the Interface Management Plan and Detailed Interface Documents are mutually acceptable to both the JP/JS15B Contractor and the relevant Project Contractors before submission.

7.2.3 The Contractor shall liaise with the Employer's Representative and the relevant Project Contractors and co-ordinate for site access.

8. VERIFICATION, TESTING AND COMMISSIONING

8.1 General Guidelines for Testing and Commissioning

- 8.1.1 The Contractor shall perform stage-wise testing and commissioning activities in accordance with the requirements given in this Specification.
- 8.1.2 The Contractor shall ensure that the Employer's Representative prior to the commencement of the test has reviewed test documentation associated with any test without objection.
- 8.1.3 The Contractor shall ensure the System is in a state ready for testing and commissioning before the commencement of the tests witnessed by the Employer's Representative. The Contractor may conduct trial tests by himself before the Employer's Representative witnesses the tests, if necessary.
- 8.1.4 Test results of the Contractor's own trial tests shall be made available to the Employer's Representative on request before the tests are witnessed by the Employer's Representative, to indicate the readiness of the System for tests witnessed by the Employer's Representative to commence.
- 8.1.5 The Contractor shall satisfy himself that all items interfacing to Project Contractors are in satisfactory condition for the Contractor's tests to be carried out.
- 8.1.6 The Contractor shall provide all necessary test instruments, special tools, emulators, simulators and test software to carry out the tests.
- 8.1.7 The Contractor shall provide simulation for testing in case the interfacing equipment is not available for testing.
- 8.1.8 The Contractor shall extend full support to the Employer's Representative and provide all necessary facilities to enable convenient inspection of materials, work and testing.
- 8.1.9 The Contractor shall investigate and provide corrective actions for all the faults detected during the tests. The tests shall be resumed only after all the faults are properly cleared. The Contractor shall submit fault report to the Employer's Representative to describe the symptom and causes of the faults and the corrective actions taken.
- 8.1.10 If the operation of other project contractor's system or equipment is suspected to be affected by the system during the test, the contractor shall withhold the test, investigate and provide corrective actions, if necessary, before resumption. The test shall be resumed only after the interference has been eliminated or found not to be related to the system.

8.2 Testing Stages

The Contractor shall carry out testing and commissioning activities in the following phases:

- (1) Factory Acceptance Tests (FAT)
- (2) Installation Tests (IT)
- (3) Partial Acceptance Tests (PAT)
- (4) System Acceptance Tests (SAT)
- (5) Integrated Testing and Commissioning (ITC)

8.3 Factory Acceptance Tests

8.3.1 The Contractor shall carry out factory acceptance tests at the place of manufacturing in the presence of the Employer's Engineer. The test shall include, but not be limited to, visual, environmental, electrical and functional tests on each individual equipment and associated Subsystems as well as simulation before delivery of the equipment to the Site.

8.3.2 Factory acceptance test shall be carried out for equipment and cables.

8.3.3 The Contractor shall prepare and submit a Factory Test Plan at least Three months before the tests. In addition, the Factory Test Plan shall also include the following:

- (1) a list of equipment and cables for individual Subsystem to have factory acceptance test
- (2) the program of all the activities related to factory acceptance tests
- (3) the locations where factory acceptance tests to be carried out
- (4) the estimated duration of tests activities at each locations
- (5) submission schedule of all the factory acceptance test procedures for equipment and cable

8.3.4 The Contractor shall prepare the Factory Acceptance Test Procedures for equipment and cables and submit to the Employer's Representative for review

8.3.5 The Factory Acceptance Test Procedures shall describe in detail all tests to demonstrate the functional, electrical and physical performance of the equipment and cable under designed environmental conditions.

8.3.6 Where any part of testing is carried out by an independent laboratory, a copy of Test Certificate issued by the relevant authority of that laboratory shall be submitted along with the Acceptance Test Procedure.

8.3.7 The equipment will be the same equipment as the equipment used for JS15. No type tests will be performed in respect of reused equipment in Phase 1B.

8.4 On-site Testing and Commissioning

8.4.1 General

The Contractor shall prepare and submit to the Employer's Representative for review an On-site Testing and Commissioning Plan.

8.4.2 Installation Tests

8.4.2.1 Installation Tests shall be carried out on Public Address System, Passenger Information Display System and Master Clock Systems location by location after the completion of equipment physical installation.

8.4.2.2 The objective of the installation tests shall be to ensure the following:

- 1) The equipment is installed in accordance with the reviewed design documentation.
- 2) The equipment is installed in accordance with the requirements detailed in this Specification.
- 3) All cables are properly and accurately connected and terminated.
- 4) All installation works are of acceptable workmanship.

8.4.2.3 The Contractor shall develop Installation Tests Procedures and submit to the Employer's Representative for review.

8.4.2.4 The Installation Test shall not be started unless the test procedures have been reviewed without objection by the Employer's Representative.

8.4.2.5 All installed equipment and cables shall be physically inspected against all relevant review design documentation.

8.4.2.6 The Contractor shall measure the end-to-end performance of all cores of the copper cables and optical fibre cables, including all spare cores, laid between different locations.

8.4.2.7 Not Used

8.4.2.8 All the installation test results, physical locations of the equipment and serial numbers shall be captured in the test record forms. The Contractor shall include completed test record forms in the Test Report and submit to the Employer's Representative for review.

8.4.3 Partial Acceptance Tests

8.4.3.1 Partial Acceptance Tests shall be carried out on Public Address System, Passenger Information Display System and Master Clock Systems location by location, on areas or Section basis to verify the functions, performance and services coverage at the stage:

- (1) After successful completion of the Installation Tests
- (2) After the Subsystems have been configured with correct settings and parameters.
- (3) Properly connected to the power supply and can be switched on for Partial Acceptance Tests.

- (4) Before the equipment of different locations are connected up and ready for System Acceptance Tests.
- 8.4.3.2 The Contractor shall develop Partial Acceptance Tests in accordance with the requirements of GS.
- 8.4.3.3 The Contractor shall develop Partial Acceptance Tests Procedures for each Subsystem and submit to the Employer's Representative for review.
- 8.4.3.4 The Partial Acceptance Tests procedures shall include:
 - (1) Objectives of the Partial Acceptance Tests for all Subsystems
 - (2) List of specifications and standards, reviewed design documentation for reference
 - (3) Step-by-step test instructions
 - (4) List of test instrument and special tools
 - (5) Test record forms
 - (6) Pass or fail criteria
- 8.4.3.5 Where performance across interfaces to Project Contractors or to other parties is required to be verified during the Partial Acceptance Tests, the Contractor shall include a list of Project Contractors and the interface test procedures agreed with the relevant Project Contractors in the Partial Acceptance Tests procedures for the relevant Subsystem.
- 8.4.3.6 The functional, electrical and timing performances of the Subsystems shall be verified against the requirements and relevant international standards.
- 8.4.3.7 Wherever applicable, the Contractor shall have local loop back tests on circuits for electrical performance measurement such as error rate and signal level measurement.
- 8.4.3.8 All local alarms, control and monitoring functions shall be verified.
- 8.4.3.9 All equipment settings and parameters shall be verified and recorded in the reviewed test record forms.
- 8.4.3.10 Not Used.
- 8.4.3.11 Not Used.
- 8.4.3.12 Not Used.
- 8.4.3.13 Not Used.
- 8.4.3.14 Not Used.
- 8.4.3.15 The Partial Acceptance Tests are considered completed only if the Employer's Representative without objection reviews the Partial Acceptance Test results.

8.4.3.16 Upon completion of the Partial Acceptance Test, the individual Subsystem shall be operational and ready to be connected to other Subsystems and interfacing systems for testing.

8.4.4 System Acceptance Tests

8.4.4.1 System Acceptance Tests shall be carried out to ensure the System operates in accordance with functional and electrical performance requirements given in the Particular Specification.

8.4.4.2 System Acceptance Tests shall be carried out at the following stages:

- (1) After completion of Partial Acceptance Tests for each Subsystem.
- (2) After all individual Subsystems have been connected together and the System as a whole is capable to operate in all respect in accordance with the requirements given in the Particular Specification.

8.4.4.3 The Contractor shall submit a System Acceptance Tests Plan to the Employer's Representative for review.

8.4.4.4 The Contractor shall conduct end-to-end circuit test to verify the circuit integrity and electrical performance for all circuits including spare.

8.4.4.5 All alarm points shall be verified with simulated faults.

8.4.4.6 All protection mechanisms such as hot-standby, parallel redundancy, automatic switchover, etc, built into the System and individual Subsystem shall be verified.

8.4.4.7 The system response time of relevant Subsystems and the System shall be tested and measured.

8.4.4.8 The Contractor shall carry out load test on each Subsystem to verify the designed system capacity and performance in accordance with the requirements given in the Particular Specification under full load condition.

8.4.4.9 The Contractor shall carry out tests on the operation of the System in accordance with the normal operation procedures and emergency operation procedures, which has been reviewed without objection by the Employer's Representative.

8.4.4.10 The Contractor shall carry out tests on the OCC operation of the System in accordance with the reviewed operation procedures as below:

- (1) When OCC is the master control
- (2) Switchover from main to standby control within OCC, if applicable

8.4.4.11 The Contractor shall conduct tests to verify the proper inter-operation among Subsystems.

8.4.4.12 Where performance across interfaces to Project Contractors or to other parties is required to be verified during the System Acceptance Tests, the Contractor shall include the list of Project Contractors and the interface test procedures agreed with

the relevant Project Contractors in the System Acceptance Tests procedures for the relevant Subsystem or Subsystems.

8.4.4.13 The System Acceptance Tests are considered completed only if the System Acceptance Tests results are reviewed by the Employer's Representative without objection.

8.4.4.14 Upon completion of the System Acceptance Tests, the System shall operate in accordance with the functional and electrical performance requirements given in the PS.

8.4.5 Integrated Testing and Commissioning

8.4.5.1 The Contractor shall carry out Integrated Testing and Commissioning after the completion of the System Acceptance Tests.

8.4.5.2 The Contractor shall co-ordinate with the Employer's Representative and with all the interfacing Project Contractors to ensure all the interface test activities are completed in accordance with the program on Completion Plan.

8.4.5.3 The Contractor shall provide all necessary supports, conduct investigation and provide corrective actions, if necessary, to ensure all matters related to interfacing are properly resolved.

8.4.5.4 Within one week upon completion of all interface test activities, the Contractor shall submit the test results to the Employer's Representative for review.

8.4.5.5 After the test results of all interface test activities have been reviewed by the Employer's Representative without objection, the Contractor shall start the reliability demonstration test in accordance with the reviewed reliability demonstration test plan.

8.4.5.6 The Contractor shall advise the Employer's Representative in writing the commencement date of the reliability demonstration test.

8.4.5.7 The reliability demonstration test period shall be at least three months.

8.4.5.8 The Contractor shall submit a Reliability Demonstration Test Plan to the Employer's Representative for review at least three months before the test.

8.4.5.9 The Contractor shall include the following in the reliability demonstration test plan as a minimum:

- (1) Calculation of the maximum allowable number of failures of equipment, Subsystems and System during the reliability demonstration period in accordance with requirements on reliability performance of the equipment, Subsystems and System given in the Particular Specification
- (2) Definition of relevant failures
- (3) Pass and fail criteria
- (4) Sample of fault logs

- 8.4.5.10 During the reliability demonstration test period, the Contractor shall record details of all faults in a fault log which shall include:
- (1) The date and time the fault occurs
 - (2) The date and time the Contractor's staff arrive on site
 - (3) The date and time the fault is cleared and the normal operation is restored
 - (4) The description of the fault
 - (5) The cause of the fault
 - (6) Equipment or component replaced
- 8.4.5.11 All fault logs shall be submitted to the Employer's Representative for review.
- 8.4.5.12 The reliability demonstration test is considered a failure if:
- (1) The actual number of relevant failures exceeds the maximum allowable number of failures for any equipment, Subsystems or System identified in the reliability demonstration test plan.
 - (2) Any fault resulting from the design omission or commission of error requires design modification in order to fix the fault.
- 8.4.5.13 If the reliability demonstration test fails, the Contractor shall provide all the necessary corrective actions and rectify the fault to the satisfaction of the Employer's Representative.
- 8.4.5.14 The reliability demonstration test shall be repeated on the affected Subsystem or Subsystems for another three months until the test is successfully completed.
- 8.4.5.15 Within two weeks upon completion of the reliability demonstration test, the Contractor shall submit the test results for the Employer's Representative to review.
- 8.4.5.16 The Integrated Testing and Commissioning is considered completed only if all the test results of the Integrated Testing and Commissioning have been reviewed by the Employer's Representative without objection.
- 8.4.6 Service Trials**
- 8.4.6.1 The Contractor shall provide all necessary support and attendance to the Employer's Representative during the Service Trials period in accordance with the requirements given in General Specification.
- 8.4.6.2 The Contractor shall provide on-Site supports to the Employer's Representative in all aspects related to the operation of the System. The Contractor shall also conduct investigation and provide corrective actions for any problems related to the System or the interfaces with the System.
- 8.4.6.3 The Contractor shall assign competent staff to support the Service Trials as required by the Employer's Representative. The persons shall be the engineering staff who

shall have sufficient skills and knowledge of the System and shall have been involved in the design, installation or commissioning of the System.

- 8.4.6.4 The Contractor shall submit a manpower plan to the Employer's Representative for review at least 1 month before the commencement of the Service Trials.
- 8.4.6.5 The manpower plan shall include the organisation chart of the Contractor's Service Trials supporting group, individual person's role and responsibility and 24-hour contacts for emergency cases.
- 8.4.6.6 The Contractor shall correct all faults found during testing, and shall arrange for the relevant tests to be repeated. The relevant tests shall only be repeated when the fault has been remedied and the equipment demonstrated to function correctly.
- 8.4.6.7 Where remedial measures involve significant modifications that might, in the Employer's Engineer's opinion, affect the validity of earlier tests, the Contractor shall repeat the earlier tests and obtain results satisfactory to the Employer's Engineer before repeating the test in which the fault was first identified.
- 8.4.6.8 The Employer's Engineer shall have the right to order the repeat or abandonment of any test in the event that results demonstrate that the equipment is significantly non-compliant with the Contract.
- 8.4.6.9 The Employer's Engineer shall have the right to suspend any test in the event that errors or failures have become unacceptable. The Employer's Engineer shall also have the right to suspend any test if a fault was detected by the Contractor but not reported to the Employer's Engineer within 24 hours of the detection. In this event, the suspension shall remain in effect until reporting has been brought up to date to the satisfaction of the Employer's Engineer.

8.5 Repeat Tests

- 8.5.1 The Contractor shall correct and re-test every fault detected during the tests.
- 8.5.2 If the test results in a failure of the item under test the provisions of GCC shall apply.
- 8.5.3 For each hardware failure that occurs at any stage of testing, the Contractor shall investigate the failure and prepare a report on its cause(s) and design implications, if any, resulting from such failure.

9. PACKAGING, SHIPPING, STORAGE AND DELIVERY

9.1 Packaging

9.1.1 General

The requirements on packaging, shipping, storage and delivery shall be as given in the GS.

9.1.2 Cable Drums

9.1.2.1 Immediately after the tests at the place of manufacturing, both ends of every length of cables shall be sealed by enclosing them with approved caps, tight fitting and adequately secured to prevent ingress of moisture.

9.1.2.2 The ends of the factory lengths of cable shall be marked "A" and "Z", "A" being the end at which the sequence of core numbers is clockwise and "Z" the end at which the sequence is anti-clockwise.

9.1.2.3 The end which is left projecting from the drum shall be consistently "A" or "Z", and shall be protected against damage in such a manner that the enclosure cannot be easily removed during handling while in transit.

9.1.2.4 Cables shall be supplied on drums in the longest possible lengths and within practical limits.

9.1.2.5 The maximum allowable diameter of cable drum shall be 2000mm. The use of cable drums with diameter in excess of 2000mm shall be subjected to the review of the Employer's Representative

9.1.2.6 All cable drums shall be designed to be securely mounted on the wagon with the mounting accessories provided by the Contractor for cable lying along trackside.

9.1.2.7 The drums shall also be designed for use in conjunction with any special cable-laying equipment and accessories complete with spindles and cable drum braking gear, which shall be used to install the cables on Site.

9.1.2.8 Each drum shall bear a distinguishing number and label "JMRTS Telecommunications System", either printed or neatly chiselled on the outside of one flange.

9.1.2.9 Particulars of the cable, i.e. voltage, length, conductor size, number of cores, finish, section and length number, gross and net weights, shall be clearly shown on one flange of the drum. In addition the words "Running End 'A'" or "Running End 'Z'" as appropriate shall be marked on the flange and the direction for rolling shall be indicated by an arrow.

9.2 Storage

9.2.1 The Contractor shall provide his own storage and facilities at his Project Office in Jaipur for storage of all items to be provided for this Contract before delivery to the Site for installation. Security of the same shall be the responsibility of JP/JS15B.

- 9.2.2 The Contractor shall maintain records of stored items for this Contract and make available for the Employer's Representative for inspection upon request.

9.3 Delivery

- 9.3.1 The Contractor shall deliver all items supplied under this Contract to the Site as desired by the Employer's Representative.
- 9.3.2 The Contractor shall include the delivery activities in his programme to draw the Employer's Representative's attention.
- 9.3.3 The Contractor shall ensure the Site is ready and in good conditions for delivery.
- 9.3.4 The Contractor shall ensure good conditions and security of the delivered items on Site.
- 9.3.5 The Contractor shall remove temporary fittings, if necessary, for delivery of his items to site and shall restore the fittings to the original state and to the satisfaction of the Employer's Representative.
- 9.3.6 No dangerous goods shall be delivered to the Site.

9.4 Inspection during delivery

- 9.4.1 Employer's Engineer at contractor's site office/store will do delivery inspection for the equipments supplied by the contractor. The format for the delivery form will be as per Appendix 6, GS:
- a) Material shall be delivered undamaged in manufacturer's original containers, as applicable packaged as indicated, with identifying labels intact and legible.
 - b) Deliveries shall be made in accordance with the contract documents, including general conditions and the contract schedule as approved by the Employer's Engineer.
 - c) Unless otherwise indicated, contractor shall notify the Employer's Engineer at least five working days prior to proposed delivery to the placement or set-up site. The contractor shall perform unloading at placement site or setup site.
 - d) Contractor shall arrange for the inspection of the material, which as per RDSO specifications.
 - e) Contractor shall arrange for the inspection of the material, which is as per TEC specifications.
 - f) Contractor shall arrange for the inspection of all other electrical items from any other recognised testing organisation after obtaining consent of the Employer's Engineer or inspection by Employers Engineer.
 - g) All inspection charges shall be borne by the JP/JS15B contractor.

10 INSTALLATION

10.1 General

- 10.1.1 The Contractor shall supervise all installation of the Works and shall ensure all technical, safety and quality matters adhered to the design reviewed by the Employer's Representative.
- 10.1.2 The Contractor shall maintain the Site in a neat and tidy state at all times. The Contractor shall also clear the Site daily before leaving.
- 10.1.3 The Contractor shall take every precaution to protect existing equipment and facilities on Site from damage, and shall make good any damage caused. Care shall also be taken not to interfere with the operation of existing equipment.
- 10.1.4 The Contractor shall provide all necessary and sufficient resources such as tools, test instruments, spares, equipment, manpower and communication facilities to complete all the installation activities.
- 10.1.5 The Contractor shall ensure his staff are competent and possess all the necessary skills to carry out the installation in a proper and safe manner.
- 10.1.6 The Contractor shall carry out site surveys to ensure sufficient knowledge on the Site before submitting the relevant installation drawings and installation related submissions to the Employer's Representative for review.
- 10.1.7 The Contractor shall submit calculation, if required by the Employer's Representative, to demonstrate the proposed brackets and mounting methods are sufficient to withstand the wind loading for the equipment.
- 10.1.8 The Contractor shall submit installation method statements for each type of installation activities at least three months before the commencement of the activity to the Employer's Representative for review.
- 10.1.9 The installation method statement shall include the details on the methods and procedures of installation, site arrangement, manpower resources, equipment and tools required. Drawings shall be included to illustrate the proposed installation details.
- 10.1.10 All installation activities shall commence only after the method statement and related submissions have been reviewed without objection by the Employer's Representative.
- 10.1.11 The Contractor shall assign competent site supervisors for each work site to be responsible for all site-related matters.
- 10.1.12 The Contractor shall carry out regular site audit on both technical and safety matters and maintain records of the site audits. The Contractor shall make these records available to the Employer's Representative for inspection upon request.

10.2 Installation Programme

- 10.2.1 The Contractor shall submit an Installation Programme for review by the Employer's Representative not later than 6 months before Commencement of installation.
- 10.2.2 The Contractor shall co-ordinate with relevant Project Contractors to agree the date of access to the physical areas to carry out installation activities.
- 10.2.3 The Contractor shall develop the Installation Programme and take the following into account:
- (1) Installation schedule
 - (2) Key Dates and Milestones
 - (3) site access
 - (4) interfacing with relevant Project Contractors
- 10.2.4 The Contractor shall highlight in his Installation Programme any items, materials, equipment, resources and supports to be provided by the Employer's Representative with dates, duration and locations.
- 10.2.5 The Contractor shall also highlight all relevant constraints, which may affect the Installation Programme, to the Employer's Representative's attention.
- 10.2.6 The Contractor shall include dependencies between relevant activities in the Installation Programme.
- 10.2.7 The Contractor shall ensure sufficient floats or slacks in all activities and avoid critical paths built in his Installation Programme. In case critical paths cannot be avoided, the Contractor shall highlight any critical paths to the Employer's Representative's attention.
- 10.2.8 The Contractor shall propose contingency plan to ensure all the major Key Dates and Milestones can be met in case there is slippage in the installation activities.
- 10.2.9 Any subsequent changes in the reviewed Installation Programme shall be submitted to the Employer's Representative for review.

10.3 Installation Works

10.3.1 Installation in Equipment Rooms

- 10.3.1.1 The following equipment rooms will be provided by Employer/Civil Works Project Contractors to install the telecommunication equipment:
- 1) Telecommunication Equipment Room at station and Depot
 - 2) Central Equipment Room at OCC
 - 3) Telecom Power Supply Room (UPS Room)
- 10.3.1.2 These rooms shall have to be shared by JP/JS15B with other Telecom/signalling Project contractors. JP/JS15B can co-ordinate the sharing of the room and the cable trays/cables therein.

- 10.3.1.3 JP/JS15B contractor shall interface with other telecom contractors for the final layout of Public Address System, Passenger Information Display System and Master Clock System for all stations,
- 10.3.1.4 For exact room dimensions, the Contractor shall however co-ordinate and refer to the final station building plans.
- 10.3.1.5 The Contractor shall liaise with the Employer's Representative and relevant Project Contractors for access to the equipment rooms for installation.
- 10.3.1.6 All floor mounted equipment cabinets at the equipment room shall be securely bolted to ground with base frame, properly aligned and levelled.
- 10.3.1.7 All wall-mounted equipment shall be installed at appropriate height to avoid any hazards to the person passing by. The Contractor shall ensure the wall is of sufficient strength to hold the wall-mounted equipment in a secure and safe manner.
- 10.3.1.8 The floor mounted equipment cabinets shall be arranged in the way to allow sufficient space at the front and rear side of the cabinets for maintenance access. Sufficient space shall also be allowed for front maintenance access of the wall mounted equipment.
- 10.3.1.9 The equipment layout within the equipment room shall be co-ordinated with other telecom contractors, who share the same equipment rooms for their equipment. Further the equipment layout within the equipment room shall be designed to allow sufficient clearance for escape out of the equipment rooms in case of emergency.
- 10.3.1.10 The Contractor shall submit the following to the Employer's Representative for review at least three months before the commencement of the installation inside the equipment room:
- (1) Drawings showing the equipment layouts and positions of the racks, cabinets and enclosures, duly agreed with other project contractors.
 - (2) Racks, cabinets layout drawings showing the arrangement of individual module
 - (3) Specifications, sample of all the mounting brackets and accessories
 - (4) Equipment mounting and installation methods
 - (5) Schematic diagrams and wiring diagrams of the System
 - (6) Electrical distribution schematics within the room including the earthing details
 - (7) Cable route diagrams for cables within the room, duly agreed with other project contractors.
- 10.3.1.11 Installation work inside the room shall be carried only after these submissions have been reviewed without objection by the Employer's Representative.

10.3.2 Installation around Station areas

10.3.2.1 Not Used.

10.3.2.2 All the ducts/space between the stations for laying cables will be provided by civil works project contractors.

10.3.2.3 All the mounting brackets and accessories shall be corrosion resistant, aesthetically designed to match with all architectural finishes and of sufficient strength to mount the equipment securely.

10.3.2.4 The Contractor shall submit the following to the Employer's Representative for review at least three months before the commencement of the installation activities:

- (1) Specifications, sample of all the mounting brackets and accessories;
- (2) Equipment mounting and installation methods; and
- (3) Schematic diagrams and wiring diagrams of the System.

10.3.2.5 If the equipment is installed at location exposing to direct sunlight, the equipment, mounting brackets, cables and accessories shall be made of materials which are resistant to ultra violet rays.

10.3.2.6 All trackside equipment and the mounting method shall be designed in the way to minimise the frequency of preventive maintenance.

10.3.3 Not Used.

10.3.4 Working in Confined Spaces

10.3.4.1 The Contractor shall observe the safety precautions under the Factories and Industrial Undertakings (Confined Spaces) Regulations when working in areas defined as Confined Spaces like the equipment room in the Underground Section.

10.3.4.2 The Contractor shall provide adequate mechanical ventilation for the efficient removal of any harmful or explosive gas therein throughout the full working period.

10.3.4.3 The Contractor shall carry out a physical gas test at the beginning of each work shift in the confined space to ensure that there is no ingress of dangerous fumes and no oxygen deficiency.

10.3.4.4 The Contractor shall ensure that no person is allowed to enter or remain in the confined space until he has certified that the space in a specified period is safe for entry without the use of breathing apparatus by virtue of the gas test.

10.3.4.5 All electrical equipment used in the confined space shall be of flameproof type.

10.4 Cabling

10.4.1 Primary cable containment, common for all telecom sub-systems around the station areas and along track-side will be provided by Civil Works Project Contractor. The JP/JS15B Contractor shall however give destinations of each cable and EMI requirements to the Project Contractors. The Contractor shall share with other

telecom project contractor and make use of the available primary cable containment for cabling.

10.4.2 The JP/JS15B Contractor shall provide all necessary secondary cable containment and supports in addition to the primary cable containment provided, if necessary, to complete the connection to the Contractor's equipment. The details are given in Chapter 5.

10.4.3 In Elevated/At Grade Sections, in case Optic Fibre cable is laid on the viaduct in the cable duct, then the Contractor shall provide it in a rugged "permanently solid lubricated" HDPE telecom duct of minimum diameter of 40 mm(Outer)/33 mm(Inner) with material characteristic as per TEC Specifications along with the accessories. HDPE Telecom duct as per TEC specifications shall be buried at a depth of 1.2 metres in the At Grade Sections and suitably supported/fixed on Elevated Sections (where the duct is not available).

10.4.4 The Contractor shall submit the working drawings with the following details to the Employer's Representative for review at least three months before the cabling activities:

- (1) Cable routes
- (2) Details of the cables to be laid along the proposed cable routes including cable types, number of cables, cable diameter, core count and estimated cable Section length
- (3) Sections of the primary cable containment to be used
- (4) Sections of additional cable supports to be provided by the Contractor with details on dimension and type of the cable supports such as cable trays, trunkings and conduits. No additional surface mounted conduits shall be provided by E & M contractors. Conduits as required for laying of cables for Public Address System, Passenger Information Display System and Master Clock System shall be surface mounted and provided by JP/JS15B contractor. Conduits and Accessories shall comply with the requirements listed in Appendix O chapter 5 of PS.

10.4.5 All cables shall be neatly run and fitted in ducts or conduits, laid in trunkings, formed trenches or troughs, or supported by trays, hangers or cleats as appropriate.

10.4.6 The Contractor shall make any wall and slab openings, including the temporary removal of architectural finishes that shall be required for his cabling. After cabling is completed, the Contractor shall seal these openings with fire resistant materials and restore the architectural finishes and fire resistance to their original state.

10.4.7 Before commencing work on any part of the Site, the Contractor shall ascertain that the Employer's Representative and also, where applicable, the local and statutory authorities or other bodies/persons concerned have reviewed each cable route

without objection. The Contractor shall further ensure that all necessary permits in such cases have been obtained and notices served.

- 10.4.8 After conduits and ducts have been laid, they shall be thoroughly cleaned by a mandrel of diameter slightly less than the conduit or duct being drawn through. The duct ends shall be sealed temporarily to prevent the entry of foreign matter. The conduits and ducts shall be cleaned again immediately before the cables are drawn in.
- 10.4.9 The Contractor shall provide his own brackets and clips to secure all the cables at an interval reviewed by the Employer's Representative. Where cables are to be laid in troughs, the Contractor shall remove and re-instate trough lids prior to and after cable installation.
- 10.4.10 Selection of cables and connectors shall be appropriate to their function. The Contractor must be able to demonstrate satisfactory usage of the type of cables proposed for use in a comparable MRTS under tropical conditions, be able to comply fully with the specifications herein, and be willing to guarantee 25 years or more of service life for all the cables.
- 10.4.11 A labelling scheme shall be applied for all cables installed. Each cable shall be uniquely identified. Labels shall be tied at both ends, at entry and exit points of cable trays, ducts and trenches and at appropriate locations where necessary. A record shall be provided to indicate clearly the type of cables, the sizes of cable, the use of each core or pair, and termination as well.
- 10.4.12 The installation and handling of cables shall be undertaken at all times by adequate staff suitably trained and supplied with all necessary plant, equipment and tools. The arrangement of the cables and all methods of laying shall be submitted to the Employer's Representative for review and shall be planned to provide an orderly formation, free from unnecessary bends and crossings. Following principles for laying of cables shall also be adopted:
- 10.4.12.1 During track crossings, following rules shall be observed:
- (1) The cable crosses the track at right angle.
 - (2) The cable does not cross the track under points and crossings.
 - (3) The cable is laid in concrete/GI pipes while crossing the track
- 10.4.12.2 At culverts and at transition from at grade to elevated section the cables shall be suitably supported and protected with B-class GI pipes.
- 10.4.12.3 All cables shall be laid within the JMRC boundary. If it is necessary to lay the cable outside the JMRC boundary, permission shall be obtained before starting the trenching. At elevated sections HDPE Duct shall be installed in the ducts provided by Project Contractors.
- 10.4.12.4 Not Used

- 10.4.13 Not Used.
- 10.4.14 Sleeves made of LSOH and flame retardant materials shall be provided for cables passing through slab or wall openings. After cable installation, the contractor shall seal empty space in the sleeves with fire-resistant compound by the Contractor.
- 10.4.15 No cable joints shall be allowed along trackside.
- 10.4.16 At no location shall the cable be bent with a radius lower than the minimum radius recommended by the manufacturers. Sharp edges shall be avoided.
- 10.4.17 Every precaution shall be taken to ensure that cables and equipment are not installed in a manner or under conditions likely to cause electrolytic or other corrosive action or damage to, or be detrimental to, the performance of the cables and equipment during operation.
- 10.4.18 Communication cables shall not run with cables carrying high voltages or heavy currents and shall conform to the requirements specified in BS 7671.
- 10.4.19 All cables and wires inside cabinets shall be housed in appropriate cable conduits or tied neatly along the side of the cabinet. They shall not cause any obstruction to the access of equipment within.
- 10.4.20 All cables shall be adequately rated for their duties. All power cables shall be able to withstand full load current for peak operation when the equipment is at its ultimate capacity. The Contractor shall comply with the latest edition of IEE Wiring Regulations.
- 10.4.21 Cable ties shall be made only from corrosion-resistant materials. They shall be further resistant to ultra-violet radiation if they are to be used at locations exposed to sunlight. In areas of significant vibration, cable ties shall be of metallic construction and coated further with a corrosion-resistant material.
- 10.4.22 Wherever possible, standard multi-pin plug/socket shall be used to terminate multi-core cables for connecting to equipment. Locking mechanism shall be integrated in the connector to secure the connection.
- 10.4.23 Use of soldering in cable connections shall be minimised and it shall be used only for terminating conductors. Cables and wires shall be terminated by more flexible means such as screw terminals, crimping or wire wrapping which shall be subject to review by the Employer's Representative.
- 10.4.24 Heat-shrinkable sleeves shall enclose all exposed and terminated contacts inside multi-pin connectors.
- 10.4.25 Any unconnected socket shall be covered up and properly labelled to avoid exposure for short-circuit and making wrong connection by mistake.

- 10.4.26 Unused cable cores of multi-core cables shall be neatly tied and wrapped up inside the connectors.
- 10.4.27 Connectors shall be suitably configured to avoid the possibility of wrong mating.
- 10.4.28 Connectors at cable ends carrying high voltages or current sources shall invariably use female contacts.
- 10.4.29 All RF joints outside the cabinets shall be sealed by waterproof tapes or jackets. These tapes or jackets shall be further resistant to ultra-violet light when the cable joints are located in areas exposed to sunlight
- 10.4.30 Cables entering enclosures shall utilise suitable cable glands or grommets for protection of these cables over the service life of the System.
- 10.4.31 Not Used.
- 10.4.32 For metallic armour of outdoor cables an earthing and gapping policy shall be incorporated into an overall earthing policy to be agreed by the Employer's Representative
- 10.4.33 All cables which run outside the station building shall be contained in protective conduits or where directly buried in ground shall be at minimum 1.2 Mtr depths in HDPE Duct/GI Pipe.
- 10.4.34 Not Used.
- 10.4.35 Not Used.
- 10.4.36 The average splice loss per splice shall not be more than 0.1dB with a maximum of 0.3 dB per splice.
- 10.4.37 Each cable shall be tested to ensure correct continuity and loss.

10.5 Marshalling and Termination

10.5.1 General

- 10.5.1.1 Main distribution frames, digital distribution frames shall be provided at appropriate locations for signal termination, distribution, disconnection, diversion and in-circuit testing. Intermediate termination points shall also be provided as appropriate to allow cable network flexibility.
- 10.5.1.2 The signal termination and distribution practice shall adopt a consistent approach for easy circuit identification and is subject to the review of the Employer's Representative.
- 10.5.1.3 The circuit terminations shall be secure enough to withstand vibration level, which is likely to be experienced in the railway environment.
- 10.5.1.4 These frames shall be designed to allow repeated circuit termination and disconnection.

10.5.2 Main Distribution Frame (if used)

- 10.5.2.1 Main distribution frame shall be provided at Telecommunication Equipment Room and Central Equipment Room for the signal distribution of all analogue, alarm and control circuits.
- 10.5.2.2 The capacity of the main distribution frame and the associated connecting blocks shall be sufficient to accommodate all circuits including spares and the cross-connect field between equipment side and line side terminations. An extra of at least 20% capacity shall be included for future expansion.
- 10.5.2.3 The Contractor shall provide at least one set of the following accessories for each Line where the main distribution frame is installed:
- (1) Tools for circuits connection and disconnection
 - (2) Plug-in devices for circuit disconnection
 - (3) Test cords and loop-back cords
 - (4) Signal patch cords
- 10.5.2.4 The outgoing circuits connecting to external lines and all circuits liable for lightning or high induced voltage, lightning arrestors and surge protection devices shall be provided with the required earth connections. For details of Transient Protection please refer to 10.8 (Transient Protection)
- 10.5.2.5 All analogue, alarm and control circuits including spares shall be properly terminated at the main distribution frame.
- 10.5.2.6 The main distribution frame shall be divided into different zones for different types of circuits.
- 10.5.2.7 The main distribution frame shall be equipped with copper earth bar to which all cable shields shall be connected. The copper earth bar shall be connected to the earth.
- 10.5.2.8 The main distribution frame shall be equipped with facilities such as use of different colours or markers to aid circuit pair's identification.
- 10.5.2.9 The Contractor shall maintain records of all the circuit terminations.
- 10.5.3 Digital Distribution Frame/Patch Panel**
- 10.5.3.1 Digital distribution frame shall be provided at Telecommunication Equipment Room, Central Equipment Room and at other locations as appropriate for data circuit termination.
- 10.5.3.2 The Contractor shall provide at least one set of the following accessories for each Line where the digital distribution frame is installed:
- (1) Plug-in devices for circuit disconnection
 - (2) Test cords and loop-back cords
 - (3) Signal patch cords.
- 10.5.3.3 All the connectors on the modules shall be of female type and equipped with locking mechanism, if applicable, for secure connection. All spare connectors shall be protected with covers.

- 10.5.3.4 Suitable Patch Panel shall be provided by FOTS contractor for SDH System for termination of user channel i.e. E1, TCP/IP and GBIC Port etc. All the users shall connect their respective Patch Chord/ Cable/Connector etc. at this patch panel only for connections to their respective systems.
- 10.5.3.5 Different modules in the digital distribution frame shall be provided for different types of data circuits.
- 10.5.3.6 The digital distribution frame shall be equipped with sufficient capacity for data circuits including spare circuits. The digital distribution frame shall also be equipped with an extra of 20% of termination capacity for future use.
- 10.5.3.7 Markers or labels shall be included in the digital distribution frame for easy identification of the circuits.
- 10.5.4 Not Used

10.6 Identification

- 10.6.1 Descriptive labels shall be provided for all cabinets, enclosures, panels, assemblies and sub-assemblies.
- 10.6.2 Labels shall be of engraved type, with durable markings and shall have character size not less than 6mm high.
- 10.6.3 The details of the labels including the material and size of the characters and sample of the labels shall be submitted to the Employer's Representative for review.
- 10.6.4 Labels and notices on equipment shall be fixed with roundhead brass screws or self tapping screws. Stick-on labels or fixing by adhesive shall not be accepted.
- 10.6.5 All enclosures containing terminals or exposed live parts where a voltage exceeds 120 volts shall have a label with lettering indicating the maximum voltage present in the enclosure.
- 10.6.6 Warning signs shall be provided with graphical symbols and wordings in red for hazardous electrical or optical laser equipment.

10.7 Electrical Distribution

- 10.7.1 3 Phase 415 V AC from the UPS, to meet the requirement of Telecom, AFC and Signalling Contractors shall be provided by JP/JS14B Contractor in UPS(S&T) Room. JP/JS14B Contractor shall provide AC distribution panel having three MCCBs (one for Signal, one for Telecom and one for AFC). JP/JS14B Contractor shall extend the 3 phase 415 V AC supply (for Telecom) from UPS Rooms to TER/CER and provide a Distribution system in a cubicle. The AC distribution system provided by JP/JS14B shall meet with the requirements of all Telecom contractors. Distribution circuits shall be suitably protected with MCBs, Earth Leakage Detectors and SPDs etc. JP/JS15B Contractor shall co-ordinate and interface with the JP/JS14B contractor for load requirement for their system.
- 10.7.2 Adequate no. of spare circuits of each type for each sub-system shall also be provided in the distribution system by JP/JS14B. The further cabling from AC

Distribution cubicle to Equipment Racks and other required locations for powering equipments to be supplied and commissioned by the respective contractor under their respective Contracts. JP/JS14B shall interface with other Telecom Contractors, AFC and Signalling contractors for actual load and circuit requirements for stations/Depot/OCC and shall submit the design of the 415 V distribution systems for each station /depot / OCC for review by the Employer's Representative. The ratings of switch gears, cables etc. should have appropriate safety margin / derating factors. JP/JS14B shall lay a spare power cable from UPS distribution to TER distribution. Spare cables as above shall be of the same capacity as the cables in use.

10.7.3 JP/JS15B contractor shall utilise spare MCBs, if available, at OCC or else shall have to arrange on its own.

10.7.4 JP/JS14B Contractor shall co-ordinate with other Telecom contractors, AFC and Signalling Contractors for the load and circuit requirement of 3 Phase 415 V AC Power.

10.7.5 Earthing Policy

10.7.5.1 An earthing system shall be designed to assure personnel safety and protection of installations against damage. It shall also serve as a common voltage reference and to contribute to the mitigation of disturbances. The Earthing Policy to be followed is as per Appendix M of PS Chapter 5.

10.7.5.2 The earthing system shall generally meet the requirements of latest standards viz. IEEE 1100, NFPA 780, IEC 1024.

10.7.5.3 To achieve the primary goal of assuring personnel safety and damage control, a low impedance path shall be made available to the current generated due to lightning or power system fault. The potential differences between any two points shall be as low as possible. Safety considerations also require the chassis or enclosure to be earthed to minimise shock hazards to passengers and transit system staff.

10.7.5.4 To achieve the secondary goal of providing protection for sensitive and interconnected electronic and electrical systems, earthing shall be designed to minimise the noise voltage generated by currents from two or more circuits flowing through common earth impedance and to avoid creating earth loops susceptible to magnetic fields and differences in earth potential.

10.7.5.5 Earthing shall be designed to accomplish the following minimum requirements:

- a) Protect personnel and equipment from electrical hazards, including lightning.
- b) Reduce potential to system neutrals.
- c) Reduce or eliminate the effects of electrostatic interference and electromagnetic interference arising from within the MRTS and other extraneous sources.
- d) Provide a proper earthing method for all equipment enclosures, cabinets, drawers, assemblies and sub-assemblies.
- e) Provide a clean zero-volt reference point.

- 10.7.5.6 There shall be two separate earth connections, a Main Earth and clean earth connection

Main Earth (For Elevated and Underground Stations)

Main earth ($< 2 \text{ Ohm}$) bus bar shall be provided in the TER&UPS(S&T) room by another Project Contractor(CIVIL/E&M) with copper strip at each location consisting of minimum 20 holes (10 per row). This strip shall be used by all Telecomm/AFC and Signal contractors. All Contractors(Telecom,S&TC and AFC)shall extendMain earth to their respective racks/equipments by their own cable and arrangement.

Clean Earth:

For underground stations, Provision and extension of clean earth ($< 1 \text{ ohm}$) up to TER to be done by other project contractor(CIVIL/E&M). A minimum cross section of 16 mm^2 insulated copper wire shall be used for extending of Earth. The Clean Earth to be terminated in TER on copper strip with a copper bus bar having minimum 20 holes (10 per row).

- 10.7.5.7 The earthing system shall meet, but not be limited to, the following:
- The resistance to earth of the system “earth terminal” must remain within the stipulated limits at all locations and under all climatic conditions.
 - Any electrical joints in the earthing system shall be protected from moisture ingress by using proper wrapping, sealing with waterproof tapes, or such other measures.
- 10.7.5.8 Not Used.
- 10.7.5.9 Main Earth shall be provided at UPS(S&T)andTelecom Equipment Room (TER) by Designated Civil/E&M Project Contractor. In UPS, TER &SCR, Main Earth shall be terminated by Designated Civil/E&M Project Contractor at a copper bus bar. These Copper bus bars shall have adequate size to accommodate Main Earth Termination requirement of Telecom, AFC and Signalling Contractors .From the earth termination copper bus bar respective Contractors shall extend the earth for their own equipment.
- 10.7.5.10 The Clean Earthing arrangements for Telecom Equipment shall be as below:
- All Telecom Equipments (including to be supplied under JP/JS15B, JP/JS14B&other telecom contract) must be protected using a mesh of copper “earth” strips of appropriate cross-sectional dimensions, forming a local Earth Bus.
 - Each equipment rack shall be connected electrically to this bus. This bus shall be connected to the external ring earth at the shortest possible distance from two opposite points of this bus.
 - All joints of this connection shall be protected from moisture ingress by using proper wrapping, sealing with water-proof tapes, or such other measures.

- d) The earthing connection shall be inspected periodically at intervals frequent enough to ensure that the earth connection meets all the requirements.
- 10.7.5.11 The metallic sheath and armouring of all cables shall require earthing with Earth in Elevated/At Grade and Underground Sections.
- 10.7.5.12 The earthing electrodes for the Clean Earth shall be located at least 20 m away from the Main Earth.
- 10.7.5.13 The route for the Clean Earth shall be so chosen as to minimise the effect of any inductive interference.
- 10.7.5.14 For the purpose of measurement of earth resistance, a small interconnecting copper strip of appropriate cross-section shall be provided in the ring earth in a small manhole chamber so that the ring earth can be broken from the loop.
- 10.7.5.15 The earth resistance at any point on the Clean Earth shall be below 1.0 Ohm, and that for the Main Earth shall not exceed 2.0 Ohm at any location and under any soil and/or climatic condition.
- 10.7.5.16 All metal work and metallic items (including chassis) shall be earthed to the Main Earth to ensure the safety of personnel.
- 10.7.5.17 The earthing methods and details shall be submitted to the Employer's Representative for review.

10.8 Transient Protection

10.8.1 General

- a) Despite the provision of earthing as specified above, failures of communication equipment do occur on account of finite earth resistance, particularly high voltage transient.
- b) Typically, a transient is temporary, usually short duration, surge voltage of limited energy. Electronic equipment with high input impedance is inherently more susceptible to transients.
- c) Physical distance from the transient source does not necessarily guarantee immunity from the transients.

10.8.2 Requirement for effective transient protection:

An effective transient protection system must protect the communication equipment from transients of the following specifications as minimum:

- a) BS EN 60950-1:2006: Specification for Safety of Information technology equipment including electrical business equipment.
- b) BS EN 61326(Annex A): Electromagnetic Compatibility (EMC) : Generic standards immunity for Industry environments.
- c) BS EN 41003:1999 : Specification for safety requirements for equipment to be connected to telecommunication networks.
- d) BS 61010-1:2003/A2:1995 : Safety requirements for electrical equipment for measurement, control & laboratory use. Part 1: General requirements.

e) Underwriters Laboratory safety std497A: Secondary protectors for Communication Circuits.

Peak transient of up-to 700 Volts on the DC Power Supply line for several microseconds.

Average transient duration of 2 microseconds with a repetition frequency of 15 kHz to 100 kHz.

For short duration transient (<5ms) the variation approaches a sine-wave.

For longer duration transients (<5ms) the variation approaches rectangular pulses with an initial rate of rise upto 5×10^4 Volts per second.

10.8.2.1 Suitable electronic devices (Hybrid Circuitry such as a combination of silicon avalanche diode – also called Transzorbs, high impedances in combination of Gas discharge Tubes) having high surge handling capability, fast response time, low clamping voltage, etc., shall be incorporated in the communication equipment subsystems offered, to ensure that the latter withstands the conditions mentioned in (10.8.2.) above without any damage or permanent degradation in performance throughout the system lifetime. The selection criteria for such devices shall include, but not limited to, the following:

1. Reverse standoff Voltage: At least twice the maximum operating voltage and allowing operation over the temperature range:
Operating temperature range -40° to $+85^{\circ}$ C
Storage temperature range -40° to $+100^{\circ}$ C
2. Pulse Power Rating: This shall have a value to handle the peak pulse power of the transients and ensure their decay in less than 10% of the rise time for the worst pulse likely to be encountered from all possible sources including lightning and transients from overhead traction power system.
3. SPD should be capable enough to handle a surge current 10kA (of 8/20mA impulse per line) for Power & Telecom Network application.
4. SPD should be of Auto Resetting type, once surge is diverted.

10.8.2.3 The earthing policy and transient protection shall be in conformity with the guidelines as outlined in Annexure M of PS Chapter 5 of the particular specification. The Contractor shall submit the proposed measures for review by employer's Representative.

10.9 **Housing, Enclosure and Cabinet**

10.9.1 All equipment installed shall be able to withstand vibration levels likely to be experienced in railway stations, tunnels and structures.

10.9.2 All design of housing and enclosure shall be submitted to the Employer's representative for review.

11. OPERATION AND MAINTENANCE SUPPORT

11.1 General

11.1.1 The Contractor shall investigate all failures, major failures, repetitive failures, design defects and provide all necessary corrective actions throughout the Contract period.

11.1.2 The Contractor shall investigate interference problems either from or to the systems of other Project Contractors and provide all necessary corrective actions throughout the Contract period.

11.1.3 Manuals shall be submitted by the contractor in case the equipment and systems are different than those provided in Phase 1A or for any updates at OCC and existing station level.

11.2 Operation and Maintenance Documentation

11.2.1 In case, of any changes or enhancements to the design of JMRTS, phase 1-A, The Contractor shall prepare relevant Operation and Maintenance documentation. Also, if required, the contractor shall assist in preparation of Employer's Operation and Maintenance Manuals.

11.2.2 The first submission shall be made to the Employer's Representative for review at least three months prior to ROD.

11.3 Maintenance Plan

11.3.1 The Contractor shall submit a Maintenance Plan in accordance with provisions in GS to the Employer's Representative for review before the commencement of installation activities.

11.3.2 The Maintenance Plan shall describe the Contractor's proposed maintenance regime for preventive and corrective maintenance of the System, including, but not be limited to the following:

- (1) The maintenance philosophy and approach
- (2) All necessary tasks for first line, second line, third line and corrective maintenance
- (3) Frequency of each maintenance task

11.3.3 The Contractor shall include the following information on each maintenance task described in the Maintenance Plan:

- (1) The equipment, Subsystems covered in the task
- (2) Step by step procedure to carry out the task
- (3) Tools and test equipment list of each task
- (4) Diagrams and flowcharts for illustration,
- (5) Recovery procedures, if applicable

- (6) Precautions the maintenance personnel to follow
- (7) Estimated duration and manpower required
- (8) Formats for various check and maintenance schedules

11.3.4 In addition to the Maintenance Plan, the Contractor shall also submit a Yearly Routine Maintenance Schedule to the Employer's Representative for review and shall indicate the schedule of maintenance tasks in a calendar year.

11.4 Software Support

11.4.1 General

11.4.1.1 The Contractor shall provide all changes, debugging, updates, modifications and upgrade of all the software developed or delivered for the System including data configuration tables if such changes are necessary and in order to maintain the normal operation and meet the requirements given in this Particular Specification. The contractor shall ensure that all relevant licences related to software/applications are valid for life time and shall submit a list of all such licences during handing over system to JMRC.

11.4.1.2 All changes and modifications of the software shall not degrade the performance or have adverse impacts of the System.

11.4.1.3 The Contractor shall maintain backup copies of all software developed or delivered for the System.

11.4.1.4 The Contractor shall ensure that all new versions are fully tested and validated and reviewed without objection by the Employer's Representative prior to loading into the System.

11.4.1.5 The Contractor shall provide training for the Employer's staff for use of new version, as and when incorporated.

11.4.2 Security Obligations

11.4.2.1 Within 60 days of the installation of any software, which is developed or modified for this Contract, into the Permanent Works by the Contractor, the Contractor shall submit to the Employer's Representative for retention by the Employer two backup copies of the software, which shall include, without limitation:

- (1) All executable code including all data configuration tables
- (2) All installation documentation relating to the software
- (3) Any specified development tools required for maintenance of the software, including, but not limited to, editors, compilers and linkers.

11.5 Support during Defects Liability Period

11.5.1 General

- 11.5.1.1 During the Defects Liability Period, maintenance will be conducted by the Employer with the support of the Contractor.
- 11.5.1.2 The Contractor shall provide workshop repair services of all defective and faulty items of the System.
- 11.5.1.3 The Contractor shall provide comprehensive DLP support for items supplied by him and provide call-out services to the Employer as required to restore the System to normal operation in case of faults and defects are found.
- 11.5.1.4 DLP shall be as detailed in the SCC.
- 11.5.1.5 The Contractor shall submit a maintenance manpower plan showing the Contractor's organization and committed resources level available for all types of activities to be carried out within the Defects Liability Period.
- 11.5.1.6 The Contractor shall ensure all his staff who provide maintenance support shall be competent and with sufficient training in the responsible Subsystems. CVs of all the staff shall be submitted to Employer's Representative for prior approval. Normal day-to-day maintenance will be carried out by Employer's personnel.
- 11.5.1.7 The Contractor shall keep sufficient stocks of Spare Parts in an off-site location in Jaipur throughout the Defects Liability Period to enable rapid replacement of any item in the Permanent Works found to require replacement as part of the Contractor's obligations during the Defects Liability Periods (Defects Liability Spares).
- 11.5.1.8 The Contractor shall replace, free of cost, the components which may be necessary as a result of removal of the wear and tear during the period of DLP.
- 11.5.1.9 The Contractor's Engineer shall check all the system once a month for its perfect working and record the observations in the log book maintained by the Employer with his signature in addition to day to day attending of faults when reported by Employer's Representative.
- 11.5.2 Workshop Repair**
- 11.5.2.1 In case a failure can not be attended to at site the Contractor shall arrange to remove the equipment from site and restore later upon rectification of the fault. In the meanwhile, the contractor shall arrange temporary replacement of defective equipment before removing the same.
- 11.5.2.2 The Contractor shall perform all necessary adjustments or alignments as to the repaired parts. The repair of defective parts can only be considered as completed and returned to stock or back to the System if the parts are tested and verified fit for use in the System.
- 11.5.2.3 The Contractor shall use only components of equal or higher specification than the original components in his repair activities.

11.5.2.4 The performance of the defective parts after repair shall not be degraded or deteriorated due to repairing.

11.5.2.5 The maximum turnaround time for workshop repair shall be less than 28 calendar days. The turnaround time is started to count when the defective parts are removed from the System and ended when the parts are repaired and returned to stock or to the System. Any extension of workshop repair time shall be agreed with the Employer.

11.5.3 Support and Call-out Services

11.5.3.1 The support and call-out services shall be available 24 hours per day and 7 days per week.

11.5.3.2 The Contractor shall provide sufficient number of competent and experienced staff for the support and call-out services.

11.5.3.3 The Contractor shall provide a list of maintenance staff together with the contact mobile telephone numbers who can be contacted for support and call-out services. List of all the Contractor's staff responsible for attending the failure during DLP shall be displayed at all the stations with their address and contact numbers.

11.5.3.4 Any changes in the call-out numbers and the maintenance staff shall be notified to the Employer's Representative at least two weeks before such changes become effective.

11.5.3.5 The Contractor's staff shall be available on Site for maintenance support within one hour upon receiving the call-out request from the Employer and shall proceed to perform corrective actions to restore the System to normal full operation.

11.5.3.6 The Contractor shall take every precaution to protect existing equipment from damage, and make good any damage caused.

11.5.3.7 Should any abnormal system behavior like intermittent faults, interference, frequent repeated faults, etc, or the performance be found to deviate from the specified tolerances, the Contractor shall conduct investigation and report the findings to the Employer's Representative together with the recommendation and proceed after the recommendation has been reviewed without objection by the Employer's Representative.

11.5.3.8 If the Contractor fails to remedy any defect or damage within time specified in PS or as the Employer may deem to be reasonable, it shall be liable for levy of penalties as specified below:

S.No.	Description	Penalty
1.	For attending and rectification of failures(time to be taken from time of information given	

	through email, SMS, Phone etc)	
a)	Beyond MTTR(Mean Time to Restore) upto 1 day	No financial penalty, however excess time taken will be cumulatively added to cater extension, if any, of DLP as given at Sr no. 3 below.
b)	Within 1 day to 5 days	Rs. 500/- per day
c)	After 5 days	Rs. 1000/- per day
2.	If any required manpower is not available	Rs. 500/- per person per day
3.	Extension of DLP period	50% of excess time taken in attending and restoration calculated by adding time in 1(a),(b),(c) & 2 above
4.	Maximum Penalty	5% of Contract Value

11.5.4 Monthly Maintenance Meeting

11.5.4.1 The Contractor shall attend the Monthly Maintenance Meeting with the Employer's Representative to discuss the maintenance matters during the Defects Liability Period. The dates and agenda of the meeting shall be agreed with the Employer's Representative.

12. SPARES, SPECIAL TOOLS AND TEST EQUIPMENT

12.1 Spares

12.1.1 General

12.1.1.1 The Contractor shall provide his own spares during installation and commissioning period as well as for support during the Defects Liability Period. The Contractor shall also provide spares for the Employer to enable the Employer to operate and maintain the System.

12.1.1.2 The Contractor shall submit the lists of spares after the Commencement Date of the Works to the Employer's Representative for review. The lists shall include:

- (1) grouping by Subsystem for stocking identification
- (2) a cross-reference and indexing system for replacement components common to more than one subsystem
- (3) detailed description and correlation with the maintenance manuals

12.1.2 Contractor's Own Spares

12.1.2.1 The Contractor shall keep and maintain sufficient stock of his Commissioning Spares and Defects Liability Spares. In addition, in determining the list of spare parts for the Commissioning Spares and Defects Liability Spares, the Contractor shall provide

calculation to support the proposed types and quantities with the following taken into account:

- (1) The expected failure rate of the parts;
- (2) Population of the parts in the System;
- (3) Criticality of the parts in the System;
- (4) Availability and MTTR figures of the System;
- (5) Spare delivery lead time; and
- (6) Workshop repair turnaround time.

12.1.2.2 The Contractor shall submit the list of Commissioning Spares, with the types and quantities of spares the Contractor intends to hold, at least three months before the commencement of installation activity to the Employer's Representative for review.

12.1.2.3 The Contractor shall submit the list of Defects Liability Spares, with the types and quantities of spares the Contractor intends to hold, at least three months before the commencement of the Defects Liability Period/ROD to the Employer's Representative for review.

12.1.2.4 The Contractor shall include details of the stock of the Contractor's own spares in the Monthly Progress Report. The status of the spares, either in store or under workshop repair, shall also be included.

12.1.3 Contract Spares for Employer's Operational and Maintenance Requirements

12.1.3.1 The Contract spares shall be as per the list specified in Appendix E under Chapter 5 of this PS. However for those of the spares not specifically included in this list but considered essential, the Contractor shall include a list of recommended additional spares.

12.1.3.2 The Contract spares shall include, but not limited to, spare modules, sub-assemblies, special components and fuses.

12.1.3.3 The Contractor shall submit item wise unit price list, primary & secondary sources, Lead Time, shelf life with quantities of each type of spare modules, sub-assemblies, and parts in the list of Employer's requirements and those recommended by the Contractor.

12.1.3.4 The Contractor shall ensure that all spares are tested and labelled prior to their delivery. Test certificates/ reports for each equipment shall be submitted to the Employer's Engineer.

12.1.4 Special Tools and Test Equipment

The Contractor shall provide test equipment and tools during the installation & commissioning periods.

13.1 TRAINING

13.1.1 GENERAL REQUIREMENTS

13.1.1.1 The contractor shall provide comprehensive training to the employer's staff, including employer's trainers, in accordance with the requirements contained in this particular specification and in the general specification if there is a provision of Training in Scope of Services of this contract ..

13.1.1.2 The contractor shall set up training class rooms at site, where he shall provide competent training instructors, training manuals, training simulators, all necessary aids and materials as required for all the training courses.

13.1.1.3 All the training courses shall be conducted during installation period and completed before the commencement of testing and commissioning. No training course shall be started before the completion of design phase.

13.1.1.4 The training courses shall normally be conducted at manufacturers' place and at the site(s).

13.1.1.5 The training instructors shall be qualified, competent, with sufficient years of practical experience in the relevant fields and possesses good communication skills.

13.1.1.6 The training instructors shall be either the system designer or engineering staff of the contractor, the contractor's subcontractors or the equipment manufacturers.

13.1.2 Training Plan

13.1.2.1 The Contractor shall submit a Training Plan to the Employer's Representative for review, if training provision is in Phase 1B contract.

13.1.2.2 The Training Plan shall include, but not limited to, the following:

- (1) The program of the training courses and submission schedule of the training materials
- (2) Overview and description of objectives of each training course
- (3) The location where the training courses to be conducted
- (4) Set ups for practical exercises
- (5) The Contractor's training organisation chart, including the role and responsibilities of individual key persons
- (6) The qualifications and experience of the training instructors
- (7) Details of training simulators to be provided or developed, if applicable

13.1.3 Training Courses

13.1.3.1 The Contractor shall provide training courses for each of the Subsystems, including,

but not be limited to:

- Public Address System
- Passenger Information Display System.
- Master Clock System

13.1.3.2 Not Used.

13.1.3.3 Different types of training courses of Public Address System, Passenger Information Display System and Master Clock System shall be provided for staff from different disciplines. Operations training courses shall be provided for the operations staff. System engineering and maintenance courses shall be provided for engineering and maintenance staff. The Employer's Training Instructors shall attend all types of training courses such that the Employer's Training Instructors shall be able to subsequently train the Employer's staff in all aspects of operation and maintenance of the System.

13.1.3.4 The maximum number of trainees of each training class shall normally not be more than fifteen. Class size larger than fifteen shall be subject to the review of the Employer's Representative.

13.1.3.5 The Contractor shall determine the number of classes for each type of training course to ensure the objectives of the course can be met.

13.1.3.6 Operations Training Courses

13.1.3.6.1 The operations training courses shall be developed to provide all necessary knowledge and skills for operations staff of the Employer to operate the system under normal and emergency situations and recovery from minor or simple faults. In particular, the training course shall include the following as minimum:

- (1) Overview of the Public Address System, Passenger Information Display System and Master Clock System.
- (2) Brief description of the operation principle of the Public Address System, Passenger Information Display System and Master Clock System.
- (3) Operational features and functions
- (4) Familiarisation and use of all man-machine interfaces involved
- (5) Reading and interpretation of system status and alarm messages or indications
- (6) Normal operating procedures
- (7) Operating procedures under emergency situations
- (8) Procedures for recovery from minor or simple faults
- (9) Use of Operation and Maintenance Manuals and documentation

13.1.3.6.2 Particular exercises shall be included in the operations training course for each trainee to operate and manage the system under normal and emergency operating conditions and simple faults recovery. Minimum 2 such courses shall be conducted – first before the commissioning of the first section and second when 50% of the sections are commissioned.

13.1.3.7 System Engineering and Maintenance Courses

13.1.3.7.1 The system engineering and maintenance courses shall be developed to provide all necessary knowledge and skills:

- (1) To perform full maintenance, including both preventive and corrective maintenance, on the System; and
- (2) To perform system engineering management including system parameter configuration, enhancement, expansion and provision of new circuits.
- (3) Minimum 2 such courses shall be conducted – first before the commissioning of the first section and second when 50% of the sections are commissioned.

13.1.3.7.2 The Contractor shall determine the content of the courses and the courses shall include the following as minimum:

- (1) Overview of the Public Address System, Passenger Information Display System and Master Clock System.
- (2) Background theory.
- (3) System features and functions.
- (4) System configuration and operation principles.
- (5) Description of system components and equipment down to card or module level.
- (6) Test and commissioning procedures.
- (7) Use of test equipment and special tools.
- (8) Reading and interpretation of alarm indications, messages and print-outs.
- (9) Preventive maintenance procedures.
- (10) Fault diagnosis, troubleshooting and corrective maintenance procedures.
- (11) Equipment settings and parameters configuration.
- (12) Use of equipment manuals, Operation and Maintenance manuals, circuit diagrams and wiring schematics.
- (13) Methods and procedures to provide new circuits, system expansion and enhancement.
- (14) Data, software backup and loading.

- (15) Use of software such as peripheral control and configuration, utility, database structure, generation and modification.

13.1.3.7.3 Practical exercises shall be provided for each trainee to practise the following as minimum:

- (1) Use of test equipment and special tools.
- (2) Preventive maintenance.
- (3) Fault diagnosis and troubleshooting with induced faults set by the Contractor to simulate real-life situation.
- (4) Faulty modules or cards replacement and restore the system to normal operation.

13.1.4 Training Materials

13.1.4.1 At least one months before the commencement of the training course, the Contractor shall submit all the training materials including the trainer's guides, training manual for trainees, training aids and presentation materials to the Employer's Representative for review. The training materials shall be prepared in a form allow easy future reproduction.

13.1.4.2 The format of the trainer's guides and training manual for trainees shall be submitted to the Employer's Representative for review.

13.1.4.3 The Contractor shall, for each course, distribute two sets of trainer's guides, one set of training manual for each trainee and one additional set of training manual to the Employer's Representative before the commencement of the training course.

13.1.4.4 The trainer's guide shall be prepared in accordance with the requirements given in the GS.

13.1.4.5 All the training materials shall be accurate and match with the actual design of the System.

13.1.5 Training Records

13.1.5.1 The Contractor shall devise a system, standards in assessing the level of knowledge, understanding of the course content and proficiency of the trainees. The system and standards shall be submitted to the Employer's Representative for review four weeks before the commencement of the training course.

13.1.5.2 The Contractor shall issue appropriate training certificate to the trainees who pass the assessment.

13.1.6 Course Evaluation

13.1.6.1 The Contractor shall develop questionnaires to trainees for each training course in determining the level of satisfaction with the course content. Appropriate scoring weighting shall be assigned to each question in the questionnaires such that the scores shall reflect the trainee's satisfaction to the training course. The

questionnaires shall be submitted to the Employer's Representative for review four weeks before the commencement of the training course.

13.1.6.2 Upon completion of each training course, the Contractor shall distribute the questionnaires to the trainees to fill in.

13.1.6.3 The Contractor shall submit a training report to the Employer's Representative for review within two weeks after completion of each course. The training report shall include a summary of the training course conducted, the results of trainees' assessment and the course evaluation questionnaires.

13.1.6.4 The contractor shall submit the course evaluation criteria to the Employer's Representative for review.

14. DOCUMENTATION

14.1 General

14.1.1 The Contractor shall submit a Submission Programme. The Submission Programme shall identify all submissions to be furnished, submission titles, submission numbers and target submission dates.

14.1.2 The Contractor shall provide configuration management to ensure that the System is correctly configured. The Contractor shall ensure that a configuration control programme is maintained. The programme shall ensure that the configuration of each item is recorded and maintained during the life of the Contract and Defects Liability Period.

14.1.3 The Contractor shall submit a Project Management Plan to the Employer's Representative for review as laid down in the GS. The Project Management Plan shall identify the persons to be responsible and the methods and arrangement to carry out the Project Management.

14.2 Submission Requirement

14.2.1 General

14.2.1.1 The Contractor shall include records of amendment in each submission with the following details:

- (1) Revision history and status of the submissions.
- (2) Description on changes for each revision.
- (3) The Contractor's signature for authorisation of the submission indicating proper design check has been carried out before the submitting to the Employer's Representative.

14.2.1.2 The revision status and date of preparation of the submission shall be clearly indicated at the header of each page of the submission.

14.2.1.3 The first submission shall be revision 0 and subsequent revision shall be A, then B, so and so forth.

14.2.1.4 The Contractor shall maintain records of the submission and updated record shall be included in the Monthly Progress Report. The submission record shall include the following details:

- (1) Submission number.
- (2) Submission title.
- (3) Revision history.
- (4) Status of Employer's Representative's Response for each revision.
- (5) Submission dates and dates of return from the Employer's Representative for each revision.

- (6) Current status.

14.2.2 Levels of Submission

14.2.2.1 The Contractor shall adopt top-down approach and submit submissions of the following levels in a logical sequence for the review of the Employer's Representative:

- (1) System level related submission
- (2) Equipment level related submission
- (3) Installation design related submission
- (4) Design calculations
- (5) Management plans and procedures
- (6) Approval certificates
- (7) Miscellaneous submission

14.2.2.2 System level related submission shall show the total system including the configuration block diagrams, operating principle, system features and functions, capacity, expandability, interconnection within the Subsystem, between Subsystems and between other Project Contractors.

14.2.2.3 Equipment level related submissions shall show the specifications on electrical, mechanical and functionality of the equipment/materials employed for the System and the Subsystems.

14.2.2.4 Installation design related submissions shall include:

- (1) The installation methods and procedures for different types of installation activities.
- (2) Drawings showing the equipment locations and positions,
- (3) Schematic and wiring diagrams.
- (4) Cable core plan and numbering scheme.
- (5) Equipment mounting details.
- (6) Configuration data, parameters and settings.
- (7) Cable route drawings.
- (8) Layouts in equipment racks, in equipment rooms, trackside, concourse, platform and all other equipment locations.

14.2.2.5 Design calculations shall demonstrate the performance of the System and Subsystems. Detailed requirements on calculation submissions are given in respective sections of individual Subsystem.

14.2.2.6 The Contractor shall submit a copy of certificates from relevant parties and authorities as required including equipment calibration certificates from manufacturers and laboratories.

14.3 As built-documentation

14.3.1 The as-built documentation shall describe the System as installed and provide sufficient information for other users, maintainers and developers to execute their responsibilities. All documentation shall be submitted for review by the Employer's Representative, and shall include (but not be limited to):

- (1) Operation and Maintenance Manuals.(if applicable)
- (2) Configuration Data Tables.
- (3) As-built drawings.

14.3.2 The configuration data tables shall be prepared for each individual Subsystem and on an item-by-item basis as well as on location basis. In case of any changes to the as-built configuration of existing equipment installed during phase 1-A, the same shall be re-submitted by the contractor.

14.3.3 The As-built drawings shall show the as-built details of the Works and shall include:

- (1) Bill of quantity of equipment on location basis along with serial numbers.
- (2) Location and connectivity of all equipment and cables.
- (3) Schematic and wiring diagrams.
- (4) Cable core plan and numbering scheme.
- (5) Equipment mounting details.
- (6) Cable route drawings.
- (7) Layouts in equipment racks, equipment rooms, trackside, concourse, platform, and all other equipment locations.

15 PROGRAMME REQUIREMENT

15.1 Access Dates and Employers' Facilities Available Dates.

15.1.1 Access dates and key dates are as given in the Appendix B under Chapter 5 of this PS. Additional access along the alignment may be available from time to time. The Contractor shall note that this additional access is not guaranteed and may be subject to change from time to time.

15.1.2 Major installation works in the stations and ancillary buildings requiring co-ordination with the civil works Projects Contractors shall be co-ordinated as per provisions in interface requirements.

16. O&M Manuals shall be submitted by the contractor in case the equipment and system is different than those provided in Phase 1A or for any updates at OCC and existing station level.

JP/JS15B

TELECOMMUNICATIONS SYSTEM

CHAPTER –2

PUBLIC ADDRESS SYSTEM

TABLE OF CONTENTS

TABLE OF CONTENTS.....	2
1. INTRODUCTION.....	3
1.1 GENERAL	3
1.2. OVERVIEW OF THE PUBLIC ADDRESS SYSTEM.....	3
2. NOT USED.....	4
3. SCOPE OF THE WORKS.....	5
3.1 GENERAL	5
3.2 SCOPE OF SUPPLY FOR PUBLIC ADDRESS SYSTEM.....	5
3.3 SCOPE OF SERVICES	6
3.4 WORKS EXCLUDED FROM THIS CONTRACT	6
4. PERFORMANCE REQUIREMENTS.....	7
4.1 GENERAL	7
4.2 RELIABILITY.....	7
4.3 AVAILABILITY REQUIREMENTS.....	7
4.4 MAINTAINABILITY REQUIREMENTS.....	8
4.5 SYSTEM SAFETY REQUIREMENTS	9
5. FUNCTIONAL REQUIREMENTS.....	10
5.1 GENERAL	10
5.2 OPERATION	10
5.3 PAS COVERAGE.....	11
5.4 MESSAGE INITIATION.....	11
5.5 MESSAGE CONSTRUCTION	14
5.6 MESSAGE PRIORITIES	14
5.7 NON OPERATIONAL BROADCASTS.....	15
5.8 AUTOMATIC LEVEL CONTROL	15
5.9 LOUDSPEAKER MUTING	15
5.10 USER INTERFACE	15
5.11 SYSTEM MANAGEMENT.....	18
5.12 FAULT AND ALARM MANAGEMENT	19
5.13 FAULT DIAGNOSTICS	19
6 DESIGN ENGINEERING REQUIREMENTS.....	20
6.1 GENERAL.....	20
6.2 TECHNICAL SYSTEM PERFORMANCE.....	21
6.3 EQUIPMENT SPECIFICATION.....	21
6.4 SYSTEM EXPANSION.....	27
7 INTERFACES.....	28

1. INTRODUCTION

1.1 General

- 1.1.1 This Chapter 2 specifies the particular technical and performance requirements of the Public Address System of the Telecommunication System.
- 1.1.2 This Chapter shall be read in conjunction with other chapters of the Particular Specification (PS) General Specification (GS) and other documents forming part of the Contract.
- 1.1.3 The design of PA system for Phase 1B shall be same as finalized for Phase 1A under JP/JS-15 contract. The TER of OCC and of existing stations of phase 1A, if required, shall be upgraded and be able to achieve same functionality and performance on these two stations as per the approved design on Phase 1A.
- 1.1.4 The Phase 1B consist of approx 2.35 km from Chandpole to Badi Chaupar section. There are 2 underground stations on this extension.

1.2. OVERVIEW OF THE PUBLIC ADDRESS SYSTEM

- 1.2.1 The PAS shall be provided to broadcast voice messages to passengers/staff in all stations.
- 1.2.2 The PAS shall have control equipment located at the equipment room(s) of each station.
- 1.2.3 The station PAS control equipment shall be interfaced to the FOTS for connection to the equipment located in the CER at the OCC to facilitate system control from OCC.
- 1.2.4 The PAS at stations shall be accessed from the following locations as a minimum:
- (1) Platform supervisors Booth (PSB).
 - (2) Station Control Room, (SCR);
 - (3) Operations Control Centre (OCC).
- 1.2.5 The PAS and Passenger Information Display System (PIDS) (refer to chapter 3 of this PS) shall be coordinated automatically to provide real time passenger audio broadcast and visual information at each station. The PAS and PIDS shall respond to special train running interrupt messages from the Train Control and Signalling System and also enable any PAS operator to send special announcement or emergency messages for passengers and staff. Train Control and Signalling System will be done by Signalling Contractor(s)
- 1.2.6 Four major types of messages shall be provided by the PAS as a minimum :
- (1) Fixed digital recording;

- (2) Pre-formatted with data to be added;
- (3) Instantly recorded; and
- (4) Live audio broadcast.

1.2.7 The PAS shall be capable of maintaining the required intelligibility at all times regardless of the changing environment including crowd density, temperature, humidity and noise level.

2. NOT USED

3. SCOPE OF THE WORKS

3.1 General

3.1.1 In addition to the requirements on the scope of the works as identified in section 3 Chapter 1 of this particular specification, the specific requirements on the scope of the Works for the PAS shall be as specified herein.

3.2 Scope of Supply for Public Address System

The Public Address System (PAS) shall include, but not be limited to, the following:

- (1) Integrated PIDS/PAS control equipment;
- (2) Audio switching matrix functionality
- (3) Digital voice announcers and recorders functionalities;
- (4) PAS/PIDS integrated MMIs;
- (5) PAS backup Goose Neck Desktop Microphone;
- (6) PAS control panels;
- (7) Microphones;
- (8) Pre-amplifiers and power amplifiers;
- (9) Digital Equalizer functionality
- (10) Noise sensing devices and automatic level control equipment;
- (11) Voice and data communication equipment;
- (12) Loudspeakers and line impedance matching transformers;
- (13) All software required for the operation of the PAS;
- (14) Testing and commissioning facilities;
- (15) Distribution frames;
- (16) Equipment cabinets, racks and cubicles;
- (17) Mounting brackets and installation materials;
- (18) All equipment power supplies, cables, connectors, accessories, cabling and earthing necessary for the works.
- (19) Any equipment necessary for integration with existing PA system of Phase 1A to allow the introduction of future services without disruption to existing operation services.
- (20) Any other item to complete the scope of JP/JS15B Contract.

3.3 Scope of Services

3.3.1 The requirements on the scope of services are given in Chapter 1 of this PS.

3.3.2 Not Used.

3.3.3 In addition, the contractor shall co-ordinate with Civil Works Project Contractors and provides comments or recommendations on subjects of station building materials; finishes and architectural layouts.

3.3.4 The contractor shall carry out an acoustic simulation to verify his proposed design.

3.3.5 The contractor shall provide all the required audio recording services at a professional recording studio for production and recording of messages for the PAS.

3.3.6 The contractor shall configure, update, commission and integrate all OCC equipment provided as part of JP/JS15 contract to the equipment at new stations for extension of all services provided in JMRTS phase 1-A. In addition, the JP/JS15B contractor shall undertake any addition, modification, alteration to the existing system configuration of phase 1-A system at all required levels to complete the scope of works at no additional cost to the employer.

3.3.7 Providing necessary support and documents for getting necessary approvals from Indian authorities viz Railway Board/ RDSO, and Commissioner of Railway Safety.

3.3.8 Any other service needed to provide a complete PAS/PIDS system.

3.4 Works excluded from this Contract

3.4.1 Train-borne Public Address System shall not be supplied as part of this contract.

3.4.2 230 Volts AC supply distribution cubicle in each TER/CER of station/OCC shall be provided by the JP/JS14B Contractor for use of all other Telecom Sub-system in that location. JP/JS14B Contractor shall design and construct the AC distribution board along with all protection devices keeping in view the AC power supply requirements of all other Telecom Contractor. All further cabling from the Distribution Cubical of JP/JS14B shall be done by the respective Telecom contractor as per their requirement. JP/JS15B Contractor shall co-ordinate and interface with the JP/JS14B contractor for load requirement for their system.

4. PERFORMANCE REQUIREMENTS

4.1 General

4.1.1 All the sub systems, equipment to be used for PAS system shall be same as those used on Phase 1A in JS15 contract, or their upgrade of proven design and in use in some passenger carrying Railway or metro system. The Employer's decision on this shall be final.

4.1.2 In addition to the overall system performance requirement as identified in Chapter 1 of this Particular Specification the specific performance requirements for the PAS shall be as specified herein.

4.1.3 The technical system performance requirements for the PAS are specified in section 6 of Chapter 2 of the PS.

4.2 Reliability

4.2.1 The inability to perform any required function, the occurrence of unexpected action or the degradation of performance below the specifications shall be considered as a failure.

MTBF shall be the average operating time accumulated by the total population of identical items between failures.

4.2.2 The PAS equipment supplied under the contract shall comply with the reliability figures given below :

PAS Equipment	MTBF (Hours)
Control and switching equipment	> 50,000
Amplifier redundancy control equipment	>100,000
Power amplifier	> 50,000
Digital voice announcer equipment	> 50,000
Microphone	> 50,000
PIDS/PAS MMI + Station Server	> 50,000
Loud speaker	> 150,000
Noise logic control sensor	> 50,000
Noise logic controller	> 100,000

Table 4-1 MTBF Figures

4.3 Availability Requirements

- 4.3.1 In determining the Availability of the PAS, reliability block diagrams using field failure rates for commercially available equipment shall be produced. Any equipment without field failure data shall have its failure rate determined strictly in accordance with MIL-HBK-217F for its appropriate operating environment.
- 4.3.2 PAS announcement initiated by any mode of operation shall be considered unavailable under the following failure conditions as a minimum:
- (1) Failure of MMI at OCC.
 - (2) Failure of PAS MMI at any station.
 - (3) Failure of one or more PAS control panel at any location;
 - (4) Failure of co-ordinated message capabilities with the PIDS at any location;
 - (5) Failure of audio broadcasts as initiated by the Train Control and Signalling (TC&S) System at any location; and
 - (6) Failure of more than 10% of PAS loudspeakers at any location
- 4.3.3 The PAS shall have an overall system Availability of better than 99.99%.
- 4.3.4 The PAS management system shall be considered unavailable if any function provided by the PAS management system cannot be properly executed. The Availability of the PAS management system shall be better than 99.95%.
- 4.3.5 The Radio-to-PAS announcement shall have an Availability of better than 99.9%.

4.4 Maintainability Requirements

- 4.4.1 The Mean Time To Restore (MTTR) of the PAS to full normal operation following a failure shall be less than four hours, excluding the time required to travel to Site.
- 4.4.2 The service life of the PAS shall not be less than 15 years. Service life of all types of cables shall no be less than 25 years. Service life shall be counted from the commencement date of Defects Liability Period. If equipment provided is same as in Phase 1A, the contractor shall ensure its life cycle, service life support and RAMS requirements are met and provide relevant documentation to confirm the same.

4.5 System Safety Requirements

- 4.5.1 The output of the PAS Amplifier should be tapped and recorded automatically either locally or remotely at OCC, so that record of actual announcement made can be analyzed at a later date. The record to be kept for 2 days.
- 4.5.2 All equipment must comply with and be installed in accordance with IEC65, IEC364 and to current safety standards applicable in India.
- 4.5.3 All metal enclosures shall be provided with an earthing terminal and earthing of all equipment shall be carried out in accordance with the overall earthing policy. Please refer to Appendix M chapter 5 of this PS.

5. FUNCTIONAL REQUIREMENTS

5.1 General

- 5.1.1 The PAS shall support message announcement in Hindi and English or any combination of these languages.
- 5.1.2 The PAS shall have the necessary facilities to direct different live or recorded announcements to separate zones or group of zones simultaneously within a station.
- 5.1.3 PAS announcement shall be capable of being originated from designated handportable radios also to a set of pre-defined PAS zones at each station. This needs to be coordinated and demonstrated with JP/JS14B (Radio Contractor) and JP/JS12B (Telephone Contractor).
- 5.1.4 The PAS shall have the necessary facilities to enable up to 2 different messages to be simultaneously broadcast over different zones or group of zones in the station.
- 5.1.5 When broadcasting pre-stored messages, the PAS shall deliver a single message as selected by the PAS operator.
- 5.1.6 The PAS shall broadcast different pre-stored messages in either one of the following orders :
- (1) Broadcast of the first message in different languages followed by the second message in the same order of languages and so on; and
 - (2) Broadcast of set of messages in one language followed by the same set of messages broadcast in another language and so on.
- 5.1.7 The PAS equipment's internal clock shall be synchronized to the Master clock being provided as part of this contract. Refer to Chapter 4 of this PS.

5.2 Operation

5.2.1 Mode of operation

The PAS shall support the following modes of operation as a minimum:

- (1) Time mode as initiated by the PAS internal system clock via a Time Table & message scheduler provided as part of the MMI facilities, both at OCC and SCR.
- (2) Automatic mode based on information from the TC & S System for train related information broadcast;

- (3) Manual mode as initiated by a PAS operator at OCC and SCR on the MMI.
- (4) Manual mode as initiated by a PAS operator at SCR/PSB on the PAS Control Panel.

5.3 PAS Coverage

5.3.1 Station Coverage

The following PAS zones shall be provided for each station as a minimum:

- (1) Concourses and entry/exits (divided into more zones if required);
- (2) UP Platform;
- (3) Down Platform;
- (4) Staff areas including Office rooms, equipment rooms, plant rooms, staff toilets mainly for emergency / fire announcements.
- (5) All Common area in between Property Development and Station area used for passenger movement.
- (6) Parking Area.

5.3.2 PAS Station Zones

5.3.2.1 PAS zones shall be fully co-ordinated with the fire protection zones in all stations. The contractor shall co-ordinate with Civil Works Project Contractors to obtain all the latest fire protection zoning details necessary for his Design Engineering.

5.3.2.2 The contractor shall develop full details of the PAS zone assignment for each station and submit to the Employer's representative for review.

5.3.2.3 Not Used.

5.3.2.4 Not Used.

5.3.3 Not used

5.3.3.1 Not used

5.3.4 Not Used

5.3.4.1 Not Used

5.4 Message Initiation

5.4.1 Messages Initiated from the station

5.4.1.1 The SCR MMI shall have the necessary facilities to initiate any fixed or instantly recorded messages and add in any additional information required to complete the pre-formatted messages.

5.4.1.2 The SCR MMI shall have the selection facilities to direct the message to any zone, combination of zones or all zones within a station. The operator shall be required to confirm this selection before the message is transmitted.

5.4.1.3 The SCR MMI shall have the instant recording facilities to store “ad-hoc” messages for repetitive broadcast.

5.4.1.4 The SCR MMI shall have the facilities to make live broadcast to any zone, combination of zones or all zones within the station.

5.4.1.5 Each PSB shall be provided with a hard-wired PAS control panel and microphone. The PAS control panel shall have the facilities to make live broadcast to a particular zone/all zones.

5.4.2 Messages initiated from the OCC

5.4.2.1 The OCC (provided as part of JP/JS15 contract) shall have full announcement facilities as described for the SCR MMI and shall be provided with the necessary facilities to access these stations. JP/JS15B contractor shall make necessary arrangements to integrate new stations to the existing OCC equipment, including any changes required in hardware/software of central equipment at OCC.

5.4.2.2 Multi-drop data links (TCP/IP) of adequate band width through FOTS (part of JP/JS11B Contract) shall be provided to each station PAS allowing the OCC to broadcast messages to the following as a minimum:

- (1) One station;
- (2) A group of stations;
- (3) All stations;

5.4.3 Any upgradation in Central system shall not disturb or hamper the existing functionality / facilities of Phase 1A at stations, depot & OCC buildings. Messages initiated from the TC&S system

5.4.3.1 Data will be sent in a coordinated manner to the PAS and the PIDS by the TC&S System to broadcast pre-defined train information including train arrivals and departures on the designated platform at all stations.

5.4.3.2 Designated PAS message shall be initiated and co-ordinated with the PIDS, based on the train information received from the TC&S System.

5.4.3.3 The PAS shall ensure the data integrity of the train information received from the TC&S System.

5.4.3.4 PAS announcements shall be made to alert passengers of all non-stopping trains based on the information received from the TC&S System.

- 5.4.3.5 The PAS shall carry out the internal time countdown based on the estimated time data sent by the TC&S System and the current PAS internal system clock.
- 5.4.3.6 The time countdown shall be frozen when a train stops proceeding to the next stopping station, due to circumstance detectable by the TC&S System and related to the PAS.
- 5.4.3.7 The estimated time to arrive and/or depart of the train(s) shall be stepped down automatically every minute from the current PAS internal system clock and shall be corrected if necessary following a data update from the TC&S System.
- 5.4.3.8 The pre-defined announcements shall be triggered by the time countdown functions of the PAS or data to be sent by the TC&S System including announcement of non stopping trains passing through the station.
- 5.4.3.9 All messages initiated by the TC&S System shall be designed for automatic broadcast without human intervention.
- 5.4.3.10 In automatic mode the train announcement shall be made when the train is about to arrive at the platform. Similarly departure announcement shall be made when the train is ready to depart from the platform. The exact details shall be proposed by the contractor as part of detailed design for review and approval by the Employer.
- 5.4.3.11 Upon receiving train information from the TC&S System, the PAS shall broadcast the pre-defined announcements to the designated PAS zones in real-time and there should not be any delay for announcements even when 2 trains are being received/dispatched simultaneously on both platforms of the same station, and the announcement should simultaneously occur in respective zones of each platform. The announcement at Concourse should be for the first train at the same time and announcement for second train should be in queue. At Concourse there should not be announcement of train which is about to leave within the next 1 minute to avoid people rushing over the stairs/escalators to the platforms. This parameter shall be configurable by the system administrator, from 0 to 1 minute.

5.4.4 Messages relating to fire detection and alarm system

- 5.4.4.1 On detection of Fire alarm, operator in SCR/PSB shall manually make live announcements to alert the passengers and staff and broadcast evacuation messages.

5.4.5 Not used

5.5 Message Construction

5.5.1 Fixed and Pre-formatted Messages

5.5.1.1 The fixed and pre-formatted messages shall be created and loaded into the Digital Voice Announcer (DVA) of the central PAS control equipment at OCC via the PAS management system. These messages shall then be downloaded to the station control equipment as programmed by the PAS management system.

5.5.1.2 The pre-formatted messages at each station shall be identical, providing fields for name, time or other variables to be added.

5.5.1.3 Messages shall be constructed and stored in Hindi and English.

5.5.2 Instantly Recorded Messages

5.5.2.1 The PAS shall enable the OCC and SCR MMI operators to digitize live messages and store them in the local digital voice announcer. These messages can then be retrieved for broadcasting or be deleted, if they are no longer required by the operators.

5.5.2.2 The instantly recorded messages shall be broadcast either one-off (broadcast only once) or repeatedly, similar to the pre-stored messages.

5.6 Message Priorities

5.6.1 Following priority shall be provided for the PAS announcements :

Level of Priority	Message Type
1	Live audio broad cast from PSB.
2	Live audio broad cast from SCR, through MMI.
3	Live audio broad cast from OCC, through MMI.
4	Announcement initiated by TC &S
5&6	Pre stored messages from SCR/OCC.
7&8	Spare
9&10	Audio port 1&2

5.6.2 Only the higher priority level message, when initiated shall interrupt any lower priority announcement currently in progress.

5.6.3 Busy indication on the MMI (s) shall be displayed when the broadcast is in progress over a zone / group of zones etc.

5.6.4 Message priorities shall be programmable by the PAS management system

5.6.5 JP/JS15B shall make necessary arrangements including configuration, commissioning, interfacing with CDRS system for recording of Live audio

broadcast relating to emergency, fire and evacuation messages in the Centralized digital recording system at OCC provided as part of JP/JS14 contract. Similar broadcasts made from SCR/PSB shall be recorded at the SCR/TER in the PAS station server or the MMI itself. It shall however be possible to retrieve any message so recorded and save same on an external storage device like a memory stick for future. It is expected that PAS/PIDS/MCK Contractor for Phase 1B shall utilize the existing interfaces of his system with CDRS for recording PAS announcement from OCC and not seek any modification to existing interface between CDRS & PAS/PIDS & Telephone System. If otherwise, JS15B shall interface its system with CDRS system for execution of same for two proposed station.

- 5.6.6 The output of the PAS Amplifier should be tapped and recorded automatically either locally or remotely at OCC, so that record of actual announcement made can be analyzed at a later date. The record to be kept for 2 days.

5.7 Non Operational Broadcasts

The PAS at stations shall have two external audio input ports for providing background Music to selected public zones.

5.8 Automatic Level Control

- 5.8.1 All the PAS zones at each station/depot shall be provided independently with automatic gain control for each loudspeaker feeder line to compensate for changing noise levels.

- 5.8.2 The performance of the PAS shall be maintained at its uncompensated level in the event of a total failure of the noise sensing device.

5.9 Loudspeaker Muting

- 5.9.1 Provisions shall be made to prevent positive feedback when any microphone used for announcements is in close proximity to loudspeakers.

- 5.9.2 The PAS shall have the necessary facilities to mute or attenuate selected PAS locations or zones either manually or under time mode control in areas where broad casts may disturb the public.

- 5.9.3 The gain setting for muting the PAS audio outputs shall be adjustable by maintenance personnel at each location.

5.10 User Interface

5.10.1 Man Machine Interface (MMI)

5.10.1.1 General

- 5.10.1.1.1 The Contractor shall provide same type of MMI in 1B section as developed and approved during phase 1A with necessary modification .
- 5.10.1.1.2 MMI shall be provided in each SCR. JP/JS15B Contractor shall make necessary arrangements to integrate these two station requirements in existing MMI provided in OCC /CSS as part of JP/JS15 Contract. JP/JS15B Contractor shall update the existing MMI at OCC/CSS to cater this extension.Refer to Appendix H chapter 5 of this PS for provision of MMIs. Each PAS MMI shall be integrated with the PIDS MMI to provide the operator with all PAS announcement and associated system features in order to operate and control the PAS.
- 5.10.1.1.3 Both PAS MMI and PIDS MMI shall be implemented on a common Workstation with the same look and feel, as provided in Phase 1A. MMI at Station Control Room should be an Integrated PC cum Monitor Unit to reduce space requirement and accidental failure or equipment can be kept in TER/CER and all signals extended to SCR (Monitor, Mouse, Keyboard etc.).
- 5.10.1.1.4 Designated PAS commands and audio inputs shall be automatically co-ordinated with the PIDS messages if the messages are determined and selected to be concurrently broadcast and displayed.
- 5.10.1.1.5 Zone busy indications shall be shown on the MMI when a PAS operator attempts to initiate a lower priority message while a higher priority message is being broadcast to the selected zone.
- 5.10.1.1.6 The MMI shall have the necessary facilities to send out message(s) once or periodically at a constant interval to the selected zones. The periodic interval shall be operator selectable.
- 5.10.1.1.7 The MMI shall have the necessary selection checks for all types of data entry and selection confirmation before message transmission.
- 5.10.1.1.8 The MMI at OCC shall have the selection facilities for sending a message or sequence of messages to a station, group of stations or all stations.
- 5.10.1.1.9 The MMI at SCR shall have the selection facilities for sending a message or a sequence of messages to a zone, a group of zones or all zones in a station.
- 5.10.1.1.10 Each MMI shall have a set of speakers for monitoring active messages being broadcast to selected PAS zones and for play-back of the instantly recorded messages.

- 5.10.1.1.11 The MMI shall have the necessary facilities for play-back of pre-stored message on the monitor speakers of the MMI prior to broadcasting to any PAS zone.
- 5.10.1.1.12 Each MMI position shall be equipped with a PAS Control Panel including a microphone to enable live broadcast messages to be made even when the MMI, and DVA equipment fail. Hence PAS Control panel shall work as a manual backup to MMI (including the DVA) at all locations ie; stations
- 5.10.1.1.13 The SCR MMI shall have the necessary facilities to monitor OCC initiated messages.
- 5.10.1.1.14 The MMI shall have a reset command for the PAS operator to stop the message broadcast. When the message broadcast is reset, the current messages shall be cancelled and then the pre-set routine message schedule shall be resumed.
- 5.10.1.1.15 The SCR MMI shall receive notification of any message initiated from the microphone broadcast from the PSB. When more than one PSB exists, the individual PSB shall be differentiated.
- 5.10.1.1.16 One major and one minor summary alarm, along with a volume adjustable audible tone that can be enabled or disabled by the PAS operator, shall be available to alert the operator of a PAS equipment fault on the MMI.
- 5.10.1.1.17 The following minimum facilities shall be made available to the operator via the MMI:
- (1) Each group shall be pre-programmable to automatically connect, from a single selection action, any combination of station zones from the SCR MMI and any combination of stations and station zones from the OCC MMI.
 - (2) The ability to select fixed and pre-formatted message broadcast, to create instantly recorded messages and to make live audio broadcast.
 - (3) None of the fixed or pre-formatted messages shall be erasable by any MMI operator.
 - (4) When the selected zones are available, a “ready-to-proceed” indication shall be given to the operator indicating that announcements can be proceeded.
 - (5) The ability to display major and minor summary alarms on the MMI.
 - (6) The facilities to acknowledge alarms and to clear alarms from the alarm display.

5.10.1.1.17 Not Used

5.10.1.2 Pre-defined System Information

5.10.1.2.1 Each station or Central PAS control equipment shall contain predefined system information of the commonly and regularly used information for quicker selection by the MMI operator.

5.10.2 Not used

5.10.3 Log on Control

5.10.3.1 The PAS shall be provided with all necessary facilities to enable each PAS operator or controller to execute log on sequence, by entering both unique user name and password, before any commands are available on the MMI.

5.10.4 Platform Supervisors Booth (PSB)

5.10.4.1 Each station PSB shall be provided with a hard-wired PAS control panel to gain access to its associated platform(s).

5.10.4.2 The PAS control panel shall be equipped with a lamp which shall be illuminated when the respective platform PAS zone is in use. Whenever a live announcement is made via the PAS control panel, a busy signal for that PSB shall be indicated back to the MMI at SCR and OCC to indicate that the channel is busy.

5.10.4.3 The PAS control panel shall be equipped with a ready to proceed indication when the platform zone(s) selected are available.

5.10.5 Not used

5.11 System Management

5.11.1 The PAS system shall have the following system management functions as a minimum. Facilities available at OCC shall be extended to new stations equipment:

- (1) Loading and creating fixed and pre- formatted messages;
- (2) Down loading of system software;
- (3) Message priority assignment;
- (4) Co-ordinating PAS and PIDS messages.
- (5) Preprogramming system triggering events;
- (6) Retrieve event logs;
- (7) Modifying pre-defined system information;
- (8) System parameter configuration.

5.11.2 System administration function as a minimum shall be available to control, resetting of password creation and deletion of users. JP/JS15B contractor shall extend this facility to new station workstations.

5.12 FAULT AND ALARM MANAGEMENT

JP/JS15B shall extend all features provided by existing PAS Management System such as Fault and Alarm Management, Alarm Handling etc to new stations. Any modifications/upgrades required to the existing Central system at OCC shall be the responsibility of JP/JS15B.

5.12.1 Fault and Alarm Monitoring

5.12.1.1 Status of major equipment of the system shall be monitored and displayed with suitable indications on the local PAS equipment shelves/racks.

5.13 Fault Diagnostics

5.13.1 General

5.13.1.1 The equipment shall incorporate a self diagnostic process for monitoring all amplifiers and loudspeaker circuits. In the event of a fault being detected, an alarm shall be given on the control panel at OCC.

5.13.1.2 The fault diagnostic system shall provide features for local testing of individual module.

5.13.2 Failure Modes

5.13.2.1 When power is restored following a power failure to the PAS, the PAS shall perform all necessary self testing processes and then automatically resume functioning fully in the same configuration as before the shutdown.

5.13.2.2 Failure of a MMI shall not prevent any other MMIs or other PAS control panels from operating and controlling the PAS.

5.13.2.3 Failure of MMI inside the SCR and digital voice announcer shall not prevent a PAS operator in the SCR from making live audio broadcast to the entire station to meet emergency requirements through the PAS Control Panel.

6 DESIGN ENGINEERING REQUIREMENTS

6.1 General

- 6.1.1 In addition to the Design Engineering requirements as identified in Chapter 1 of this particular specification, the PAS shall meet the technical system performance and equipment specification as specified herein. The design shall be in accordance with the approved design of Phase 1A except when otherwise stated.
- 6.1.2 The PAS shall be designed with fault tolerant system architecture to prevent common mode failure.
- 6.1.3 The software shall be designed to accommodate the ultimate, fully expanded capacity, without requiring any change to the hardware or firmware of the installed system and without affecting the overall operation or performance of the PAS.
- 6.1.4 The contractor shall carry out the STiPa simulation to verify the system design of the PAS before installation. The simulation shall be based on the proposed speaker layout and system design as well as the architectural finishes and acoustic environment found at the location. The STiPa simulations for all areas

of each zone at stations and the depot shall meet the requirements specified below and submitted to the Employer's Representative for review.

- 6.1.5 The details of the synchronization plan with the master clock system shall be submitted for review by the Employer's Representative

6.2 Technical system Performance

6.2.1 Coverage Performance

6.2.1.1 Sound Pressure Level (SPL)

- 6.2.1.1.1 In order to allow for the worst case ambient noise levels, the PAS shall generate SPLs in 95% of the area (but without sacrificing important locations) of 90dB(A) for concourse and 95dB(A) for platform areas and 80 dB(A) for nonpublic areas. Coverage shall be uniform with +/-3 dB on platforms (95+/- 3dB) and within +/- 6 dB on concourse areas (90+/- 6dB) of stations.

- 6.2.1.1.2 Headroom margin of at least 6 d B above average SPL shall be available at all amplifier stages such that the input is passed through the PAS without clipping.

- 6.2.1.1.3 The SPL shall not exceed 100 dB (A) in all public and non public areas.

- 6.2.1.1.4 When automatic level adjustment is at its minimum, the SPL measured at 1.5 metres above floor in each zone shall be no less than 70 dB(A) .Ambient noise monitoring shall ensure PAS output 10 dB(A) higher than the ambient noise level in all zones.

6.2.2 Distortion

- 6.2.2.1 The **amplifier total harmonic distortion** shall be less than 0.5% at 1 kHz with full power.

- 6.2.2.2 The noise level under no signal condition shall be at least 80db below the design signal level.

6.2.3 Frequency Response

- 6.2.3.1 The minimum overall system frequency response for the PAS from 100 Hz to 7000 Hz shall be within ± 3 dB.

6.2.4 Intelligibility

The index of speech intelligibility (STiPa) measurement values at 95% of the areas for the PAS shall be greater than or equal to 0.5 for all areas. The design shall take into account effects of reverberations. The requirement of STiPa shall be complied with at all public areas like station concourses, platforms, entrances to stations etc. For parking areas & non-public areas , the criterion shall be adequacy of SPL and intelligibility.

6.3 Equipment Specification

6.3.1 PAS Control Equipment

- 6.3.1.1 The hardware and software of the PAS shall use modular design to allow for easy expansion of the system. Addition of input and output ports for the switching equipment shall be achieved by simple addition of plug-in cards or input output modules.
- 6.3.1.2 The PAS control equipment shall be provided with suitable redundant modules/cards to prevent single point of failure that affects overall system operation at a particular location including critical components so as to achieve the RAMS requirements laid down.
- 6.3.1.3 The PAS control equipment shall include all the necessary computer server equipment capable of meeting all the interface requirement with the PIDS and TC & S system.
- 6.3.1.4 The PAS control equipment shall be provided with an internal system clock which shall be synchronized with the Master Clock system. The internal system clock shall maintain the current time clock without drifting a single second for a period of at least 1 week whenever the synchronization link with Master clock system fails.
- 6.3.1.5 All configuration data of the equipment shall be stored in non-volatile memory.
- 6.3.1.6 The PAS control equipment shall be equipped with a monitoring speaker to test and verify audio output functions of each amplifier in the PAS equipment racks at all stations. This facility can also be provided through station MMI or through maintenance laptops provided in contract JP/JS15.
- 6.3.1.7 The audio matrix switch of the PAS shall be provided with sufficient audio inputs to cater for all the audio services required by this particular specification and enable the audio cross connections necessary for broadcasting over any zone, combination of zones or all zones.
- 6.3.1.8 The audio matrix switch shall be digitally controller switch and shall be based on solid state technologies or realized by software.
- 6.3.1.9 The audio matrix switch shall be fail safe and shall be capable of being manually bypassed to maintain all zone broadcast availability, if necessary on failure of the audio matrix switch.
- 6.3.1.10 The PAS control equipment shall be equipped with a maintenance port and appropriate accessories to allow local maintenance access.
- 6.3.1.11 The two external audio input ports for non-operational broadcasting of each station PAS shall be screened with 600 Ohm impedance.
- 6.3.1.12 The PAS control equipment shall be equipped with built –in test routines that are capable of testing each hardware module. These routines shall selectively operate in an off-line mode to allow a complete functional test of the module in question.

6.3.1.13 Built-in test routines shall be initiated by the Local and remote maintenance commands automatically as a part of the power up initialization process.

6.3.1.14 Each station PAS shall be deigned and wired to the extent necessary to enable two additional audio inputs and two additional PAS zones to be fully accommodated at each station.

6.3.1.15 Not used

6.3.2 Digital Voice Announcer And Recorder

6.3.2.1 The Digital Voice Announcer (DVA) equipment shall be of solid state type or hard disk with sufficient memory backup to store fixed, pre-formatted and instantly recorded messages.

6.3.2.2 After power failure, power on or power reset conditions, the PAS shall run self-diagnostic checks and auto-execution of programs for the DVA equipment.

6.3.2.3 The DVA shall be provided with adequate hard disk or other fast access memory capacities (30 minutes) for each PAS control equipment and for each language required.

6.3.2.4 The contractor shall use suitable encoding and decoding technology that is capable of maintaining the same audio quality in order to minimize the file size of the DVA messages. The encoding and decoding technology shall be the “commercially Off the shelf” type. Commercially available compact disc for loading recorded messages into the DVA shall be used.

6.3.2.5 The contractor shall provide different chime tones for different types of messages to alert the passengers. The chime tone, if selected, shall be triggered and broadcast automatically before each associated announcement.

6.3.3 Work Station

6.3.3.1 Each work station shall consist of all equipment necessary to provide the specified display and command functions for a PAS operator.

6.3.4 PAS Control Panel

6.3.4.1 Each PAS control panel shall be equipped with “gooseneck” microphone with “Push-to-Talk button.

6.3.4.2 Each button for zone selection and external music source selection shall have a built-in LED for status indication including idle, engaged by others and selected by the operator of the pre-defined zones.

6.3.4.3 Not used.

6.3.4.4 The monitor speaker with volume adjustment control on the PAS control panel shall be used for real time monitoring of any message being broadcast to the pre defined zones.

6.3.4.5 A ready to proceed indication shall be provided when selected zone or zones are available. Zone busy indication shall be displayed on the control panel when broadcast is in progress over a zone or a group of zones.

6.3.4.6 The panel shall have sufficient space to accommodate the requirements of the proposed ultimate Jaipur Metro network.

6.3.5 Microphones

6.3.5.1 All microphones for the PAS shall have the following features;

- (1) Unidirectional;
- (2) "Gooseneck";
- (3) Low sensitivity to feedback;
- (4) Noise suppressing;.

6.3.5.2 The microphone shall have the following minimum performance:

- (1) Frequency response 100 Hz – 10 kHz (± 3 dB)
- (2) Sensitivity > -73 dB (0.22mV)
- (3) Distortion at 1 kHz $< 1\%$ and
- (4) Inherent noise ≤ 25 dB SPL, A weighted

6.3.6 Microphone Pre-amplifier Unit

6.3.6.1 The microphone pre-amplifier unit shall have a nominal output level of 0 dBm compatible with the output from the DVA.

6.3.6.2 Suitable automatic level control technique shall be employed for microphone input processing to ensure that the level of instantly recorded voice is controlled within an acceptable range.

6.3.6.3 The microphone pre-amplifier unit shall have the following minimum performance:

- (1) Frequency response : 100 Hz – 10 kHz (± 3 dB);
- (2) Output impedance : 600 ohm balanced;
- (3) Output level : 0-6 dBm continuously adjustable;
- (4) S/N ratio : > 70 dB; and
- (5) Distortion at 1 kHz : $< 0.5\%$

6.3.7 Power Amplifier

- 6.3.7.1 The output power amplifier shall be justified by system Design /Application Engineering. Maximum power for each power amplifier for the PAS zone shall be 1.4 times the power required for meeting the SPL and STiPa requirements.
- 6.3.7.2 Not used
- 6.3.7.3 A power amplifier shall be provided for each audio distribution line feeding alternate speakers in a zone.
- 6.3.7.4 Adequate standby arrangements shall be provided to achieve system availability. At least one power/pre-amplifier shall be provided for every eight working amplifiers. Hot stand by amplifier shall be switched into operation automatically by the PAS supervisory functions. The switch over to the standby / backup power amplifier should be dynamic
- 6.3.7.5 The amplifiers shall have the following minimum performance:
- (1) RMS Power output : As required by individual or paralleled modular units;
 - (2) Power efficiency : >75%
 - (3) Protection : Insensitive to output open and short-circuits;
 - (4) Frequency response : 100 Hz to 15 kHz (± 3 dB);
 - (5) Total harmonic distortion: Less than 1% of rated output;
 - (6) Noise : Better than 80 dB below rated output;
 - (7) Input sensitivity : 775m V into 10K ohms for rated power output;
and
 - (8) Line voltage : 100 volts.

Tenderer shall indicate the power consumption of the offered equipment.

6.3.8 Digital Equalizers

- 6.3.8.1 Multi channel digitally controlled equalizer provided for PAS zones shall meet required RASTI value and the natural speech tones of messages to be transmitted. Real time frequency analyzer for automatic zone equalization as well as routine maintenance checking shall be incorporated.

6.3.9 Automatic Level Control

- 6.3.9.1 The ambient noise-sensing device provided for automatic level control shall be of continuous monitoring type based on time averaging. Multiple noise sensing device may be provided if wide noise level differentials exist in a PAS zone. Noise sensing devices shall be mounted in aesthetic housing .Each loud speaker feeder line feeding alternate speakers of each zone at stations shall be provided with independent noise sensing device(s)

6.3.10 Sound Distribution

6.3.10.1 Each zone, other than the staff areas shall be fed by a minimum of two supervised distribution lines feeding alternate speakers.

6.3.10.2 The alternate feeding arrangement shall optimize the PAS coverage which remains if a distribution line fails.

6.3.11 Loudspeakers

6.3.11.1 Loudspeakers shall not be driven at more than 75% of their maximum specified input rating (peak power handling capacity).

6.3.11.2 Loudspeakers shall be of heavy duty, high performance type, resistant to corrosion and designed for use in adverse tunnel environments.

6.3.11.3 Loudspeaker output power shall be limited to provide a maximum SPL of 100 dB (A).

6.3.11.4 Line coupling transformers shall be used with the loudspeakers and shall have a minimum of three output matching taps to enable individual speaker output to be adjusted to achieve a uniform level of coverage.

6.3.11.5 In open areas with coverings (Platforms etc.) the loudspeakers shall be dust proof and water proof to IP55 standard. But in open areas where loudspeakers will be exposed to rain, the loudspeaker shall be dust proof and water proof to IP 65 standard.

6.3.11.6 Loudspeakers shall operate on a 100 volts line.

6.3.11.7 Loudspeakers shall have a minimum frequency response for 100 Hz to 7,000 Hz within ± 3 dB.

6.3.11.8 The loudspeakers and the loudspeaker cables shall be manufactured from fire retardant , low smoke, zero/ low halogen materials and shall be of the fire survival type to ensure circuit integrity for at least 3 hours during fire.

6.3.11.9 The tenderer shall give complete specification of the offered loudspeakers including impedance, nominal power output, peak power handling capacity, sensitivity, polar diagram for various frequencies and SPL characteristics.

6.3.11.10 The Contractor shall co-ordinate with Civil Works Project Contractors for the design of loudspeakers taking into account the effect of the station architectural design that will affect the choice, colour, layout and mounting of loudspeakers.

6.3.12 PAS Management System

6.3.12.1 PAS Management System provided at OCC CER/CSS as part of JP/JS15 contract shall be required to manage all stations. This NMS should not be available for access in other than CSS/CER. All configuration, commissioning

and integration of NMS with station equipment shall be done by JP/JS15B contractor.

6.3.12.2 The mass storage device shall be provided with a storage capacity for at least 4 weeks of alarm data, system configuration data, alarm history, event logging data and recording of all live announcement per clause 5.6.5 above. It shall be possible to copy and store such data and the live announcements on media like CD s for future retrieval.

6.3.12.3 Appropriate software shall be pre-loaded onto the notebook computers of JMRC to access full management facilities through the local maintenance port.

6.3.13 Power Supply System

6.3.13.1 All equipment of the PAS shall work from 230 Volts \pm 20% AC Single phase power supply and connected to a UPS. Refer to clause 3.4.2 of this chapter.

6.3.14 Cables

6.3.14.1 All cabling and wiring inclusive of loudspeaker supply circuit cabling shall use fire resistant cables to achieve the optimum fire performance level.

6.3.14.2 All control and audio cables shall be twisted pair overall screened cables.

6.3.14.3 The Contractor shall provide all cables in accordance with the cable specifications detailed in Appendix D Chapter 5 of this PS.

6.4 System Expansion

6.4.1 Software databases working in an off-line or on-line mode of operation shall be designed to allow for ease of expansion. Where new database structures are implemented with fixed sizes then at least 25% spare capacity of each entry type and attribute shall be provided.

6.4.2 The exact databases for which this expansion requirement will apply shall be subject to review by the Employer's representative. In general the use of commercially available, proven and mature database is preferred.

6.4.3 Station equipment shall be modularly expandable without the need to replace the installed hardware and software for the service life of the PAS. Minimum expansion capacity of 20% by the addition of cards and /or modules shall be included.

6.4.4 Not used.

7 INTERFACES

7.1 General

7.1.1 The JP/JS15B Contractor shall interface with the other Project Contractors as per interface table in PS Chapter 5 minimum and ensure the interfacing requirements are complied with the requirements of the PAS system.

7.1.2 All circuit interfaces between PAS system and FOTS network shall be provided at the main distribution frame, digital distribution frame, as appropriate, depending on the type of circuit connections.

7.1.3 The PAS system Contractor (JP/JS15B) shall determine the appropriate type of circuits for interface connections and ensure the interfacing circuits are of sufficient quantity and bandwidth to meet the requirements described in this Chapter.

7.1.4 As far as possible, all telecommunication contractors shall adopt existing interface among their systems and equipment and not seek any modification to systems provided in Phase 1A contracts. Detailed Interface Documents have already been developed for these interfaces during Phase 1A shall be used as base line document.

7.2 Interface with Master Clock System

7.2.1 The PAS system shall receive time data messages from the Master Clock system at each PAS control equipment location for time synchronization.

7.3 Interfaces with PIDS/Train Control and Signalling System (TC&S)

7.3.1 It is expected that the Signalling and Train Control and PAS/PIDS/MCK contractors for Phase-IB shall adopt the existing interfaces among their systems and not seek any modifications to the equipment, sub-system and systems supplied by the existing Phase-IA. Further, the PAS shall interface with the PIDS to enable co-ordinated visual information displays to be activated to the required PIDS display board, combination of display boards or all display boards within the station via a common PIDS/PAS MMI.

7.3.2 The PIDS shall interface with the PAS to enable co-ordinated voice announcements to be activated to the required PAS zone, group of zones or all zones within the station.

7.3.3 PIDS/PAS shall interface with TC&S system for automatic display of train related information including train arrivals/departures on pre-

designated display boards as detailed in Appendix A Chapter-5 of this PS.

7.4 Interface with Fibre Optics Transmission System (FOTS)

- 7.4.1 Audio and data interfaces confirming to TCP/IP of the FOTS shall be provided for remote access by OCC to include remote voice broadcast, recording and data transmission facilities. JP/JS15B shall interface with FOTS Contractor (JP/JS11B) and jointly with him develop the required Channels and submit for review by the Employer's Representative as detailed in Appendix A Chapter-5 of this PS.

Main earth bus bar terminated on a copper strip shall be provided in the TER at all locations by E&M contractor. This strip shall be utilized by the JP/JS15B contractor to extend their individual earths to their cables, equipments/racks, including PAS, PIDS and Clock equipments in the TER/CERs.

7.5 Interface with Civil Works Project Contractors

- 7.5.1 JP/JS15B Contractor shall co-ordinate with Civil Works Project Contractors to ensure that all requirements of the specifications pertaining to interfaces between PAS and the Civil Works Project Contractors are properly satisfied as per Appendix-A Chapter-5 of this PS

7.6 Interface with Power Supply UPS System- Distribution Cubical

- 7.6.1 230 Volts AC supply distribution cubicle in each TER/CER of station/OCC/Depot shall be provided by the JP/JS14B Contractor for use of all other Telecom Sub-system in that location. JP/JS14B Contractor shall design and construct the AC distribution board along with all protection devices keeping in view the AC power supply requirements of all other Telecom Contractor. All further cabling from the Distribution Cubical of JP/JS14B shall be done by the respective Telecom contractor as per their requirement. JP/JS15B Contractor shall co-ordinate and interface with the JP/JS14B contractor for load requirement for their system.

7.7 Interfaces with Radio System and Telephone System

PAS announcement shall be capable of being originated from designated hand portable radios also to a set of pre-defined PAS zones at each station. This needs to be coordinated and demonstrated with Radio System and JP/JS12B (Telephone Contractor). All

interfacing equipment shall be co-ordinated between JP/JS15B & JP/JS12B Contractors.

7.8 Interface with Centralized Digital Recording System

All PAS live audio broadcasts relating to emergency, fire and evacuation messages from OCCs shall be recorded in the Centralized digital recording system at OCC. JP/JS15B shall interface with CDRS System to finalize type of no. of channels and type of interface, responsible to provide CDRS in OCC for additional stations.

JP/JS15B

TELECOMMUNICATIONS SYSTEM

CHAPTER 3

PASSENGER INFORMATION DISPLAY SYSTEM

TABLE OF CONTENTS

1. INTRODUCTION.....	3
1.1 GENERAL.....	3
1.2 OVERVIEW OF PASSENGER INFORMATION DISPLAY SYSTEM.....	3
2. NOT USED	4
3. SCOPE OF THE WORKS	5
3.1 GENERAL.....	5
3.2 SCOPE OF SUPPLY FOR PASSENGER INFORMATION DISPLAY SYSTEM.....	5
3.3 SCOPE OF SERVICES	5
3.4 WORK EXCLUDED FROM THIS CONTRACT	6
4. PERFORMANCE REQUIREMENTS.....	7
4.1 GENERAL.....	7
4.2 RELIABILITY REQUIREMENTS	7
4.3 AVAILABILITY REQUIREMENTS	7
4.4 MAINTAINABILITY REQUIREMENTS.....	8
4.5 SYSTEM SAFETY REQUIREMENTS.....	8
5. FUNCTIONAL REQUIREMENTS	9
5.1 GENERAL.....	9
5.2 OPERATION	9
5.3 MESSAGE INITIATION	10
5.4 MESSAGE CONSTRUCTION	11
5.5 MESSAGE PRIORITIES.....	14
5.6 MESSAGE LOGGING FACILITIES.....	15
5.7 PIDS DISPLAY BOARDS (LED TYPE AND LCD TYPE).....	16
5.8 MAN MACHINE INTERFACE (MMI)	19
5.9 PIDS MANAGEMENT SYSTEM	25
5.10 FAULT DIAGNOSTICS.....	26
6 DESIGN/APPLICATION ENGINEERING REQUIREMENTS	28
6.1 GENERAL.....	28
6.2 TECHNICAL SYSTEM PERFORMANCE	28
6.3 EQUIPMENT SPECIFICATION	29
6.4 SYSTEM EXPANSION.....	34
7 INTERFACES.....	36

1. INTRODUCTION

1.1 General

- 1.1.1 This Chapter 3 of this Particular Specification specifies the particular technical and performance requirements of the Passenger Information Display system.
- 1.1.2 The design of PIDS system for Phase 1B shall be same as finalized for Phase 1A under JP/JS-15 contract. The TER of OCC and of existing stations of phase 1A, if required, shall be upgraded and be able to achieve same functionality and performance on these two stations as per the approved design on Phase 1A.
- 1.2.3 The Phase 1B consist of approx 2.35 km from Chandpole to Badi Chaupar section. There are 2 underground stations on this extension.

1.2 Overview of Passenger Information Display System

- 1.2.1 The Passenger Information Display system (PIDS) shall be the primary means of visual communications with passengers at station concourses and platforms for the notification of scheduled train arrivals and departures and for operational, normal and emergency including evacuation message displays to passengers.
- 1.2.2 The PIDS shall have control equipment located at the equipment room (s) of each station and the Operations Control Centre (OCC)(already provided as part of JP/JS15 Contract).
- 1.2.3 The station PIDS control equipment shall be interfaced to the Fibre Optic Transmission System (FOTS) for connections to the equipment located in the Central Equipment Room (CER) of the OCC and to facilitate system control from the OCC.
- 1.2.4 The PIDS shall be accessed from the following locations as a minimum:
- (1) From the Station Control Room (SCR) to the PIDS at the station; and
 - (2) From the OCC to the PIDS at one station
 - (3) From the OCC to a group of stations
 - (4) From the OCC to all stations of a line.
- 1.2.5 The PIDS and Public Address system (PAS) shall be co-ordinated automatically to provide real time passenger audio broadcast and visual information on designated platform at each station and in concourse at each station. The PIDS and PAS shall respond to special train running interrupt messages from the Train Control and Signalling System. PIDS operator shall be able to display special or emergency

messages for passengers and staff on individual or all display boards. It shall be possible to suitably select multiple windows in the LCD panels in concourse/platforms to simultaneously display train related information / special or emergency messages and commercial advertisement clips with video & audio. For specifications of PAS refer to Chapter 2 of this particular specification.

1.2.6 Three major types of messages shall be provided by the PIDS as a minimum:

- (1) Fixed;
- (2) Pre-formatted with data to be added; and
- (3) Instantly constructed.

1.2.7 All PIDS display boards shall present a full message in Hindi and English characters and graphics. All messages shall be displayed simultaneously in Hindi and English characters and/or scrolling/blinking from one language to another language as selected by the PIDS operator.

2. NOT USED

3. SCOPE OF THE WORKS

3.1 General

In addition to the requirements on the scope of works as identified in section 3 Chapter 1 of this Particular Specification, specific requirements on the scope of works for the PIDS shall be as specified herein:

3.2 Scope of Supply for Passenger Information Display System

3.2.1 The Passenger Information Display system (PIDS) shall include, but not be limited to, the following:

- (1) PIDS control equipment;
- (2) LCD (TFT Active Matrix) monitors complete with mounting fixtures/accessories for platforms and concourse PIDS displays of under ground station;
- (3) MMI Workstation integrated with the PAS MMI;
- (4) All software required for the operation of the PIDS including compact disk containing software's both application & operating systems Data communication equipment;
- (5) Distribution frames;
- (6) Equipment cabinets, racks and cubicles;
- (7) Equipment housing, mounting brackets and installation materials; and
- (8) All equipment power supplies, cables, connectors, accessories, cabling and earthing necessary for the Works.
- (9) All fixtures/supports, both primary and secondary, for installing the PIDS Boards LCD .
- (10) All surface conducting/channeling.
- (11) Any other item for completing the scope of JP/JS15B Contract.

3.3 Scope of Services

3.3.1 The requirements on the scope of services are given in Chapter 1 of this PS. In addition, the Contractor shall co-ordinate with Project Contractors as defined in Section 7 of this chapter of the PS and provide comments or recommendations on subject of station building materials, finishes, architectural layouts and installation

requirements for Display Boards and associated cabling on platforms and concourses at stations.

3.3.2 NOT USED

3.3.3 In addition, the contractor shall co-ordinate with Civil Works Project Contractors and provides comments or recommendations on subjects of station building materials; finishes and architectural layouts. JP/JS15B Contractor shall propose, to the Employer's Representative for review, the site location of each of the PIDS boards on platforms and in the concourses such that maximum visibility requirements per contract are achieved.

3.3.4 The contractor shall configure, update, commission and integrate all OCC equipment provided as part of JP/JS15 contract to the equipment at new stations for extension of all services provided in JMRTS phase 1-A. In addition, the JP/JS15B contractor shall undertake any addition, modification, alteration to the existing system configuration of phase 1-A system at all required levels to complete the scope of works at no additional cost to the employer.

3.3.5 Providing necessary support and documents for getting necessary approvals from Indian authorities viz Railway Board/ RDSO, and Commissioner of Railway Safety.

3.3.6 Any other service needed to provide a complete PAS/PIDS system.

3.4 Works excluded from this Contract

3.4.1 Not Used.

3.4.2 230 Volts AC supply distribution cubicle in each TER/CER of station/OCC/Depot shall be provided by the JP/JS14B Contractor for use of all other Telecom Sub-system in that location. JP/JS14B Contractor shall design and construct the AC distribution board along with all protection devices keeping in view the AC power supply requirements of all other Telecom Contractor. All further cabling from the Distribution Cubical of JP/JS14B shall be done by the respective Telecom contractor as per their requirement. JP/JS15B Contractor shall co-ordinate and interface with the JP/JS14B contractor for load requirement for their system.

4. PERFORMANCE REQUIREMENTS

4.1 General

In addition to the overall system performance requirements as identified in section 4 of Chapter 1 General of this Particular Specification, the specific performance requirements for the PIDS shall be as specified herein:

4.2 Reliability Requirements

4.2.1 The inability to perform any required function, the occurrence of unexpected action or the degradation of performance below the specifications shall all be considered as a failure.

4.2.2 MTBF shall be the average operating time accumulated by the total population of identical items between failures.

4.2.3 The Contractor shall ensure that PIDS equipment supplied under the Contract comply with the reliability figures herein:

PIDS Equipment	MTBF (Hours)
Control equipment	> 50,000
Display equipment/ Display boards	> 35,000
PIDS/PAS MMI on common Workstation	> 50,000
Serial Converters	>100,000
Routers	> 200,000
Hubs	> 200,000

Table 4-1 MTBF Figures

4.3 Availability Requirements

4.3.1 In determining the Availability of the PIDS, reliability block diagrams using field failure rates for commercially available equipment shall be produced. Any equipment without field failure data shall have its failure rate determined analytically strictly in accordance with MIL-HBK-217F for its appropriate operating environment.

4.3.2 PIDS visual messages initiated by any mode of operation shall be considered unavailable under the following failure conditions as a minimum:

- (1) Failure of integrated MMI at OCC;
- (2) Failure of integrated MMI for PAS and PIDS at each control position at stations;
- (3) Failure of co-ordinated message capabilities with the PAS at any location;

- (4) Unable to display messages as initiated by the Train Control and Signalling (TC&S) System at any location;
- (5) Failure of more than one PIDS display board at any location.
- (6) Non-readable from specified viewing distance/angle.

4.3.3 The PIDS shall have an overall system Availability of better than 99.96%.

4.3.4 The PIDS management system shall be considered unavailable if any function provided by the PIDS management system cannot be properly executed. The Availability of the PIDS management system shall be better than 99.95%.

4.4 Maintainability Requirements

4.4.1 The Mean Time To Restore (MTTR) of the PIDS to full normal operation following a failure shall be less than 4 hours (excluding time of Travel).

4.5 System Safety Requirements

4.5.1 All equipment must comply with and be installed in accordance with IEC 65, IEC 364.

4.5.2 All metal enclosures shall be provided with an earthing terminal and earthing of all equipment shall be carried out in accordance with overall earthing policy. Please refer to Appendix M chapter 5 of this PS.

5. FUNCTIONAL REQUIREMENTS

5.1 General

5.1.1 The PIDS shall display passenger information in any combination of Hindi text, English text, numerals, animated graphics, punctuation and symbols. Each page of display shall be complete in meaning which shall be easily interpreted by passengers.

5.1.2 The PIDS MMI shall have the necessary facilities to direct manually triggered different messages to individual side of the display board, both sides of the display board, or group of display boards simultaneously within a station.

5.1.3 The PIDS shall send different messages, other than initiated by the TC&S system, in either one of the following user programmable orders:

- (1) Display of the first message in different languages followed by the second message in the same order of languages and so on; and
- (2) Display of a set of messages in one language followed by the same set of messages in another language and so on.
- (3) For LCD displays full flexibility of display of messages in different languages shall be provided.

5.1.4 All PIDS equipment's internal clock shall be synchronized to the Master Clock system. The station PIDS equipment shall be synchronized with the Station Sub-Master Clock system. The details of the Master Clock system are given in Chapter 4 of this Particular Specification.

5.1.5 The existing Boards in Phase-IA stations of JMRTS shall be referred for typical LCD type board layouts in Underground Stations and detailed layouts shall be submitted to Employer's Representative for review. For any further information JP/JS15B Tenderer may visit the site JMRTS Ph-IA.

5.2 Operation

5.2.1 The PIDS shall support the following modes of operation as a minimum:

- (1) Time mode as initiated by the PIDS internal system clock via a Time table & message scheduler provided as part of the MMI facilities;
- (2) Automatic mode based on information from the TC&S System for train related information displays;
- (3) Manual mode as initiated by a PIDS operator on the MMI at OCC & SCR.

5.3 Message Initiation

5.3.1 Message Initiated from the SCR

5.3.1.1 The SCR MMI shall have the necessary facilities to initiate any fixed or instantly constructed messages, and add in any additional information required to complete the pre-formatted messages.

5.3.1.2 The SCR MMI shall have the selection facilities to direct the message to one side of a display board, both sides of a display board, group of display boards or all display boards within a station. In the case of under ground stations provided with LCD displays additional facilities for display of any messages/video clips shall be possible and submitted to Employer's Representative for review. The operator shall be required to confirm this selection before the message is transmitted.

5.3.1.3 The SCR MMI shall have the instant message construction facilities to store "ad-hoc" messages for repetitive displays.

5.3.2 Messages Initiated from the OCC

5.3.2.1 The OCC shall be provided with the necessary facilities to access PIDS Board at every station.

5.3.2.2 Data communication links shall be provided to each station allowing the OCC to convey messages to the following as a minimum:

- (1) One station;
- (2) A group of stations;
- (3) All stations;
- (4) One or more display boards at one station; and
- (5) Any combination of display boards in any combination of stations.

5.3.2.2.1. **Any upgradation in Central system shall not disturb or hamper the existing functionality / facilities of Phase 1A at stations, depot & OCC**

5.3.3 Messages Initiated from the TC&S System

5.3.3.1 Data will be sent to the PIDS by the TC&S System to display train related information including train arrivals and departures on pre-designated display boards throughout the platforms and concourse of all stations.

5.3.3.2 Train arrival/departure related PIDS message shall be initiated and co-ordinated with the PAS, based on the information received from the TC&S System. The PIDS shall ensure, within the PIDS System., the data integrity of the train information received from the TC&S System,

5.3.3.3 The PIDS shall carry out time count down based on the estimated time data sent by the TC&S System and the current PIDS internal system clock. PIDS shall accordingly

display the estimated train arrival and/or departure particulars. JP/JS15B contractor will configure the PAS/PIDS server at OCC and co-ordinate/interface with the relevant TC&S Contractor for addition of new stations. The Platform Display Board shall, display, countdown timer based on the real-time, expected time of arrival of the Train on the Platform and once the train is fully received on the platform the Display Board shall then display expected time of departure of the train. On the Concourse Display Boards, the expected time of departure of the next three trains shall be displayed in absolute terms of time of the day. Also the concourse display board shall stop showing the train which is about to leave within the next 1 minute to avoid people rushing over the stairs/escalators to the platforms. This parameter shall be configurable by the system administrator, from 0 to 1 minute.

- 5.3.3.4 The estimated time to arrive and/or depart of the train(s) as shown on any display board shall be updated automatically and shall be corrected if necessary following a data update from the TC&S System.
- 5.3.3.5 The pre-defined message displays shall be triggered by the data to be sent by the TC&S system including message displays of non-stopping trains passing through the stations and user defined message displays. All messages to be triggered by the TC&S System shall be designed for automatic display without human intervention. However, the PIDS operator shall have the necessary facilities to override the automatic display and to blank the current display.
- 5.3.3.6 Upon receiving train information from the TC&S System at the OCC, the PIDS shall display the train information to the designated display boards in real-time.
- 5.3.3.7 The TC&S equipment at each station shall invoke the station PIDS control equipment to clear the designated row of the train arrival/departure information on the corresponding PIDS display boards subsequent to a train departure subject to provisions of clause 5.3.3.3 regarding displays at concourse.
- 5.3.3.8 The TC&S system shall give the information for the Four/Six coach train arrival/departure. Upon receiving such information from the TC&S system, it shall be the responsibility of JP/JS15B to display the same on the PIDS and to make coordinated announcement on PAS system at station.

5.4 Message Construction

5.4.1 Fixed and Pre-Formatted Messages

- 5.4.1.1 The fixed and pre-formatted messages shall be produced by the Contractor with message scripts to be issued by the Employer's representative earlier than the commencement date of Installation Tests. Samples of the produced messages along

with suggested animated graphics shall be submitted for review by the Employer's representative before full production of the messages.

5.4.1.2 Special and emergency messages shall be fixed, pre-formatted or instantly constructed messages depending on the message nature. Typical examples of these messages shall include the following:

- (1) Fixed message - "Smoking is prohibited in the entire station";
- (2) Pre-formatted message - "This station is";
- (3) Special messages - "Due to failure, the arrival of trains shall be delayed";
and
- (4) Emergency messages - "Owing to an accident, please leave the station as soon as possible".

5.4.1.3 Messages shall be constructed and stored in Hindi and English characters, along with the associated animated graphics, symbols and punctuation. Every message shall be displayed in one language or any combination of these languages.

5.4.1.4 The pre-formatted messages at each station shall be identical, providing fields for name, time or other variables to be added.

5.4.1.5 Messages shall be selected from a screen look-up table. Message additions required for pre-formatted messages shall be typed in directly from the key-board or "click and dragged" from another look-up table of commonly used characters, words and phrases.

5.4.1.6 Fixed or pre-formatted messages initiated from the OCC shall be issued in message codes to respective station PIDS control equipment.

5.4.1.7 Pre-formatted messages may have more than one variable to be added with one containing fixed characters and the other containing variable information. These messages shall be used repeatedly by inserting different variables.

5.4.2 Instantly Constructed Messages

5.4.2.1 The PIDS shall enable the OCC and SCR MMI operators to instantly construct messages and store them to the local message database of the PIDS control equipment. These messages can then be retrieved for display or be deleted if they are no longer required by the operators.

5.4.2.2 The instantly constructed messages shall be displayed either one-off or repeatedly similar to the pre-stored messages.

5.4.2.3 Emergency messages relating to fire, evacuation etc. shall be fixed, pre-formatted or instantly constructed and manually triggered by a MMI operator.

5.4.3 Message Edition

5.4.3.1 User-friendly message editing facilities shall be provided to define messages which consist of characters, symbols, punctuation and graphics.

5.4.3.2 Editing facilities shall be provided for both Hindi and English characters.

5.4.3.3 General editing functions including cut, paste and copy as employed in commonly used word processor software shall be provided.

5.4.3.4 Global selection capabilities shall be provided for pre-defined, commonly used words, phrases and messages for all stations.

5.4.3.5 Global selection capabilities of pre-defined presentation styles shall be provided for standard displays. This shall enable the operator, as a minimum, provide blinking or highlighted characters, change scrolling and animation effects.

5.4.3.6 Preview functions of the editing messages shall be provided for different display boards via the "What You See Is What You Get (WYSIWYG)" facilities of the MMI.

5.4.3.7 The graphical editing facilities shall enable the operator to create/modify animated graphics which will consist of graphical symbols, drawings/pictures and Hindi/English characters.

5.4.3.8 Drawing capabilities shall be provided to produce different shapes for each object within the same graphical frame.

5.4.3.9 Necessary facilities shall be provided to create new characters, symbols and graphics that can be stored in bit map or equivalent format. The new characters shall then be assigned with a code and stored for future retrieval.

5.4.3.10 The PIDS shall be provided with adequate facilities for the edition and creation of Hindi messages which shall be reviewed by the Employer's Representative:

5.4.4 Message Characteristics

5.4.4.1 All messages under preview via the "WYSIWYG" facilities of the MMI shall have the same font type, display speed and display effect as will be shown on the display board.

5.4.4.2 Messages shall have a number of characteristics assigned to them depending on the message type. The message characteristics shall include display speed, display

effect, associated animated graphics and the message display intervals as defined by the message scheduler of the MMI facilities.

5.4.5 Scrolling Messages

5.4.5.1 Messages shall be scrolling horizontally from right to left or vertically from lower to upper for any type of display boards. This choice shall be made by the Operator from the MMI. Also it shall be possible to have a combination of fixed static message on one row and scrolling/flashing message on another row of the same PIDS Board. These functions shall be operator selectable from the Station MMI.

5.4.5.2 For platform display boards, at the conclusion of the previous message, the display line shall momentarily blank before the scrolling message emerges.

5.4.5.3 The message to be scrolled for a number of cycles shall be programmable by the operator.

5.4.6 Flashing Messages

5.4.6.1 Important messages shall be selected to have a flashing effect to draw attention to the importance of the message being displayed. This choice shall be made by the Operator from the MMI.

5.4.6.2 The default flashing period shall be 1 second "on", 0.5 second "off". This duration shall be user re-programmable within practical limits by the PIDS management system.

5.5 Message Priorities

5.5.1 Message displays shall be prioritized. Before any message is displayed, the PIDS shall check internally that no other message of higher priority is about to be or being sent. If a conflict is detected, the highest priority message or a sequence of messages shall be displayed first.

PIDS message priorities shall be programmable from the PIDS management Workstation. PIDS shall offer the following levels of priority as a minimum, in a descending order.

1	Instantly constructed / pre-stored messages relating to emergencies like fire, evacuation, abnormal working etc. from the SCR.
2	Instantly constructed / pre-stored messages relating to emergencies like fire, evacuation, abnormal working etc. from the OCC
3	Train arrival/departure related messages Actuated automatically by Train Control & Signalling system

4-9	Pre-stored / instantly constructed messages regarding routine system information.
10	Maintenance and test messages
11- 13	Spares

Table 5-1 Message Priorities

5.5.2 Any higher priority level message, when initiated, shall interrupt any lower priority message currently displayed. All such interrupted messages shall be removed from the message queues so that they will not restart or continue after they have been interrupted.

5.5.3 Lower priority message shall not interrupt any higher priority message in progress. The lower priority message shall only be initiated by the automatic / manual modes of operation defined for the PIDS in accordance with its respective priority level only at the end of a message display cycle as indicated by the removal of the busy indication.

5.5.4 Equal priority level messages shall be dealt with on a “first-come-first-served” basis.

5.6 Message Logging Facilities

5.6.1 General

5.6.1.1 All messages with priority level 1 and level 2 manually triggered by a MMI operator shall be automatically time tagged and logged.

5.6.1.2 Message logs shall consist of MMI operator identification, message coding, message origin, message destination, message type, message content and destination time and date sent.

5.6.1.3 Message logs at each station and the OCC shall be stored locally in the corresponding message database of the PIDS control equipment. Message data base with sufficient storage capacity for storage of atleast 200 local message logs over a period of 1 week shall be provided. The access to these messages shall be to the MMI operators with appropriate password authority.

5.6.1.4 Message logs from the local message data base of the PIDS control equipment shall be downloaded automatically to the message database of the existing central PIDS control equipment at OCC for central archiving during the daily non-traffic hours period.

5.6.1.5 Verification and validation processes shall be provided to ensure successful download of message logs to the existing central PIDS control equipment. Local message logs shall not be deleted by the system until the downloading is confirmed.

5.6.2 Central Archiving Facilities

5.6.2.1 JP/JS15B contractor shall make necessary upgrades along with required configuration/commissioning to extend all existing Central Archiving facilities to new stations.

5.7 PIDS Display Boards (LCD type)

5.7.1 General

5.7.1.1 PIDS display boards shall be provided at the following locations as a minimum:

- (1) Concourses at all stations;
- (2) Platforms at all stations;

5.7.1.2 All PIDS display boards shall be capable of ceiling or pillar or wall mounting, as per site conditions.

5.7.1.3 All PIDS display boards shall be either single-sided or double-sided depending upon the place of use. The final position of all display boards shall be subject to review by the Employers representative.

5.7.1.4 The display format and display sequence for each row of messages to be displayed on the display boards shall be individually defined and selected and programmed by the MMI operator.

5.7.1.5 The Contractor shall co-ordinate with Civil works project Contractors to finalize the location and installation details of the display boards for optimal viewing distance/ angle. The final position of the display boards shall be subject to review by the Employer's Representative.

5.7.2 Font Sizes and Number of Characters

5.7.2.1 The Contractor shall provide Hindi and English fonts as provided in Ph-IA.stations of JMRTS. For any further information JP/JS15B Tenderer may visit the site JMRTS Ph-IA.

5.7.2.2 The Contractor shall propose to the Employer's Representative, the dimensions of characters, housing dimensions, etc for approval.

5.7.2.3 Not used.

5.7.2.4 For LCD displays, the requirement of Hindi and English characters, their font size, colour etc shall be as provided in Ph-IA of JMRTS. For any further information

JP/JS15B Tenderer may visit the site JMRTS Ph-IA. The details shall be submitted to the Employer's Representative for review.

5.7.3 Display Capabilities

- 5.7.3.1 The Concourse single sided wall mounted display boards shall have a minimum of three rows to display information in Hindi and English in a scrolling / alternative mode for three trains. The display boards shall display pending trains departure message including associated platform number. LCD display Boards shall display information of three trains in Hindi and English simultaneous / scrolling / alternate mode. Details shall be submitted to Employer's Representative for review.
- 5.7.3.2 The platform double sided display boards shall have a minimum of two rows to display train arrival information in Hindi and English simultaneously for next one train. LCD displays shall be located either individually facing appropriately in one direction or two displays placed back to back for optimum viewing requirements. The final arrangements shall be developed as part of Final detailed design for under ground stations.
- 5.7.3.3 The PIDS shall enable each display board to display up to six message screens per minute. The number of message screens to be displayed per minute shall however be user programmable.
- 5.7.3.4 The display board shall display a combination of text messages in Hindi and English characters, symbols, punctuation, graphics with or without animation. Each animated graphics file shall contain information for displaying a full graphics animation sequence or image designed for the display board.
- 5.7.3.5 The display board shall be capable of producing special display effects including scrolling up/down/left/right, fade-in/fade-out, wipe up/down/left/right, pop, character by character and blinking.
- 5.7.3.6 Each display board (or in the Station PIDS server) shall be capable of storing at least 100 pre-defined messages, 20 schedules, and 10 sets of animated graphics files which shall be called up to be displayed as a default message when enabled via the local station PIDS control equipment.
- 5.7.3.7 For all double-sided display boards, each side shall display same or different messages or scripts, as required, and operated independently from the other side.
- 5.7.3.8 Each side of the display board shall have a default message assigned. The default message shall be displayed, if enabled by the MMI operator, when no other information is assigned to the display board. All default messages shall be configurable from the MMI by an operator of appropriate authority.

5.7.4 Display Board Positioning

- 5.7.4.1 All display boards shall be located to minimize interference to passenger flows and other station signage while providing optimum viewing distance.
- 5.7.4.2 Display boards suspended above open floor space shall be mounted so that the lowest part of a display board is at least 2.5 meters above floor level. In case it is not possible to meet these criteria because of site constraints, specific approval of the Employer's Representative shall be required.
- 5.7.4.3 Wall mounted display boards, which protrude more than 0.2 meter from the wall surface shall meet the criteria for suspended display boards. In case it is not possible to meet these criteria because of site constraints, specific approval of the Employer's Representative shall be required.

5.7.5 Concourse Display Boards

- 5.7.5.1 When pending train departure messages are to be displayed on concourse 3 line single sided display boards, the train destinations, time of departure from the terminal station and the associated platform number for the next three trains shall be displayed in English and Hindi. Length of the display boards shall be limited to a maximum of 2.5 meters.
- 5.7.5.2 Not Used.
- 5.7.5.3 Corresponding train departure message on the display board shall be removed on imminent departure of that train to avoid passengers rushing to the platform. In this connection refer to clause 5.3.3.3 above.
- 5.7.5.4 Two numbers of single sided display Boards (LCD) shall be provided for concourse at each station.

5.7.6 Platform Display Boards

- 5.7.6.1 Platform display boards shall predominantly display information on train arrivals for the corresponding platform. Relevant service and passenger information shall also be displayed if required on the destination station field.
- 5.7.6.2 Four numbers of LCD displays shall be provided at each platform of under ground stations. These display boards shall be positioned for optimal viewing coverage. Length of the display boards shall be limited to a maximum of 2.5 meters.
- 5.7.6.3 Platform display boards shall show the estimated time of arrival of the next train by a countdown counter. Train information shall be displayed with the Hindi characters and English characters simultaneously. (The display shall be coordinated with PA

announcement for the expected train arrival announcement also) This display sequence format for the train information shall be continuously displayed unless a message with higher priority is assigned, including an emergency message.

5.7.6.4 Information of all non-stopping trains, including non-stopping EMU, and maintenance vehicles, will be shown on platform display boards The PIDS shall, however, co-ordinate with the PAS to ensure that appropriate audio announcements are made to alert passengers of these non-stopping trains.

5.7.6.5 Stopping train not in passenger service shall be displayed as "NOT IN SERVICE" in place of destination for all the train information display messages at all stations.

5.7.6.6 Train terminating at any intermediate station shall be described as "TERMINATES HERE" in place of destination for all the train information display messages at the intermediate terminal station.

5.8 Man Machine Interface (MMI)

5.8.1 General

5.8.1.1 MMI(s) shall be provided in each SCR. Refer to MMI provision schedule in Appendix H Chapter 5 of this PS. Each PIDS MMI shall be integrated with the PAS MMI to provide the operator with all the PIDS display information and associated system features in order to operate and control the PIDS.

5.8.1.2 Both PAS MMI and PIDS MMI shall be implemented on a common Workstation and should have the same look and feel. MMI at Station Control Room/ should be either an Integrated PC cum Monitor Unit to reduce space requirement and accidental failure or equipment can be kept in TER/CER and all signals extended to SCR (Monitor, Mouse, Keyboard etc.). The Contractor shall refer to Chapter 2 of this Particular Specification for the PAS MMI facilities.

5.8.1.3 Integrated MMI Workstation(s) shall be provided for the station Operator in each SCR. JP/JS15B Contractor shall make necessary arrangements to integrate the MMI provided in OCC as part of JP/JS15 Contract.

5.8.1.4 No more than five manual actions (i.e. keystroke or mouse-click) shall be required to select and transmit a fixed or pre-formatted or instantly constructed message on the MMI.

5.8.1.5 The MMI shall be provided with the overall graphical user interface with a graphical display of the station layout, clearly demarcating the Platform Area, Concourse Area, different PA Zones, etc, with icons representing PIDS display boards and the necessary system software for the PIDS.

- 5.8.1.6 Designated PIDS commands and display message data inputs based on information received from TC&S shall be automatically co-ordinated with the PAS messages if the messages are determined and selected to be concurrently broadcast and displayed.
- 5.8.1.7 Display board busy indications shall be shown on the MMI when a PIDS operator attempts to initiate a lower priority message while a higher priority message is being made to the selected display board(s). These busy indications shall include the identification of station or stations from where the local messages are being made.
- 5.8.1.8 When a message has been interrupted a “message interrupted” advice shall be displayed on the MMI which originates the lower priority messages.
- 5.8.1.9 The MMI shall have the necessary facilities to send out the message(s) once or periodically at a constant interval to the selected display boards. The periodic interval shall be operator selectable in minutes, hourly, daily, weekly or monthly basis.
- 5.8.1.10 The MMI shall have the necessary facilities to select fixed, pre-formatted and instantly constructed messages using message codes together with the time and other filler information required.
- 5.8.1.11 The MMI shall have the real-time “WYSIWYG” facilities to view the information assigned to a selected display board by clicking at a graphical station layout screen or by keyboard input of the identity number of the display board.
- 5.8.1.12 The MMI shall have the necessary selection checks for all types of data entry and selection confirmation before message transmission.
- 5.8.1.13 Limits shall be applied automatically to the length of a message as the message is created and if the message is too long, a warning message shall be provided on the MMI plus selection options for scrolling or truncation.
- 5.8.1.14 The MMI at OCC shall have the selection facilities for sending a message to a station, a group of stations or all stations.
- 5.8.1.15 The MMI shall have the selection facilities for sending a message to one side or both sides of a display board, a group of display boards or all display boards within a station.
- 5.8.1.16 The MMI shall have the selection facilities for displaying the message continuously, at pre-programmed intervals or intervals selected by the PIDS operator.

- 5.8.1.17 The MMI shall have the selection facilities for blanking one side or both sides of a single display board, or a group of display boards or all display boards to avoid confusion to passengers.
- 5.8.1.18 The MMI shall have the necessary facilities to activate the pre-defined message schedules.
- 5.8.1.19 The MMI shall have a reset command for the PIDS operator to stop the message display. When the message display is reset, the current messages shall be cancelled and then the pre-set routine display schedule shall be resumed.
- 5.8.1.20 The MMI shall have additional reset facilities to reset one side or both sides of a single display board or a group of display boards or all display boards within a station. When a display board or a group of display boards is reset, the current messages shall be cancelled and then the pre-set routine display schedule shall be resumed.
- 5.8.1.21 The SCR MMI shall have the necessary facilities to monitor OCC initiated messages to the station. The SCR operator shall be able to select which PIDS display board within his station to monitor.
- 5.8.1.22 One major and one minor summary alarm, along with an audible tone that can be enabled or disabled by the PIDS operator, shall be available to alert the operator of a PIDS equipment fault on the MMI. Any PIDS display board faults shall be shown on the associated PIDS board icon on the MMI.
- 5.8.1.23 The volume of the audible tone shall be adjustable to alert the PIDS operator within the control centre or control room environment.
- 5.8.1.24 The Contractor shall provide same type of MMI in phase 1B section as developed and approved during phase 1A. MMI shall be provided in each SCR. JP/JS15B Contractor shall make necessary arrangements to integrate these two station requirements in existing MMI provided in OCC /CSS as part of JP/JS15 Contract. JP/JS15B Contractor shall update the existing MMI at OCC/CSS to cater this extension.
- 5.8.1.25 The MMI shall have the necessary facilities to prepare a comprehensive set of listing and displays with user selectable range of parameters. The following shall be included as a minimum:
- (1) Listing of master messages;
 - (2) Listing of words and phrases;
 - (3) Listing of symbols;

- (4) Listing of animated graphics;
- (5) Listing of emergency messages; and
- (6) Listing of system schedules.

5.8.1.26 The following minimum facilities shall be made available to the operator via the MMI working in conjunction with the PAS and PIDS:

- (1) The ability to draw the operator's attention by audible and visual indication for messages which have an associated PAS message and a choice be given to the operator whether to initiate the concurrent PAS and PIDS message;
- (2) The ability to select one side or both sides of a display board, group of display boards or all display boards by menu items or by clicking the display board icons on the MMI;
- (3) The ability to select a particular row of all display boards by menu items or by clicking the display board row icons on the MMI;
- (4) Display board selection shall be arranged via station layout plans showing the locations of display board on different levels and areas of the station;
- (5) Automatic colour changes of the display board icons on the MMI to differentiate busy message displays initiated by SCR and OCC;
- (6) A group selection facility for commonly used combination(s) of display boards shall be provided. A minimum of twenty four group selections shall be available for each MMI;
- (7) Each group shall be pre-programmable to automatically connect, from a single selection action, any combination of display board selections from the SCR MMI and any combination of stations and display boards within the station from the OCC MMI;
- (8) The ability to select fixed and pre-formatted message displays and to construct instant messages;
- (9) None of the fixed or pre-formatted messages shall be erasable by any MMI operator;
- (10) When the selected combination of display boards are available, a "ready-to-proceed" indication shall be given to the operator indicating that information displays can be proceeded;
- (11) The ability to display individual display board alarm on corresponding display board icon;
- (12) The ability to display major and minor summary alarms on the MMI. Major summary alarms shall also be implemented on PA/PIDS NMS.; and

- (13) The facilities to acknowledge alarms and to clear alarms from the alarm display.
- (14) For LCD displays additionally it shall be possible to display train related information and other messages/video clips simultaneously or in any combination etc.

5.8.2 Time Table and Message Scheduler (common for PAS and PIDS)

- 5.8.2.1 The PIDS shall have the necessary facilities to allow at least 500 message schedules to be programmed into the system.
- 5.8.2.2 The Time Table and Message Scheduler shall be available in OCC MMI and also at each station MMI. The MMI shall have the message scheduler facilities to enable the PIDS operator to pre-set an hourly, daily, weekly or monthly schedule for the selected messages.
- 5.8.2.3 Inputting information to the Message Scheduler shall be simple and shall be similar to inputting data in an Excel file or importing data from Excel file, so that a Fixed Train Time Table can be loaded by the Operator and activated to provide relevant data to the Station PIDS/PA system for dissemination in case the Train Information from the ATS is unavailable. Any other complicated inputting of data shall not be acceptable. In the event information from the ATS to PAS/PIDS fails at OCC then the OCC MMI Time Table and Scheduler shall be used to disseminate the time table & messages to all stations. And in case link between OCC MMI and station MMI /server fails, same way station level time table/message scheduler shall be used.
- 5.8.2.4 The MMI shall have the following control parameters for the message scheduler as a minimum:
 - (1) Output selection of station(s);
 - (2) Output selection of display boards;
 - (3) With associated PAS message(s) or not;
 - (4) Display language sequence;
 - (5) Message sequence;
 - (6) Display effect;
 - (7) Display duration;
 - (8) Start and end time for the display;
 - (9) Repeated or one-off pattern; and
 - (10) Repeat interval for hourly, daily, weekly and monthly schedules.

5.8.3 Emergency Message Sending

- 5.8.3.1 The MMI operator shall have the necessary facilities to send emergency messages to all display boards in an expeditious manner including replacing the current display in real-time for all selected display boards, both from the SCR and from the OCC.
- 5.8.3.2 The emergency message sending screen shall be provided with categorized and prioritized sets of pre-defined emergency messages for the MMI operator to choose from. The screen shall have an instantly constructed emergency message editing facilities which shall enable the MMI operator to edit and immediately send out the emergency messages to the selected display boards.
- 5.8.3.3 The Contractor shall submit to the Employer's representative the details of automatic coordination of emergency messages on PIDS and PAS.

5.8.4 Pre-Defined System Information

- 5.8.4.1 Each station or central PIDS control equipment shall contain pre-defined system information of commonly and regularly used information for quicker selection by the MMI operator.
- 5.8.4.2 The pre-defined system information shall be categorized into global information and station specific information.
- 5.8.4.3 The Contractor shall submit to the Employer's Representative the details of predefined system information for review.

5.8.5 Not used

5.8.6 Log-on Control

- 5.8.6.1 The PIDS shall be provided with the necessary facilities to enable each PIDS operator or Controller to execute a log-on sequence before any commands are available on the PIDS MMI.
- 5.8.6.2 The log-on sequence shall, as a minimum, require the PIDS operator to enter both a unique user name and password.
- 5.8.6.3 The PIDS shall enable immediate access to all authorized indications and commands following successful log-on.
- 5.8.6.4 The PIDS log-on control access level granted to a PIDS operator shall define the functions and commands that are authorized and accessible by the operator on the MMI.

- 5.8.6.5 PIDS log-on control access levels for each PIDS operator on any MMI shall be programmable by the PIDS management system and the PIDS shall offer the following levels of log-on as a minimum:

Log-on Levels	Control Functions
7	Operation control functions for OCC
6	Operation control functions for Station
5-1	Spares

Table 5-2 PIDS Log-on Control Access Levels

5.9 PIDS Management System

5.9.1 General

The Contractor shall configure and integrate the PIDS management system provided as part of JP/JS15 Contract for the overall control, supervision, maintenance and configuration of the PIDS system at new stations. It is envisaged that the existing NMS provided in the CSS/CER OCC shall be responsible to manage all the new stations controlled from OCC Theatre. JP/JS15B shall extend all features provided by existing PIDS Management System such as System Management, System Administration Management, Fault and Alarm Management, Performance Management, Fault Printing, Event Logging etc. to new stations. Any modifications/upgrades required to the Central system at OCC shall be the responsibility of JP/JS15B.

5.9.1.1 Not used.

5.9.1.2 Not used.

5.9.1.3 Not used.

5.9.1.4 Not used.

5.9.1.5 Not used

5.9.1.6 The existing central management database shall be configured/updated for defining the changes in system hardware and software configurations. Any changes in the database shall be updated automatically on system disk and mass storage device so that an up-to-date version of the software is available should a system failure or power-down event occur.

- 5.9.1.7 Not used
- 5.9.1.8 Not Used.
- 5.9.2 Not used**
- 5.9.3 Not used**
- 5.9.4 Not used**
- 5.9.5 Not used**
- 5.9.6 Not used**
- 5.9.7 Not used**
- 5.10 Fault Diagnostics**
- 5.10.1 General**
- 5.10.1.1 Fault diagnostics shall be provided for each PIDS control equipment and for each display board.
- 5.10.1.2 All PIDS control equipment and the display board shall be equipped with a local maintenance port for local maintenance access in case the link to the central PIDS management system fails.
- 5.10.1.3 The fault diagnostics system shall detect the alarm conditions.
- 5.10.1.4 The fault diagnostics system shall have the following additional diagnostics features as a minimum:
- (1) Provide testing to individual module and card level;
 - (2) Provide on-line help to maintenance personnel; and provide self-test facilities and built-in diagnostic routines to enable malfunctions to be automatically displayed.
- 5.10.2 Failure Modes**
- 5.10.2.1 When power is restored following a power failure to the PIDS, the PIDS shall perform all necessary self-testing processes and then resume functioning fully in the same configuration as before the shutdown. This shall be completed automatically within 5 minutes of power restoration.
- 5.10.2.2 Not used.

- 5.10.2.3 Failure of both sides of the display board shall not cause failure or loss of communication to other display boards.
- 5.10.2.4 Failure of a MMI shall not prevent any other MMIs from operating and controlling the PIDS.

6 DESIGN/APPLICATION ENGINEERING REQUIREMENTS

6.1 General

6.1.1 In addition to the Design/Application Engineering requirements as identified in Chapter 1 of this Particular Specification, the PIDS shall meet the technical system performance and equipment specification as specified herein.

6.1.2 The PIDS shall be designed with fault tolerant system architecture to prevent common mode failure points. The software shall be designed to accommodate the ultimate, fully expanded capacity, without requiring any change to the hardware or firmware of the installed system and without affecting the overall operation or performance of the PIDS.

6.1.3 The service life of the PIDS shall not be less than 15 years. Service life shall be counted from the commencement date of Defects Liability Period.

6.1.4 The PIDS application software shall be based on a proven operating system subject to the review by the Employer's representative.

6.1.5 The software package shall incorporate commercially available software for graphics and character generation, particularly for the generation of Hindi characters.

6.2 Technical System Performance

6.2.1 Not used

6.2.2 System Response Figures

6.2.2.1 The display of a fault alarm at the PIDS management Workstation and the MMI shall occur in real-time after the fault occurring.

6.2.2.2 The maximum response time from sending a message, after selecting the destination, to the message being shown on the selected display boards shall occur in real-time if the message is initiated locally within the station and occur in real-time if the message is initiated remotely from OCC to the station.

6.2.2.3 On-screen performance management reports generation on the PIDS management Workstation shall occur in real-time.

6.2.3 MMI Response Figures

6.2.3.1 The MMI screen up-date shall occur in real-time, which is measured as the interval of time between the PIDS operator's last action required to call a new tabular display, and the moment the requested display becomes visible. This shall be completed with

all data updating in real-time, and the operator has full operational control of the PIDS functions.

6.2.3.2 The MMI alarm update shall occur in real-time, which is measured as the time taken from detection of the alarm condition by the PIDS control equipment to a display of the alarm being visible on the alarm display and activation of the audible tone.

6.2.3.3 The MMI alarm acknowledgement shall occur in real-time, which is measured as the time taken from the PIDS operator acknowledging an alarm to visible display of the acknowledgement.

6.3 Equipment Specification

6.3.1 PIDS Control Equipment

6.3.1.1 The hardware and software of the PIDS shall use modular design to allow for easy expansion of the system.

6.3.1.2 The PIDS control equipment shall be provided with suitable redundant modules/cards to prevent single point of failure that affects overall system operation at a particular location including the critical components such as common control processor card, so as to meet the RAMS requirements specified.

6.3.1.3 The PIDS control equipment shall include all the necessary computer server equipment capable of meeting all the interface requirement with the PAS, PA/PIDS NMS, Master Clock system, TC&S System and FOTS.

6.3.1.4 The station PIDS clock shall be synchronized with the Sub-Master Clock of the station so that there is no difference between the time being displayed by the station clocks and the PIDS internal clock. The internal system clocks of PIDS shall maintain the current time clock without drifting a single second for a period of at least 1 week whenever the synchronization link with the Master Clock system fails.

6.3.1.5 All configuration data of the equipment shall be stored in non-volatile memory.

6.3.1.6 Each station PIDS rack in TER shall be designed, wired and equipped to the extent necessary to enable two additional digital data inputs and four additional PIDS display board outputs to be fully accommodated at each station. These Boards shall be configurable both as Platform Display Boards and Concourse Display Boards.

6.3.1.7 The PIDS control equipment shall select and route various inputs to any combination of outputs to one side or both sides of the designated display board, combination of display boards or all display boards according to the control command from the integrated PIDS/PAS MMI.

- 6.3.1.8 Data validation and data integrity checks shall be done for all input and output ports to ensure correct information is transmitted and received.
- 6.3.1.9 The central PIDS control equipment shall hold the fixed and pre-formatted message format for each station, with specific variables for the insertion of, for example, destination names, arrival/departure time and platform number.
- 6.3.1.10 A compact disc unit or other alternative device subject to review by the Employer's representative shall be provided to add to or extend the graphics software which shall be capable of being downloaded locally or centrally.
- 6.3.1.11 The message database equipment shall be of proven database technology with sufficient storage capacity to store fixed, pre-formatted and instantly constructed messages.
- 6.3.1.12 Storage capacity shall be provided to store the local and central message logs for all the instantaneous messages manually triggered by the PIDS operators.
- 6.3.1.13 The message database equipment shall be provided with the following hard disk or other fast access memory capacities for uncompressed messages for each PIDS control equipment as a minimum:
- (1) 250 fixed messages for Hindi and 250 fixed messages for English;
 - (2) 250 pre-formatted messages for Hindi and 250 pre-formatted messages for English;
 - (3) 50 instantly constructed messages for Hindi and 50 instantly constructed messages for English;
 - (4) 100 graphics and symbols;
 - (5) All Hindi characters;
 - (6) All standard ASCII characters and punctuation.
- 6.3.1.1.4 Each message shall contain an average of 40 English and 40 Hindi characters including spaces, punctuation and symbols. Symbols shall be mixed with texts in messages.
- 6.3.1.1.5 The PIDS control equipment and each individual display board at station shall be equipped with built-in test routines that are capable of testing each hardware module. These routines shall selectively operate in an off-line mode to enable a complete functional test of the module in question.
- 6.3.1.1.6 Built-in test routines shall be initiated by the following means as a minimum:

- (1) Local maintenance commands via a notebook computer connected to the local maintenance port;
- (2) Remote maintenance commands via the central PIDS management Workstation;
- (3) Automatically as a result of the on-line error detection; and
- (4) Automatically as part of the power-up initialization processes.

6.3.2 Workstations

- 6.3.2.1 Each Workstation shall consist of all equipment necessary to provide the specified display and command functions for a PIDS/PAS operator.
- 6.3.2.2 A common Workstation for PIDS and PAS shall be used. MMI at Station Control Room/ should be either an Integrated PC cum Monitor Unit to reduce space requirement and accidental failure or equipment can be kept in TER/CER and all signals extended to SCR (Monitor, Mouse, Keyboard etc.) Refer to Chapter 2 of the Particular Specification for requirements of the Workstation for PAS.
- 6.3.2.3 The MMI shall be a window 7 or higher based or COTS operating System based environment using a mouse as the pointing device.
- 6.3.2.4 Multiple windows shall be opened concurrently. Each Workstation shall as a minimum be equipped with one keyboard, one pointing device, headphone, microphone and loudspeaker.
- 6.3.2.5 All functionality accessible via the pointing device shall be available through the keyboard via configurable function (hot) keys and/or via keyboard macros.
- 6.3.2.6 All Workstation displays shall support high-resolution (1280x1024) colour graphics, and shall be a minimum 17" TFT screen for the desktop for stations MMI.
- 6.3.2.7 The GUI shall be a WIMP (Windows, Icon, Menus, Pointing) style interface that allows operators to have easy control and fast response. The GUI shall employ a combination of graphic presentations and pull down menus.
- 6.3.2.8 The Contractor shall detail for Employer's Representative's review the functionality and presentation of the system to meet all the requirements specified in this specification.
- 6.3.2.9 All functionality accessible via the point device shall also be available through the keyboard via configurable (hot) keys and /or via keyboard macros.
- 6.3.2.10 Not Used.

6.3.3 Display Equipment

6.3.3.1 General

- 6.3.3.1.1 The Contractor shall review different display board requirements and determine the final standard size for each type of display board to ensure that the overall performance requirements of the PIDS can be met.
- 6.3.3.1.2 The individual display board shall have graphics display capabilities. The software programs for these graphic animations shall be contained in the PIDS control equipment.
- 6.3.3.1.3 The display board shall be blanked whenever no valid signal is received from the local PIDS control equipment and if the default display message is not activated. If the default display message is activated then the default message in the PIDS Boards memory or in the PIDS station server shall be displayed.
- 6.3.3.1.4 The LCD and other processor modules for the display board shall be the plug-in type to facilitate easy module replacement.
- 6.3.3.1.5 Not used.
- 6.3.3.1.6 LCD (TFT active matrix) type display Board shall meet the following minimum specifications:
- (1) Viewable picture size 40" minimum
 - (2) Viewing Angle 120° (horizontal & vertical) minimum
 - (3) Brightness 500cd/m² or better
 - (4) Contrast 1000 ; 1 or better
 - (5) Resolution 1366 x 768 or better
 - (6) Unaffected by severe problem of burn in when static picture or text continues for long
 - (7) Software will allow defining objects with their attributes (back ground colour, the type, size and colour of fonts etc).
 - (8) LCD to be protected by 3 mm polycarbonate optically correct overlay without affecting quality of picture
 - (9) Each LCD panel shall have an inbuilt 12 watts output loud speaker for colour video clips with audio.
 - (10) LCD flat panels shall offer highly bright, crisp, high resolution images for easy viewing in all ambient lighting conditions for the underground stations / subways.
 - (11) LCD Panels shall operate satisfactorily even in environmental external temperature up to 50° Celsius.
 - (12) Video input for playing video streams / audio streams shall be plugged into the PIDS equipment in the station TER and/or Central Servers at OCC. Hence video/audio input port shall be available in the PIDS equipment for feeding standard video/audio format.
- 6.3.3.1.7 The Tenderer shall furnish full specifications of the offered LCD panels
- 6.3.3.2 **Display Quality**
- 6.3.3.2.1 The visibility of each Display shall be at least 45 m.

6.3.3.2.2 The display board shall display moving text/graphics smoothly at the programmable scrolling rate. No “break-up”, “line pulling” and “line jittering” shall occur to the displays on the display board.

6.3.3.2.3 Each display board shall be equipped with light sensors to adjust the brightness to a level comfortable for passengers according to the ambient light intensity in different environments.

6.3.3.2.4 The Contractor may propose an architecturally bending sunshade or sunshield to reduce the incident sunlight but this shall not reduce the viewing angle and viewing distance.

6.3.3.3 Display Board Housing

6.3.3.3.1 The internal components of the display board shall be arranged in a compact manner to minimize the thickness of the housing.

6.3.3.3.2 The Contractor shall submit detailed design information of the display board housing and mounting brackets for review by the Employer’s representative

6.3.3.3.3 The visual impact of display boards and the proposed housing and mounting designs shall take into account ergonomic considerations and overall harmonization with station architectural design. The Contractor shall co-ordinate with Civil Works Project Contractors to finalize the locations, visual impact, housing and mounting design and colour selection for the display boards.

6.3.3.3.4 All display board housings shall be lockable but easily accessible for maintenance.

6.3.3.3.5 All the display board equipment faces shall be provided with shatterproof, anti-reflective glazing and scratch resistant coating.

6.3.3.3.6 Indoor display boards shall be suitable for operating in an indoor environment with or without air-conditioning. Indoor housing shall be designed to IP54 compliant.

6.3.3.3.7 Not used.

6.3.3.3.8 There shall be no gap between the edge of the housing and the LCD circuitry so that no internal hardware or wiring is exposed to the public.

6.3.3.3.9 No sharp corner in the housing design shall be provided and if the housing has corners, the corners shall be at an external radius of 35mm in front and rear elevations.

6.3.3.3.10 The design of the ceiling or pillar or wall mounting brackets shall facilitate easy replacement of the whole display board.

6.3.3.4 Concourse Display Boards

6.3.3.4.1 Each concourse display board shall be single sided and sized to display at least 3 rows of Hindi / English characters to display information for next three trains in Hindi and English in a scrolling / alternative mode.

6.3.3.4.2 The viewing distance for the concourse display boards shall be at least 45 meters for both Hindi and English characters when displaying in the biggest font size characters.

6.3.3.5 Platform Display Boards

6.3.3.5.1 Each platform display board shall be sized to display 1 row of Hindi and 1 row of English characters to display information on next train in Hindi and English simultaneously.

6.3.3.5.2 The viewing distance for the platform display boards for each side shall be at least 45 meters for both Hindi and English characters when displaying in the biggest font size characters.

6.3.4 Not used

6.3.5 Cables

6.3.5.1 PIDS display boards shall be connected by either serial or LAN connections or through Optical Fibre Cable to the station PIDS control equipment. All cables shall be as per the Cable specifications detailed in the Appendix D chapter 5 of this PS for Cables.

6.4 System Expansion

6.4.1 Not used.

6.4.2 Not used.

6.4.3 Station equipment shall be modularly expandable without the need to replace the installed hardware and software for the service life of the PIDS. The following spare capacity requirements shall be included as a minimum:

- (1) An expansion capacity of 20% by the addition of cards and/or modules; and
- (2) An expansion capacity of 50% by the addition of racks or cabinets.

6.4.4 These spare capacity requirements shall apply to the following resources as a minimum:

- (1) Primary memory, consisting of all memory used for real-time processing and storage of data;
- (2) Disk storage, typically consisting of fixed disk equipment, but also covering the use of interchangeable magnetic media including disk cartridges and tapes;
- (3) Communication links, standard network, serial and parallel ports, port-to-port connection and peripheral equipment including printers and modems; and
- (4) I/O capacity including spare ports, bit rate capacity and channel capacity.

7 INTERFACES

7.1 General

- 7.1.1 The JP/JS15B Contractor shall interface with the other Project Contractors as per interface table in PS Chapter 5 minimum and ensure the interfacing requirements are complied with the requirements of the PIDS system.
- 7.1.2 All circuit interfaces between PIDS system and FOTS network shall be provided at the main distribution frame, digital distribution frame or optical distribution frame, as appropriate, depending on the type of circuit connections.
- 7.1.3 The PIDS system Contractor (JP/JS15B) shall determine the appropriate type of circuits for interface connections and ensure the interfacing circuits are of sufficient quantity and bandwidth to meet the requirements described in this Chapter.
- 7.1.4 As far as possible, all telecommunication contractors shall adopt existing interface among their systems and equipment and not seek any modification to systems provided in Phase 1A contracts. Detailed Interface Documents have already been developed for these interfaces during Phase 1A shall be used as base line document.

7.2 Interface with Master Clock System

- 7.2.1 The PIDS system shall receive time data messages from the Master Clock system at each PIDS control equipment location for time synchronization.

7.3 Interface with Train Control and Signalling System (TC&S)

- 7.3.1 It is expected that the Signalling and Train Control and PAS/PIDS/MCK contractors for Phase-I B shall adopt the existing interfaces among their systems and not seek any modifications to the equipment, sub-system and systems supplied by the existing Phase-I A. The PIDS shall interface with the TC&S system for automatic display of train related information including train arrivals/departures on pre-designated display panels as detailed in the interface specification listed in Appendix-A Chapter-5 of this PS. JP/JS15B Contractor shall interface with TC&S System to update the existing Central Servers at OCC for integration of new stations in order to extend all PIDS-TC&S interface requirements.
- 7.3.2 The TC&S system shall give the information for the Four/Six coach train arrival/departure. Upon receiving such information from the TC&S system, it shall be the responsibility of JP/JS15B to display the same on the PIDS and to make coordinated announcement on PAS system at station. The JP/JS15B contractor shall interface with the TC&S contractor for such information.

7.4 Interface with PAS

- 7.4.1 The PAS shall interface with the PIDS to enable co-ordinated visual information displays to be activated to the required PIDS display board, combination of display boards or all display boards within the station via the integrated PIDS/PAS MMI.

- 7.4.2 The PIDS shall interface with the PAS to enable co-ordinated voice announcements to be activated to the required PAS zone, group of zones or all zones within the station.

7.5 Interface with FOTS

- 7.5.1 Data interfaces conforming to TCP/IP of the FOTS shall be provided for remote access by OCC to include remote control and display of PIDS messages from OCC to stations. JP/JS15B shall interface with FOTS Contractor (JP/JS11B) and jointly with him develop the required Channels and submit for review by the Employer's Representative as detailed in Appendix A Chapter-5 of this PS.

Main earth bus bar terminated on a copper strip shall be provided in the TER at all locations by E&M contractor. This strip shall be utilized by the JP/JS15B contractor to extend their individual earths to their cables, equipments/racks, including PAS, PIDS and Clock equipments in the TER/CERs.

7.6 Interface with Civil Works Project Contractors

- 7.6.1 JP/JS15B Contractor shall co-ordinate with Civil Works Project Contractors to ensure that all requirements of the specifications pertaining to interfaces between PIDS and the Civil Works Project Contractors are properly satisfied as per Appendix-A Chapter-5 of this PS

7.7 Interface with Power Supply UPS System- Distribution Cubical

- 7.7.1 230 Volts AC supply distribution cubicle in each TER/CER of station/OCC/Depot shall be provided by the JP/JS14B Contractor for use of all other Telecom Sub-system in that location. JP/JS14B Contractor shall design and construct the AC distribution board along with all protection devices keeping in view the AC power supply requirements of all other Telecom Contractor. All further cabling from the Distribution Cubical of JP/JS14B shall be done by the respective Telecom contractor as per their requirement. JP/JS15B Contractor shall co-ordinate and interface with the JP/JS14B contractor for load requirement for their system.

7.8 Not used

JP/JS15B

TELECOMMUNICATIONS SYSTEM

CHAPTER 4

CLOCK SYSTEM

TABLE OF CONTENTS

1.	INTRODUCTION	3
2.	NOT USED	4
3.	SCOPE OF THE WORKS	5
4.	PERFORMANCE REQUIREMENTS.....	6
5	FUNCTIONAL REQUIREMENTS	8
6.	DESIGN REQUIREMENTS.....	10
7	INTERFACES.....	12

1. INTRODUCTION

1.1 General

- 1.1.1 This Chapter 4 specifies the particular technical and performance requirements of the Master Clock system of the Telecommunications System.
- 1.1.2 This Chapter shall be read in conjunction with other Chapters of the particular specification, General Specification (GS), General Conditions of Contract (GCC), Special Conditions of Contract (SCC), Instructions to Bidders (ITB) and other documents forming part of the contract.
- 1.1.3. The design of Master Clock system for Phase 1B shall be same as finalized for Phase 1A under JP/JS-15 contract. The TER of OCC and of existing stations of phase 1A, if required, shall be upgraded and be able to achieve same functionality and performance on these two stations as per the approved design on Phase 1A.
- 1.1.4. The Phase 1B consists of approx 2.35 km from Chandpole to Badi Chaupar section. There are 2 underground stations on this extension.

1.2 Overview of Clock System

- 1.2.1 The Master Clock System to be provided under JP/JS15B Contract shall consist of the following major components:
- (1) Sub-master clocks at each of the stations
 - (2) Slave clocks, both digital and analogue at all stations
 - (3) All power and signal cables, surge protection devices etc
 - (4) Both primary and secondary fixtures for installation;
- 1.2.2 The Master Clock system provided at OCC as part of JP/JS15 contract shall provide synchronization signal to all sub master clock units at stations and also provide synchronization signal and Date/Time to new systems (Radio system, telephone system, PAS/PIDS, CCTV, Automatic Fare Collection system, SCADAs, TC&S etc) at OCC/stations. JP/JS15B contractor shall configure master clock at OCC and integrate sub-master clocks to the master clock at OCC for provision of synchronization to sub-master clocks and to any new systems at OCC.

2. NOT USED

3. SCOPE OF THE WORKS

3.1 General

In addition to the requirements on the scope of the Works as identified in Section- 3 of Chapter 1 General of this Particular Specification, the specific requirements on the scope of the Works for the Clock System shall be as specified below.

3.2 Scope of Supply for Clock System

3.2.1 The scope of supply shall include, but not be limited to, the following:

- (1) Sub master clocks;
- (2) Slave clocks;
- (3) Clock signal and power supply cables, earthing and accessories including termination protection devices;
- (4) Both Primary and secondary Fixtures for installation;
- (5) Floor Mounted Rack (which can be common with PA/PIDS rack)
- (6) All installation, testing & commissioning, including the material therein.
- (7) Any other item required to complete the scope of the work.

3.3 Scope of Services

3.3.1 The requirements on the scope of services are given in Chapter 1 of this PS.

The Master Clock system provided at OCC as part of earlier JP/JS15 contract shall provide synchronization signal to all sub master clock units at stations and also provide synchronization signal and Date/Time to new systems (Radio system, telephone system, PAS/PIDS, CCTV, Automatic Fare Collection system, SCADAs, TC&S etc) at OCC/stations. The design of the Mater Clock system at stations will be similar to the design adopted in stations of JMRTS phase 1-A.

For clock facilities for stations please refer to Clause 1.2.1 above.

3.3.2 In addition, the contractor shall co-ordinate with Civil Works Project Contractors and provides comments or recommendations on subjects of station building materials; finishes and architectural layouts.

3.3.3 The contractor shall configure, update, commission and integrate all OCC equipment provided as part of JP/JS15 contract to the equipment at new stations for extension of all services provided in JMRTS phase 1-A. In addition, the JP/JS15B contractor shall undertake any addition, modification, alteration to the existing system configuration of phase 1-A system at all required levels to complete the scope of works at no additional cost to the employer.

- 3.3.4 Providing necessary support and documents for getting necessary approvals from Indian authorities viz Railway Board/ RDSO, and Commissioner of Railway Safety.
- 3.3.5 Any other service needed to provide a complete PAS/PIDS system.
- 3.4 Not Used
- 3.4.1 Not Used

4. PERFORMANCE REQUIREMENTS

4.1 General

4.1.1 The technical system performance requirements for the Clock System are specified in this Particular Specification.

4.1.2 Fault tolerant design with protections against failure shall be provided in order to achieve the system availability.

4.2 Reliability

4.2.1 The inability to perform any required function, the occurrence of unexpected action or the degradation of performance below the specifications shall be considered as a failure.

4.2.2 MTBF shall be the average operating time accumulated by the total population of identical items between failures.

4.2.3 The equipment shall comply with the reliability figures herein:

Equipment	MTBF (Hours)
Sub-master Clock	> 50,000 Hours

Table 0-1 MTBF Figures

4.3 Availability

4.3.1 The Clock system shall be considered unavailable if the clock signal is not available at any station/ depot (after the Sub-Master) or the accuracy of the clock signal is below the specification. The availability of the clock system shall be better than 99.99%.

4.4 Maintainability Requirements

4.4.1 The Mean Time to Restore (MTTR) of the master clock system shall be less than four hours excluding time of Travel. The service life of the clock system shall not be less than 15 years.

5 FUNCTIONAL REQUIREMENTS

5.1 Not used

5.2 The Master Clock System for JP/JS15B contract shall include, but not be limited to, the following:

- (1) Clock distribution system shall distribute the GPS synchronised master clock to sub-master clocks. In the absence of valid master clock signal, the sub-master clocks shall operate in free running mode with an internal clock supplying the time signals. On restoration of the master clock signal the sub-master clocks shall validate the signal. After the successful validation, the sub-master clocks shall self-correct, if necessary.
- (3) Sub-master clocks, synchronised to the master clock, at stations shall provide clock sources to the slave clocks of stations/depot.
- (4) Sub-master clock shall supply timing signals to the voice and video recording equipment, the train control & signalling system, PIDS, PAS, Radio, Telephone system, CCTV System, power supply computer (SCADA), other SCADA systems, the AFC central computer and other necessary equipment.

5.3 Alarm and status monitoring of the Master Clock system shall be connected to the existing NMS of PAS/PIDS in OCC. Any upgradation in Central system shall not disturb or hamper the existing functionality / facilities of Phase 1A at stations, depot & OCC buildings.

5.4 The local Jaipur time shall be derived from the UTC data from GPS by offsetting as required.

5.5 The Sub-Master Clock system shall provide appropriate clock output interfaces for master clock and timing and reference distribution. The type and quantities of the clock output interfaces shall be determined by the interfaces requirements of the subsystems (PAS, PIDS, Radio, CCTV, CDRS, Telephone System etc) and relevant interfacing project contractors (Traction, Fare Collection, Train Control and Signalling etc.). Suitable interfaces (such as RS422 or RS232 or LAN connections) for clock output interfaces shall be supported.

5.6 Clock output interfaces of Suitable standards (such as RS422 or RS232 or LAN) in form of suitable outlets (such as RJ-45) shall be provided within station concourse and platforms at locations where the station clocks are mounted.. The Sub-Master Clock at stations shall also provide reference clock for PIDS Clock Display.

5.7 Not used.

5.8 Not Used.

5.9 Not Used.

5.10 Not Used.

6. DESIGN REQUIREMENTS

6.1 General

6.1.1 In addition to the Design Engineering requirements given in Chapter 1 of this Particular Specification, the Contractor shall submit the following information to the Employer's representative for review:

- (1) Details of Clock distribution system to accommodate requirements in OCC for all stations.
- (2) Details of the synchronisation plan for the sub master clocks with master clock system and sub master clocks with slave clocks.
- (3) Details of the cabling arrangement within the station and the surge protection methodology.

6.2 Technical System Performance

6.2.1 The overall Clock system accuracy shall be better than +/- 0.0 1 second per 24 hours.

6.3 Equipment Design

6.3.1 General

6.3.1.1 The equipment design of shall be with plug-in units

6.3.1.2 A summary alarm indication shall be provided at the top of each rack or the equipment itself, to indicate the summary alarm status of the equipment within the rack.

6.3.1.3 The Sub-master clock equipment shall preferably be rack mounted type and with front panel control.

6.3.1.4 In the event of failure of the slave clock control system, on reconnection the sub-master clocks shall automatically re-adjust the slave clocks on re-connection.

6.3.1.5 The clock system shall not interfere with other communication circuits.

6.3.1.6 The master clock system shall work from 230V AC UPS with an internal backup of at least 4 hours.

6.3.1.7 The front panel of Sub-master clock equipment shall provide status display and time display. The indications on the front panel shall include the Master clock signals, the status of the output and alarms indication

6.3.1.8 The design of the slave clocks shall be of high quality and blend into the architecture of the area in which they are located. All slave clocks shall be programmable both for 12 hours and 24 hours. Clocks shall be provided as follows:

- (1) One wall mounted digital clock in each SCR, supervisor's office's, equipment and plant rooms at stations/depot. The character height of the display shall not be less than 55 mm.

- (2) One single faced, out door type, digital clock each at head end and tail end of each platform suitably positioned for the use of the train driver. Where ever CCTV monitors or Driver Mirror for monitoring of train doors are installed, these clocks shall be aesthetically co-located with the CCTV monitors/Mirror. These clocks shall be visible from the driver's cab in emergency lighting conditions and in bright sun light. The character height of the display shall not be less than 170 mm.
- (3) one 60 centimetre diameter double faced suspended analogue clock at each entrance gate to the passenger areas to be visible in all lighting conditions;
- (4) One 60 cm diameter double faced suspended analogue clock in centre of each platform at each station.
- (5) The numbers of clocks are to be worked as per the above requirement. However the minimum number shall be:
 - 60 cm dia Analog clock double faced : 4 Nos. per Station
 - Digital Room clocks (Indoor) : 10 Nos. per Station
(Character height > 55 mm) :
 - Digital Outdoor Clocks : 2 Nos. per Platform
(Character height > 170 mm)

6.3.1.9 The sub-master and slave clocks (digital) shall have internal backup of atleast 4 hours.

6.4 System Expansion

Not used.

7. INTERFACES

7.1 General

- 7.1.1 The JP/JS15B Contractor shall interface with the other Project Contractors as per interface table in PS Chapter 5 minimum and ensure the interfacing requirements are complied with the requirements of the Master Clock system.
- 7.1.2. As far as possible, all telecommunication contractors shall adopt existing interface among their systems and equipment and not seek any modification to systems provided in Phase 1A contracts. Detailed Interface Documents have already been developed for these interfaces during Phase 1A shall be used as base line document.

7.2 Fibre Optic Transmission System (FOTS) and Other System Contractors

- 7.2.1 Data channels as required shall be provided by the FOTS Contractor (JP/JS11B). JP/JS15B shall interface with JP/JS11B and jointly with him develop the required channels and submit for review by Employer's representative.
- 7.2.2 The Master Clock system shall provide appropriate clock output interfaces for master clock and timing and reference distribution. The type and quantities of the clock output interfaces shall be determined by the interfaces requirements of the subsystems (PAS, PIDS, Radio, CCTV, CDRS, Telephone System etc) and relevant interfacing project contractors (Traction, Fare collection, TC & S etc.). The JP/JS15B Contractor shall interface with JP/JS14B and other relevant interfacing Contractors for master clock timing and reference signal. Suitable interfaces (such as RS 422 or RS232 or LAN connections) for clock output interfaces shall be supported.
- 7.2.3 All circuit interfaces between the Master Clock system and all telecommunication subsystems (FOTS, PAS, PIDS, Radio, CCTV, CDRS, Telephone System etc), Traction, Fare control and train control & signalling Subsystems etc shall be provided at the main distribution frame, digital distribution frame or optical distribution frame, as appropriate, at stations & OCC depending on the type of the circuit. JP/JS15B contractor shall be the responsible to provide suitable clock output interface at stations/OCC to any Telecommunication, Traction, Fare control and train control & signalling Subsystems etc as per requirement. This will include provision of any switching equipment at stations/OCC by JP/JS15B.
- 7.2.4 The JP/JS15B Contractor shall determine and provide the appropriate type of circuits for interfacing and ensure the interfacing circuits are of sufficient quantity and bandwidth for proper operation of the Subsystems.
- ### **7.3 Civil Works Project Contractors**
- 7.3.1 JP/JS15B Contractor shall co-ordinate with Civil Works Project Contractors to ensure that all requirements of the specifications pertaining to interfaces are properly satisfied as per Appendix-A Chapter-5 of this PS.

7.4 Power Supply UPS System- Distribution Cubical

- 7.4.1 230 Volts AC supply distribution cubicle in each TER/CER of station/OCC/Depot shall be provided by the JP/JS14B Contractor for use of all other Telecom Sub-system in that location. JP/JS14B Contractor shall design and construct the AC distribution board along with all protection devices keeping in view the AC power supply requirements of all other Telecom Contractor. All further cabling from the Distribution Cubical of JP/JS14B shall be done by the respective Telecom contractor as per their requirement. JP/JS15B Contractor shall co-ordinate and interface with the JP/JS14B contractor for load requirement for their system.

7.5 Not Used

**DESIGN, MANUFACTURE, SUPPLY, INSTALLATION, TESTING AND
COMMISSIONING
OF
PUBLIC ADDRESS SYSTEM,
PASSENGER INFORMATION DISPLAY SYSTEM,
AND
MASTER CLOCK SYSTEM**

JP/JS15B

PARTICULAR SPECIFICATIONS

CHAPTER 5

APPENDICES

TELECOMMUNICATION SYSTEMS

This chapter covers the Appendices of Particular Specifications of JP/JS15B Contract.

1. **Appendix A: INTERFACE RESPONSIBILITIES**
The JP/JS15B Contractor's responsibilities for specification and provision of the requirements for Design and Works which interface with designated Project Contractors are given.
2. **Appendix B: KEY & ACCESS DATES**
The schedule of Key Dates to be met by the JP/JS15B Contractor and Access Dates to be used in planning the Works are laid out.
3. **Appendix C: SECTIONS**
Describes the names of stations.
4. **APPENDIX D: CABLE SPECIFICATIONS**
The Cable Specifications to be followed for JP/JS15B Contract. These specifications will not be applicable on equipment specific cabling/wiring.
5. **Appendix E: CONTRACT SPARES**
The list of minimum Contract Spares to be supplied under JP/JS15 Contract
6. **Appendix H: MMI PROVISION SCHEDULE**
Requirements of MMIs for all Telecommunication systems are given in Appendix H
7. **APPENDIX M: EARTHING POLICY AND TRANSIENT PROTECTION**
Describes the policy for Earthing and Transient Protection for Telecommunication Systems.
8. **Appendix N: BASE FRAME, FALSE FLOOR AND UNDER FALSE FLOOR CABLE TRAYS WITH REQUIRED RISERS FOR WALL MOUNTED UNITS IN TER.**
Describes the scope of work for Design, Supply and Installation of Base Frame, False Floor & under False Floor Cable Trays with required risers for wall mounted units for all Telecom Systems in TER of JMRTS Station along with TER taken over from Civil / E&M.
9. **APPENDIX O: SPECIFICATIONS OF CONDUITS AND ACCESSORIES FOR TELECOMMUNICATION SYSTEMS.**
10. **APPENDIX P: Provision of AMC for PIDS/PAS/MCK**

APPENDIX A**INTERFACES WITH DESIGNATED OTHER CONTRACTORS**

A1	INTERFACE BETWEEN JP/JS15B AND DESIGNATED STATION / TUNNEL / DESIGN CONSULTANTS (CIVIL AND E&M) & DESIGNATED STATION / TUNNEL / CONSTRUCTION CONTRACTORS (CIVIL AND E&M).
A2	NOT USED
A3	JP/JS15B AND DESIGNATED 3 PHASE 415V AC POWER SUPPLY CONTRACTOR(S) (JP/JS14B) INTERFACE
A4	JP/JS15B to TRACTION SUPPLY/SCADA/NP-SCADA/BMS INTERFACES
A5	INTERFACE BETWEEN JP/JS15B (DESIGNATED PAS/PIDS/MCLK SYSTEM CONTRACTOR) AND JP/JS11B (FOTS CONTRACTOR).
A6	INTERFACE BETWEEN JP/JS15B (DESIGNATED PAS/PIDS/MCLK SYSTEM CONTRACTOR) AND JP/JS12B (TELEPHONE CONTRACTOR)
A7	INTERFACE BETWEEN JP/JS14 CONTRACTOR (RADIO/CCTV/UPS) AND DESIGNATED PUBLIC ADDRESS/PASSENGER INFORMATION DISPLAY/MASTER CLOCK SYSTEMS CONTRACTORS (JP/JS15).
A8	INTERFACE BETWEEN JP/JS15B (DESIGNATED PAS/PIDS/MCLK SYSTEM CONTRACTOR) AND TC & S SIGNALLING CONTRACTOR (JP/JS02B)
A9	INTERFACE MANAGEMENT DOCUMENT FOR CIVIL & OTHER SYSTEM CONTRACTORS OF UNDERGROUND SECTION

APPENDIX A1

INTERFACE BETWEEN JP/JS15B AND DESIGNATED STATION / TUNNEL / DESIGN CONSULTANTS (CIVIL AND E & M) & DESIGNATED STATION / TUNNEL / CONSTRUCTION CONTRACTORS (CIVIL AND E & M).

1. Definitions and Introduction

- 1.1. This specification describes the interface requirements between Contract JP/JS15B and Designated Design Consultants (Civil and E&M)/Designated Construction Contractor (Civil and E&M) for Underground and Tunnel .
- 1.2. In this Specification, unless otherwise stated, the term “Contracts” refers to all the relevant Contracts and the term “Contractors” refers to all the relevant Contractors. The individual Contractors are referred to by the corresponding Contract number.
- 1.3. This document shall be read in conjunction with the relevant paragraphs of the General Specification. The Contractors shall ensure all requirements of the General Specification and Particular Specification pertaining to the contracts are fully resolved and implemented.
- 1.4. In the event of a conflict between the Particular Specification and this specification, the requirements of the Particular Specification shall prevail.
- 1.5. This specification outlines the Contractors' interfacing requirements which are based on the Technical Studies carried out during the early stages of the Project. However, the requirements herein specified are by no means exhaustive and it remains the Contractors' responsibilities to further develop, update and execute jointly Interface Management details during the design and the execution of Works, to ensure that all interfacing issues between the Contracts are satisfactorily resolved.

2.0 **Scope of Work:** Scope of work is mentioned in the table given below:

<u>Scope of work</u>				
1	UNDERGROUND SECTION			
		Design	Construction/ Execution Contractor	Inputs to be given by and co-ordination with construction/ execution contractor
A	TUNNEL REQUIREMENTS			
	1. Provision of space on outer edge of tunnel wall for installation of stand -Offs for laying of LCX cables for GSM/CDMA/TETRA.	DDC/Architect	N.A.	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B) and GSM/CDMA Operator
	2. Cross over pipes are required for laying of TETRA/GSM/CDMA cables from undercroft to the outer edge of tunnel wall in station Box area for each tunnel as per Telecom requirements.	DDC/Architect	Civil	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B) and GSM/CDMA

				Operator
	3. Brackets/hangers are to be provided on tunnel inner edge for laying of optical fibre cable and emergency telephone cables as per telecom requirements.	DDC/Architect	E & M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	4. Cable tray connectivity is to be provided from Telecom brackets in tunnel to telecom cable trays in nearest S&T shaft.	DDC/Architect	E & M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	5. Provision of space in tunnels is to be done for GSM/CDMA Repeaters as per GSM/CDMA operators requirements (preferably be provided in cross passage).	DDC/Architect	N.A.	Concerned GSM/CDMA Operator
	6. Provision of UPS Power supply is to be done for these GSM/CDMA Repeaters in tunnel as per load requirements by the operator.	DDC/Architect	E & M	Concerned GSM/CDMA Operator
	7. Provision of space for emergency telephone at cross passages to be done as per telecom requirements.	DDC/Architect	N.A.	JP/JS12B
	8. Provision of main earth (<2ohm) strips at cross passages for emergency telephones.	DDC/Architect	Traction	JP/JS12B
	9. Provision of Temporary power to be provided for installation of emergency telephone and stand OFFs for LCX cable of GSM/CDMA/TETRA system.	N.A.	Civil, On payment basis by System Contractor	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	10. There should not be any kind of infringement with telecom installations in tunnel and station box area with other systems.	DDC/Architect	N.A.	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
B	STATION AREA REQUIREMENTS			
	1. Provision of architectural finishes, acoustic treatment and building materials of the entire station.	DDC/Architect	Civil, as per CSD	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15)
	2. Space and Provision for Telecom Cables / Cable Trays crossing is to be provided from concourse level to platform level and platform level to under croft level. Access provision for future maintenance should be kept.	DDC/Architect	Civil, as per CSD	E&M and Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	3. Tray Connectivity for Telecom data and power Cables is required to connect Data / Power trays provided in concourse, platform and undercroft level. No electrical tray closer than 300mm should be there.	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	4. Data and Power cable trays are to be provided from TER to Concourse, Platform Undercroft areas, All Station Entrance/Exits, Technical Rooms, Ancillary Buildings, DG Room, Pump Room etc. as per Telecom requirements.	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	5. DATA / POWER Cable tray risers / droppers (for trays provided by E&M) to be provided in TER, TOM, EFO, Security Room etc.	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	6. For Telecom System Equipment (clock,	DDC/Architect	Concerne	Concerned Telecom

	speaker, PID, telephone, CCTV etc.), conduits with junction / termination / gang box are to be provided as per system requirements in technical / non technical rooms and also in station areas. These conduits are to be extended from nearest S&T Data / Power trays up to location of the telecom equipments to be installed. Separate conduit for Data and Power cable to be extended.		d Telecom System contractor (s) (JP/JS11B to JP/JS15B)	System contractor(s) (JP/JS11B to JP/JS15B)
	7. For stations with radio base equipments, cable tray connectivity for two different locations (with route diversity) from TER to open sky at ground level to be provided for installation of GPS antennas as per Telecom requirements.	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	8. For all stations, cable tray connectivity for from GSM/CDMA room to open sky at ground level to be provided for installation of GPS antennas as per GSM/CDMA system requirements.	DDC/Architect	E&M	Concerned GSM/CDMA operator.
	9. Telecom Data and Power trays to be marked with distinct color codes to avoid any ambiguity between telecom and other services trays.	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	10. Minimum distance of 2 mts (horizontal) to be maintained between OHE and telecom equipment at Platform level and height of lowest part of Display board/ Clock should be at least 2.5 mts above finished floor level.	DDC/Architect	Concerned Telecom System contractor (s) (JP/JS11B to JP/JS15B)	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	11. Data and power tray should have separation of at least 150mm between them at any place and if crossing is required there should be provision of a bridge to cross the cable tray.	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	12. Cable tray junctions and T points should not have sharp bends and edges to avoid cable damage. The bending radius of minimum 1.5m shall be provided.	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	13. Cable trays are to be provided for GSM/CDMA from GSM/CDMA Room to concourse/platform/undercroft Area.	DDC/Architect	E&M	Concerned GSM/CDMA operator.
	14. Provision of Space and construction of ESP/ PSP as per telecom requirements is to be done at middle of the each Platform. Both ESP and PSP should be at the 1200 mm height from the FFL.	DDC/Architect	Civil, as per CSD	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	15. Tray connectivity from the nearest S&T tray for Platform Supervisory Panel (PSP).	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	16. For the Stations with side platforms, connectivity between both undercrofts for Telecom Cable routing should be provided with cross over pipes and connectivity with other station areas as per telecom requirements.	DDC/Architect	Civil	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)

	17. In case there is double height area at PF level, the provision of cable trays and mounting structures for GSM/CDMA antennas, CCTV cameras and PAS/PIDS/Clock equipments should be designed at appropriate height away from PF edge. Cable Trays should be provided in a manner so that minimum no. of sleeves/cutouts is required for Telecom equipment installations.	DDC/Architect	E&M	GSM/CDMA Operator and Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	18. At concourse/Platform level, provision of sleeves/holes/cutout in the civil/finishing structure for various Telecom and GSM/CDMA services.	DDC/Architect	Civil, as per CSD	GSM/CDMA Operator and Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	19. Provision of Main earth (<2 ohm) and clean earth (<1 ohm) pits. Location of clean earth MAT is to be at least 20m away from main earth pit locations.	DDC/Architect	Civil, as per CSD	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	20. Extension of Main earth (<2 ohm) to be done from Main Earth Mat location to TER, & UPS (S&T) Room. Copper Bus bar with min.20 holes (10 per row) to be provided in TER, UPS (S&T) Room.	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	21. Extension of clean earth (<1 ohm) to be done from Clean Earth Mat location to TER. Copper Bus bar with min.20 holes (10 per row) to be provided in TER.	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	22. LCX cable for TETRA is to be laid in underground station Area. The route for leaky co-axial cable shall have following conditions. a) False ceiling shall be at least 200mm below LCX route and false ceiling below LCX cable should be non-metallic. b) Between ceiling and the leaky coaxial there shall not be obstructions. c) Where LCX is close to a wall, no obstructions for hanging the brackets for LCX.	DDC/Architect	N.A.	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	23. Holes are to be provided in wall cladding for Telecom equipment installations and also cutouts in false ceiling are to be provided for mounting of speakers, PIDS, Clock, CCTV cameras and CCTV Monitors at concourse level.	DDC/Architect	Civil, as per CSD	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	24. Signage should not block visibility of PIDS, clock, CCTV cameras and CCTV monitors at concourse and platform level.	DDC/Architect	N.A.	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	25. Provision of space for temporary storage is to be done for material storage of telecom contractors in consultation with Civil Deptt.	N.A.	N.A.	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	26. Temporary lighting in Tunnel should not be provided in space reserved for GSM/CDMA/TETRA cables	Civil	Civil	DDC/Architect and Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
C	Telecom Equipment Room (TER) Requirements			

1.	Area of TER as per requirements is min 40 sqm. with 2.4 meter wide corridor in front of TER.	DDC/Architect	Civil, as per CSD	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
2.	TER should be adjacent to UPS(S&T) room. UPS (S&T) room should be located in between TER & SER.	DDC/Architect	Civil, as per CSD	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
3.	Provision of Fire rated door (outside open able) in TER as per requirement of min. size 1500x2400mm.	DDC/Architect	Civil, as per CSD	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
4.	Drainage system of Air conditioning system should be installed outside TER and only air outlet is to be provided inside TER to maintain temperature nominal 25 degree continuous.	DDC/Architect	VAC Contractor	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
5.	Clear height of 3 meter should be available in TER for telecom equipments installations. Installations of other contractors' equipments shall be above 3 meter height.	DDC/Architect	N.A.	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
6.	No false ceiling required in TER. In case provision is made then clear height of 3 m should be available with Open able Trap doors in case of fixed type false ceiling. No windows or ventilators required inside TER.	DDC/Architect	Civil	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
7.	Escalator area above TER should be avoided.	DDC/Architect	Civil and E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
8.	2 x Cut outs (300 x 200 mm) for Power & Data Cables in the wall common between TER & UPS to be provided as per Telecom requirements.	DDC/Architect	Civil, as per CSD	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
9.	There should not be any water flow or drainage pipe passing through TER.	DDC/Architect	Civil	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
10.	Base frame, False Floor and under false floor cable trays with required risers for wall mounted units for All Telecom Systems as per Appendix N of this chapter. Raised false floor should have minimum clearance of 300 mm from Finished Floor Level. False flooring should be capable of handling loading capacity of 600 kg/m.	Designated Telecom System contractor (JP/JS14B)	Designated Telecom System contractor (JP/JS14B)	DDC/Architect and other Telecom System contractors
11.	Provision of AC power points, v lighting facility and fire protection system to be done. Minimum 300 lux. Level of Lighting at FFL to be provided with some lights with emergency supply.	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
12.	During handover of TER availability of following items are to be ensured, as a minimum - AC power, Cable tray Risers, Air-conditioning, Lighting, AC power sockets, data /power tray connectivity.	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
13.	During handover of TER availability of following items is to be ensured, as a minimum: - Wall cut-outs, concrete floor	DDC/Architect	Civil	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)

	with dust proofing, Wall finish with paint, Doors with lock arrangement with three keys.			JP/JS15B)
	14. Confirm Fire Safety Provisions	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	15. Seal the gaps after cable installation work in S&T Rooms (TER, SER & UPS Room)	N.A.	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
D	GSM AND CDMA ROOMS REQUIREMENTS			
	1. The Area of both GSM and CDMA should be kept 25 SQM (min.) for each room. Also the Location of these rooms should be in vicinity of TER.	DDC/Architect	Civil, as per CSD	Concerned GSM/CDMA contractor(s)
	2. There should not be any drainage/Water flow pipe passing through these rooms.	DDC/Architect	Civil	Concerned GSM/CDMA contractor(s)
	3. No false ceiling and false floor is required in these Rooms and in case provision of false ceiling is done then clear height of 3.5 m should be kept. Also trap doors are to be provided as per requirement	DDC/Architect	Civil	Concerned GSM/CDMA contractor(s)
	4. Floor level of GSM/CDMA rooms should be kept a step higher (approx. 200 mm) above the level of corridor to avoid any water leakage from outside.	DDC/Architect	Civil, as per CSD	Concerned GSM/CDMA contractor(s)
	5. Drainage system of air conditioning system should be kept outside the rooms so that only air outlet is Provided inside these rooms to maintain temperature of 25 degree continuous	DDC/Architect	VAC	Concerned GSM/CDMA contractor(s)
	6. Provision of power supply to be done as per GSM/CDMA operator equipment load requirements.	DDC/Architect	E&M	Concerned GSM/CDMA contractor(s)
	7. Provision of Main earth (< 2 ohm) extension with copper earth strip to be done in the GSM and CDMA Rooms.	DDC/Architect	E&M	Concerned GSM/CDMA contractor(s)
	8. Fire-rated door of min. size 1500x2400 mm is to be provided with locking arrangement.	DDC/Architect	Civil, as per CSD	Concerned GSM/CDMA contractor(s)
	9. Provision of AC power points & indoor lighting facility and fire protection system to be done. Minimum 300 lux. Level of lighting at FFL to be provided with some lights with emergency supply.	DDC/Architect	E&M	Concerned GSM/CDMA contractor(s)
	10. During hand over of GSM and CDMA rooms availability of following items are to be ensured, as a minimum:- AC power, Air-conditioning , Lighting, AC power sockets, power supply cables, Main Earth (<2ohm) copper strip.	DDC/Architect	E&M	Concerned GSM/CDMA contractor(s)

	11. During hand over of GSM and CDMA rooms availability of following items is to be ensured, as a minimum - Wall paint, Wall cut-outs, finished floor, Door with lock arrangement with three keys.	DDC/Architect	Civil	Concerned GSM/CDMA contractor(s)
E	UPS ROOM REQUIREMENTS			
	1. UPS Room to be provided adjacent to TER .Size of UPS should be min. of 50 sq-m with floor loading of 1.5 mT/sq.m for Telecom battery system.	DDC/Architect	Civil, as per CSD	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	2. Trenches on floor with checker plates are to be provided. Cutting of Checker plates for taking out cables as per layout plan.	DDC/Architect	Civil, as per CSD	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	3. Provision of AC power points & indoor lighting facility and fire protection system to be done. Minimum 300 lux. Level of Lighting at FFL to be provided with some lights with emergency supply.	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	4. Drainage system of Air conditioning should be outside UPS and only air outlet to be provided inside UPS to maintain temperature of 25 degree continuous.	DDC/Architect	VAC	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	5. Fire-rated door (outside open able) of min. size 1500x2400 is to be provided with locking arrangement.	DDC/Architect	Civil, as per CSD	N.A.
	6. False ceiling is not required in UPS Room. In case false ceiling is provided Minimum clear height should be 3 m is to be provided. Provision for open able trap doors is to be done in case of fixed type false ceiling.	DDC/Architect	Civil, as per CSD	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	7. Three phase power required with two feeders, one from mains and other from DG/emergency supply.	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	8. Three phase power after switching arrangement for SMPS	JP/JS14	JP/JS14	JP/JS12B
	9. During handover of UPS Room, availability of following items is to be ensured, as a minimum:- AC power, Air-conditioning, Lighting, AC power sockets, data /power tray connectivity.	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	10. During handover of UPS ROOM availability of following items is to be ensured, as a minimum: - trenches with chucker plates including cutouts at appropriate places for UPS cable, Wall paint, Fire Doors with lock with three keys.	DDC/Architect	Civil	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
F	Station Control Room (SCR) Requirements			
	1 Data/Power cable tray risers are to be provided in SCR with connectivity from near by S&T Data/Power cable trays.	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)

	2.Holes with the required diameter are to be provided on SCR counter table as per requirement for installation of telecom systems MMIs.	DDC/Architect	Finishing	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	3. In case false ceiling is provided in SCR, trap doors are to be provided near cable tray risers.	DDC/Architect	Civil, as per CSD	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
G	SECURITY ROOM Requirements			
	1. DATA/POWER cable tray connectivity is to be provided.	DDC/Architect	E&M	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	2.Furniture to be provided for installation of CCTV MMIs	DDC/Architect	Operation	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)

4	General Requirements (For both Underground and Elevated Sections)			
	1. Incorporate locations of CCTV cameras, CCTV Monitors clocks, telephones, Public address loudspeakers, Passenger Information Display Boards etc. in drawings.	DDC/Architect	N.A.	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)
	2. For Design purpose: Furnish weight, dimensions, colours and mounting details of clocks, telephones, Public address loudspeakers, ambient noise sensors, Passenger information display boards. Specify the locations of CCTV cameras / monitors, PA Loud Speakers, PID, Clock, phone etc. In Station area and in rooms as required. Furnish quantities, position and sizes of space cut-outs to the ceiling/ wall finishes for mounting clocks, telephones, Public address loudspeakers, ambient noise sensors, Passenger Information Display Boards, CCTV cameras / monitors.	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)	N.A.	DDC/Architect
	3. Install clocks, telephones, PAS loudspeakers, ambient noise sensors, all types of CCTV cameras / monitors and PIDS Boards throughout the station including all fixtures (Primary and Secondary) & structural mounting support, and mounting arrangements; Install integrated control panel/ work station for Public Address system and PIDS in SCR and control panel for Public Address system in Platform Supervisor's Booths; Install control panel/ work station and monitors for CCTV, Radio Access Unit etc.in SCR. All types of Structural and Mounting support, both primary and secondary. The supports to be finalised in consultation with the Design/Civil Contractor, so as not to degrade the design, aesthetics and safety of the structures.	Concerned Telecom System contractor(s) (JP/JS11B to JP/JS15B)	Concerned Telecom System contractor (s) (JP/JS11B to JP/JS15B)	DDC/Architect and other Project Contractors.

Appendix A2 Not used

Appendix A3

JP/JS15B AND DESIGNATED 3 PHASE 415V AC POWER SUPPLY CONTRACTOR(S) (JP/JS14B) INTERFACE

1. Definitions and Scope

- 1.1 This specification covers the interface requirements between JP/JS15B Contractor and Designated 3 PHASE 415V AC Power Supply Contractor(s) (JP/JS14B).
- 1.2 In this Specification, unless otherwise stated, the term “Contracts” refers to the JP/JS15B contract and 3 PHASE 415V AC Power Supply Contract (JP/JS14B) and the term “Contractors” refers to JP/JS15B and designated 3 PHASE 415V AC Power Supply Contractor(s). The individual Contractor is referred to by the corresponding Contract number. For the AC 3 PHASE 415V AC supply, the S&T Power Supply (JP/JS14B) Contractor shall be the relevant Contractor.
- 1.3 This document shall be read in conjunction with the relevant paragraphs of the General Specification. The Contractors shall ensure all requirements of the General Specification and PS pertaining to interfaces are fully resolved and implemented.
- 1.4 In the event of a conflict between any Particular Specification and this specification, the requirements of the Particular Specification shall prevail.

2 Contractors’ Responsibilities

- 2.1 This specification outlines the Contractors’ interface requirements which are based on the Technical Studies carried out during the early stages of the Project. However, the requirements herein specified are by no means exhaustive and it remains the Contractors’ responsibilities to develop, update and execute jointly Interface Management details during design & throughout the execution of Works, to ensure that:
 - All interface issues between the Contracts are satisfactorily resolved;
 - Design, supply, installation and testing of equipment are fully co-ordinated; and
 - All equipment and facilities supplied under the Contracts are fully compatible with each other, whilst meeting the requirements of the respective Specifications.
- 3 JP/JS1B Contractor shall advise the 3 Phase 415 V AC Power Supply Contractor(s) location (stations/depot/OCC) wise requirement of 415 V AC Supply for 3 Phase UPS DC Power System for operation of Signalling, Telecom and AFC equipments. 3 Phase 415V AC Power Supply contractor(s) shall provide two feeders (one from normal and one from emergency supply) in a distribution board in UPS(S&T) room.
- 4 Not used.

- 5 3 Phase 415 V AC Power Supply from UPS to meet the requirement of Signalling, Telecom and AFC Contractors shall be provided by JP/JS14B at an AC Distribution Board in UPS (S&T) room. The interface will be through MCBs in AC Distribution Board (to be provided by JP/JS14B). JP/JS14B shall extend AC Power Supply from their ACDB in UPS (S&T) room to TER and install AC Distribution Board in TER to meet the AC Power requirements of JP/JS11B to JP/JS15B equipment. The interface will be through MCBs in AC Distribution Board (to be provided by JP/JS14B Contractor). JP/JS11B to JP/JS15B Contractors shall lay cables from AC Distribution Board to their equipment Racks for powering equipment to be supplied and commissioned under their respective contracts.

- 6 JP/JS15B & 3 Phase 415 V UPS AC Power Supply Contractors (JP/JS14B) will jointly test the Power Supply Arrangement. Joint Test Report shall be submitted for review of Employer's Representative.

Appendix A4**JP/JS15B to TRACTION SUPPLY/SCADA/NP-SCADA/BMS INTERFACES****1. Definitions and Scope**

- 1.1. This specification covers the interface requirements between Telecommunication System Contract JP/JS15B and Traction/SCADA/NPSCADA/BMS Contract(s).
- 1.2. In this Specification, unless otherwise stated, the term “Contracts” refers to the JP/JS15B, Traction/SCADA/NP-SCADA/BMS Contract(s) and the term “Contractors” refers to JP/JS15B, Traction/SCADA/NP-SCADA/BMS Contractors. The individual Contractor is referred to by the corresponding Contract number.
- 1.3. This document shall be read in conjunction with the relevant paragraphs of the General Specification. The Contractors shall ensure all requirements of the General Specification and PS pertaining to interfaces are fully resolved and implemented.
- 1.4. In the event of a conflict between any Particular Specification and this specification, the requirements of the Particular Specification shall prevail.

2. Contractors' Responsibilities

- 2.1 This specification outlines the Contractors' interface requirements, which are based on the Technical Studies carried out during the early stages of the Project. However, the requirements herein specified are by no means exhaustive and it remains the Contractors' responsibilities to develop, update and execute jointly Interface Management details during design & throughout the execution of Works, to ensure that:
 - All interface issues between the Contracts are satisfactorily resolved;
 - Design, supply, installation and testing of equipment are fully co-ordinated; and
 - All equipment and facilities supplied under the Contracts are fully compatible with each other, whilst meeting the requirements of the respective Specifications.

3. PHYSICAL INTERFACE

- 3.1 The contractors shall co-ordinate for ensuring the minimum safe distance between any Telecommunication field/Platform installation and the live OHE contact point for the purpose of human safety apart from EMI/EMC considerations.

4. TRACTION RETURN

The Traction contractor shall advise the JP/JS15B Contractor of the normal and worst short circuit current levels, which need to be taken into account by Telecommunication Contractors in their design to take care of EMI/EMC affects.

5. Not used

APPENDIX A5

INTERFACE BETWEEN JP/JS15B (DESIGNATED PAS/PIDS/MCLK SYSTEM CONTRACTOR) AND JP/JS11B (FOTS CONTRACTOR).

1. Definitions and Scope

- 1.1 This specification covers the interface requirements between Contract JP/JS15B and JP/JS11B FOTS System Contract(s).
- 1.2 In this Specification, unless otherwise stated, the term “Contracts” refers to the PAS/PIDS/MCLK -JP/JS15B System Contract(s) and the term “Contractors” refers to JP/JS11B & JP/JS15B Contractors. The individual Contractor is referred to by the corresponding Contract number.
- 1.3 This document shall be read in conjunction with the relevant paragraphs of the General Specification. The Contractors shall ensure all requirements of the General Specification and PS pertaining to interfaces are fully resolved and implemented.
- 1.4 In the event of a conflict between any Particular Specification and this specification, the requirements of the Particular Specification shall prevail.

2. Contractors’ Responsibilities

This specification outlines the Contractors’ interface requirements which are based on the Technical Studies carried out during the early stages of the Project. However, the requirements herein specified are by no means exhaustive and it remains the Contractors’ responsibilities to develop, update and execute jointly Interface Management details during design & throughout the execution of Works, to ensure that:

- all interface issues between the Contracts are satisfactorily resolved;
- design , supply, installation and testing of equipment are fully co-ordinated; and
- all equipment and facilities supplied under the Contracts are fully compatible with each other, whilst meeting the requirements of the respective Specifications.

3. JP/JS11B Contractor and JP/JS15B Contractor will jointly develop the Channelling Plan(s) covering the requirements of their respective systems. JP/JS15B Contractor shall convey its channel requirements including any updates in the channel configuration of existing network topologies of phase 1-A, if any. This jointly agreed Channelling Plan(s) shall be submitted for review of Employer’s Representative.
4. JP/JS11B Contractor will provide Channels/Fibres as per reviewed Channelling Plan(s) for PAS/PIDS/MCLK System Contractor(s). The physical interface point shall be Main Distribution Frame/Digital Distribution Frame/Patch panel. Necessary protection as per provisions of JP/JS11B Contract against Transient/Surge/Lightening etc. shall be provided by JP/JS11B Contractor, at his end.

5. JP/JS11 Contractor and JP/JS15 (PAS/PIDS/MCLK System Contractor(s)) will jointly test the Channels/Fibres as per reviewed Channelling Plan(s). Joint Test Report shall be submitted for review of Employer's Representative.

APPENDIX A6

INTERFACE BETWEEN JP/JS15B (DESIGNATED PAS/PIDS/MCLK SYSTEM CONTRACTOR) AND JP/JS12B (TELEPHONE CONTRACTOR).

1. Definitions and Scope

- 1.1 This specification covers the interface requirements between Contract JP/JS15B and JP/JS12B (Telephone system Contract(s)).
- 1.2 In this Specification, unless otherwise stated, the term "Contracts" refers to the PAS/PIDS/MCLK -JP/JS15B System Contract(s) and the term "Contractors" refers to JP/JS12B & JP/JS15B Contractors. The individual Contractor is referred to by the corresponding Contract number.
- 1.3 This document shall be read in conjunction with the relevant paragraphs of the General Specification. The Contractors shall ensure all requirements of the General Specification and PS pertaining to interfaces are fully resolved and implemented.
- 1.4 In the event of a conflict between any Particular Specification and this specification, the requirements of the Particular Specification shall prevail.

2. Contractors' Responsibilities

This specification outlines the Contractors' interface requirements which are based on the Technical Studies carried out during the early stages of the Project. However, the requirements herein specified are by no means exhaustive and it remains the Contractors' responsibilities to develop, update and execute jointly Interface Management details during design & throughout the execution of Works, to ensure that:

- all interface issues between the Contracts are satisfactorily resolved;
 - design , supply, installation and testing of equipment are fully co-ordinated; and
 - all equipment and facilities supplied under the Contracts are fully compatible with each other, whilst meeting the requirements of the respective Specifications.
3. JP/JS15B Contractor and JP/JS12B Contractor will jointly develop the Clock Synchronization Plan covering the requirements of centralized time synchronization of the Telephone system. This jointly agreed Plan(s) shall be submitted for review of Employer's Representative.
 4. The physical interface point shall be Main Distribution Frame/Digital Distribution Frame/Patch Panel. Necessary protection as per provisions of JP/JS12B Contract against Transient/Surge/Lightening etc. if any required shall be provided by JP/JS12B Contractor, at his end.
 5. JP/JS12B Contractor and JP/JS15B will jointly test as per reviewed Plan(s). Joint Test Report shall be submitted for review of Employer's Representative.
 6. JP/JS15B will co-ordinate with JP/JS12B for broadcast of audio messages from Radio on the PAS system at stations.

APPENDIX A7

INTERFACE BETWEEN JP/JS14B CONTRACTOR (RADIO/CCTV/UPS) AND DESIGNATED PUBLIC ADDRESS/PASSENGER INFORMATION DISPLAY/MASTER CLOCK SYSTEMS CONTRACTORS (JP/JS15B).

1. Definitions and Scope

- 1.1 This specification covers the interface requirements between Contract JP/JS14B and JP/JS15B Contract(s).
- 1.2 In this Specification, unless otherwise stated, the term “Contracts” refers to the JP/JS15B and the term “Contractors” refers to JP/JS15B & JP/JS14B. The individual Contractor is referred to by the corresponding Contract number.
- 1.3 This document shall be read in conjunction with the relevant paragraphs of the General Specification. The Contractors shall ensure all requirements of the General Specification and PS pertaining to interfaces are fully resolved and implemented.
- 1.4 In the event of a conflict between any Particular Specification and this specification, the requirements of the Particular Specification shall prevail.

2 Contractors’ Responsibilities

- 2.1 This specification outlines the Contractors’ interface requirements which are based on the Technical Studies carried out during the early stages of the Project. However, the requirements herein specified are by no means exhaustive and it remains the Contractors’ responsibilities to develop, update and execute jointly Interface Management details during design & throughout the execution of Works, to ensure that:
 - All interface issues between the Contracts are satisfactorily resolved;
 - Design, supply, installation and testing of equipment are fully co-ordinated; and
 - All equipment and facilities supplied under the Contracts are fully compatible with each other, whilst meeting the requirements of the respective Specifications.
3. JP/JS14B Contractor and JP/JS15B will jointly develop the Clock Synchronisation Plan covering the requirements of centralised time synchronisation of the Radio System, CCTV System and UPS. These jointly agreed Plan(s) shall be submitted for review of Employer’s Representative.
4. The physical interface point shall be Main Distribution Frame/Digital Distribution Frame/Patch Panel. Necessary protection as per provisions of JP/JS14B Contract against Transient/Surge/Lightening etc. if any required shall be provided by JP/JS14B Contractor, at his end.
5. JP/JS14B Contractor and JP/JS15B will jointly test as per reviewed Plan(s). Joint Test Report shall be submitted for review of Employer’s Representative.

APPENDIX-A8**INTERFACE BETWEEN JP/JS15B (DESIGNATED PAS/PIDS/MCLK SYSTEM CONTRACTOR) AND TC & S SIGNALLING CONTRACTOR (JP/JS02B)****1. INTRODUCTION (DEFINITIONS AND SCOPE)**

- 1.1 This specification describes the interface requirements between Contract JP/JS02B for Signalling & Train Control and JP/JS15B for PAS/PIDS/MCLK Contracts on the EW-A corridor.
- 1.2 In this Specification, unless otherwise stated, the term “Contracts” refers to all the relevant Contracts and the term “Contractors” refers to all the relevant Contractors.
- 1.3 This document shall be read in conjunction with the relevant paragraphs of the General Specification. The Contractors shall ensure all requirements of the General Specification and PS pertaining to the contracts are fully resolved and implemented.
- 1.4 In the event of a conflict between the Particular Specification and this specification, the requirements of the Particular Specification shall prevail.

2. CONTRACTORS’ RESPONSIBILITIES (COORDINATION AND INTERFACING)

- 2.1 This specification outlines the Contractors’ interface requirements, which are based on the Technical Studies carried out during the early stages of the Project. However, the requirements herein specified are by no means exhaustive and it remains the Contractors’ responsibilities to develop, update and execute jointly Interface Management details during design & throughout the execution of Works, to ensure that:
 - (i) All interface issues between the two contracts are satisfactorily resolved
 - (ii) Supply, installation and testing of equipment and software are fully coordinated
 - (iii) All equipment supplied in the contracts are fully compatible with each other

3. SCOPE OF WORK**3.1 Interface of Signalling with Public Information Display System (PIDS)**

- 3.1.1 The Contractors shall interface for automatic display of train related information including train arrivals/ departures on pre-designated display boards.
- 3.1.2 For EW-A corridor, the Central ATS and Local ATS for a specific sector of the TC&S System shall send data to the PIDS to display train related information including train arrivals and departures on pre-designated display boards throughout the platforms and the concourse of all stations.
- 3.1.3 Based on the information received from the TC&S System, PIDS system will initiate and co-ordinate Train arrival/ departure related PIDS message with the Public Announcement System.
- 3.1.4 The PIDS will carry out time count down based on the estimated time data sent by the TC&S System and display the estimated train arrival and /or departure particulars. The estimated time to arrive and/ or depart of the train(s) as shown on any display board will

be updated automatically and will be corrected if necessary following a data update from the TC&S System.

- 3.1.5 The pre-defined message displays will be triggered by the data sent by the TC&S system including message displays of non-stopping trains passing through the stations, train not in service and user defined message displays.
- 3.1.6 The TC&S equipment at each station shall invoke the station PIDS control equipment to clear the designated row of the train arrival/ departure information on the corresponding PIDS display boards subsequent to a train departure.
- 3.1.7 The two contractors shall jointly develop detailed interface document covering the hardware interface, list of messages, type and format of message to be displayed and the protocols to be followed for exchange of data between the two systems. The detailed interface document shall be submitted for review of the Employer.
- 3.1.8 The TC&S system shall give the information for the Four/Six coach train arrival/departure. Upon receiving such information from the TC&S system, it shall be the responsibility of JP/JS15B to display the same on the PIDS and to make coordinated announcement on PAS system at station.

3.2 Interface of Signalling System with Passenger Announcement System (PAS)

- 3.2.1 The Contractors shall interface for automatic announcement of train related information including train arrivals/ departures on the designated station platforms.
- 3.2.2 Data shall be sent by the TC&S to the PAS System in a coordinated manner to broadcast predefined train information including train arrivals and departures on pre-designated display boards throughout the platforms of all stations.
- 3.2.3 PAS announcements will be made to alert passengers of all non-stopping trains based on the information received from the TC&S System.
- 3.2.4 The PAS will carry out the time countdown based on the estimated time data sent by the TC&S System. The estimated time to arrive and/or depart of the train(s) will be stepped down automatically every minute and will be corrected, if necessary following a data update from the TC&S System.
- 3.2.5 The time countdown will be frozen when a train stops proceeding to the next stopping station, due to circumstance detectable by the TC&S System and relayed to the PAS.
- 3.2.6 The pre-defined announcements will be triggered by the time countdown functions of the PAS or data sent by the TC&S System including announcement of non-stopping trains passing through the station.
- 3.2.7 The two contractors shall jointly develop detailed interface document covering the hardware interface, type and format of message to be displayed and the protocols to be followed for exchange of data between the two systems. The detailed interface document shall be submitted for review of the Employer.

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APPENDIX A9**INTERFACE MANAGEMENT DOCUMENT FOR CIVIL, TUNNEL VENTILATION, ECS, E&M, POWER SUPPLY, S&T, AFC, ESCALATORS, LIFTS AND TRACK CONTRACTS OF UNDERGROUND SECTION.**

This document describes the interface responsibilities and obligations of civil contractor with other system contractors like Tunnel Ventilation, ECS, E&M, Power Supply, S&T, AFC, Escalators, Lifts and Track and vice versa. This document shall be made part of all these contracts so that clear responsibility of each contractor is defined in every contract. This document is for underground works only.

1. ATTENDANCE ON OTHER CONTRACTORS

- (i) **Works Areas** - Civil to provide properly leveled and debris free site storage space and works areas, access to and within the site, offloading and lowering areas for the use of all contractors. System contractors to advise requirements and date for handover to suit civil contractor's site program.
- (ii) **Cranes** - Civil to permit use of cranes on site by other contractors on a mutually agreed rental basis
- (iii) **Scaffold** - Civil to permit other contractors the use of scaffolding erected at site but only to the timings advised by the civil contractor.
- (iv) **Medical** - Civil to provide a first aid room at each station and the services of a staff trained in First Aid. This will be for use by other system contractors also.
- (v) **Water** - Civil to provide drinking water facilities and water supply points for the works at each end of the concourse and platform for the use of all contractors if they wish to use and may charge at mutually agreed rates.
- (vi) **Lighting** - Civil to provide general lighting to all areas and all rooms of the stations and tunnels required for a safe working environment as per lighting levels mentioned in SHE with uniformly distributed tube lights (Not by mere halogen lamps) is maintained at all times till permanent lighting becomes functional or ROD whichever is earlier. However, any shifting of light fittings provided by civil required by system contractor will be done by system contractor at his cost only.
- (vii) **Power** - Civil to supply power distribution boards at each end of the concourse and platform and at 150m intervals along the tunnel length for the use of all contractors, power capacity to suit the combined requirements of each contractor. The charge rate per unit of consumption is to be agreed with the system contractors. The power supply shall be maintained until 1 month after energisation of the LV system at ASS level or the confirmation from the system contractor whichever is earlier.

- (viii) **Survey** - Civil to provide survey/setting out grid line and level references within stations and tunnels.
- (ix) **Cleaning** – Civil will be responsible for general site cleaning and will identify common areas at each level for material to be deposited prior to removal. Large items such as cable drums/heavy packing shall be cleared by the respective system contractors. In case any system contractor fails to remove his material, the Engineer of Civil Contract, after written notice of minimum one day to the system contractor to remove his material, may instruct civil contractor to remove it and the cost of the same shall be borne by the system contractor. The decision of the Engineer of civil contractor shall be final and binding on civil as well as on the system contractor. Civil will hand over the rooms to respective system contractors in properly cleaned condition and after providing proper lockable door without gap. Once a technical room is handed over, the principal system contractor for that room will take over responsibility for cleaning the room.
- (x) **Security** – Civil will be responsible for establishing a site security system to the approval of the Engineer. The system should ensure that no labour from any agency working at site may remove materials without written authorization from the civil security-in-charge. The system once approved by the Engineer of civil contractor shall be binding on all system contracts.
- (xi) **Safety** – Civil will be in overall charge of safety and will advise JMRC staff of any safety violation by system contractors requiring corrective action.
- (xii) **Toilet** – Civil shall provide at his own cost adequate toilet facilities at ground level at each station and 4 Nos. of urinals at platform and 4 Nos. at concourse level at each station with adequate storage and pumping facilities to ensure hygienic conditions at all times. These facilities shall be used by staff and labour of all system contractors also for which they shall pay only maintenance and running charges for usage at mutually agreed rates. In case of disagreement in usage charges, the decision of the Engineer of civil contractor shall be final and binding on civil as well as system contractors.
- (xiii) **Drainage** – Civil contractor to provide and maintain temporary pumping arrangements until ROD or commissioning of permanent pumps whichever is earlier. Civil and E&M contractors will coordinate to install permanent pumps such that drainage of the sump is not interrupted.

2. **GENERAL INTERFACE REQUIREMENTS**

- (i) Civil to provide openings as per SEM drawings or Combined Services Drawings (CSD). Any change requested by system contractor in writing with the approval of the Engineer of his contract before the work of opening is taken up by civil shall be incorporated by civil. Any change in the opening size whether increase or reduction after this shall be the responsibility of the system contractor and he will do the fire sealing around the services including masonry/concrete work if required at his cost.

- (ii) Civil to provide cutouts and recesses in slabs and walls for the passage of services as per the SEM drawings. Changes to the cutouts required after casting or block wall construction shall be to the account of the agency responsible for the change.
- (iii) Civil to design and build equipment foundations. Loads and other details are to be given by respective contractor at least 90 days before these are required by him.
- (iv) Changes to any provisions within the Civil scope of work after completion, such as services openings, lifting/pulling hooks, foundations, ducts, etc shall be to the account of the agency responsible for the change.
- (v) Civil to prepare equipment delivery plans for major materials and plant of the system contractors showing temporary and permanent provisions in slabs and walls to permit future replacement of plant and to allow initial transport from ground level to final room location.

3. **INTERFACE WITH INDIVIDUAL CONTRACTORS**

A. CIVIL WITH TUNNEL VENT

- (i) TVS contractor to supply the details of all loads, plant layouts, equipment foundation for room sizes, knockout panels, cutouts, recesses, shaft/gallery sizes and tunnel niche dimensions. Changes required to details incorporated in approved drawings to be provided well in advance of casting.
- (ii) Civil to design and build rooms, room finishes, drainage, shafts, precast RCC slabs for covering the access hatch, galleries, cutouts, lifting/pulling hooks, walls for nozzles, niches in c&c tunnel roof, trackside knockout panels. Chequer plate infill around nozzles will be provided by the TVS contractor.

B. CIVIL WITH ECS

- (i) ECS contractor to supply details of all loads, plant layouts, equipment foundations, room drainage requirements, room sizes, pipe support pedestals, lowering hatches, cutouts, recesses, shaft/gallery sizes
- (ii) Civil to design and build rooms, room finishes, drainage, equipment foundations, pipe pedestals, shafts, cutouts, lifting/pulling hooks, canopy / slabs to cover access hatch as per drawing.
- (iii) Civil to design and build architectural finishes in public areas with provision for ecs fixtures including cutouts in architectural finishes for passage of services and installation of fixtures.

C. CIVIL WITH E&M

- (i) E&M contractor to supply details of all loads, plant layouts, equipment foundations, room drainage requirements, room sizes, cutouts, recesses, cable gallery/shaft sizes, LV earthmat and earthing terminations

- (ii) Civil to design and build rooms, room finishes, drainage, equipment foundations, shafts/galleries, cutouts & recesses in stations & tunnel cross passages, lifting/pulling hooks, earthmat, earthing risers through base slab to earthing terminations.
- (iii) E&M contractor to provide chequer plate/fire rated infill where openings in floors exceed the dimensions of the LV equipment
- (iv) Civil to design and build architectural finishes in public areas with provision for E&M fixtures including cutouts & provisions in architectural finishes for passage of services and installation of fixtures.

D. CIVIL WITH POWER SUPPLY (ASS & ROCS)

- (i) Power supply contractor to supply details of all loads, plant layouts, equipment foundations, room sizes (ASS, UPS, Sectioning rooms), cutouts, recesses, cable gallery/shaft sizes, cable ducts within slabs, lifting/pulling hooks, HV earthmat and earthing terminations.
- (ii) Power supply contractor to make good any unused OCS bracket drill holes in the tunnel roof
- (iii) Civil to design and build rooms, knockout panels, room finishes, equipment foundations, shafts/galleries, cutouts, recesses, cable ducts within slabs, lifting/pulling hooks, earthmat, earthing risers through base slab to earthing terminations.
- (iv) Power supply contractor to provide chequer plate/fire rated infill where openings in floors or walls exceed the dimension of the HT equipment or due to any other reason.
- (v) Civil to mark centre line of track on the soffit of the tunnel.

E. CIVIL WITH S&T

- (i) S&T contractors to supply details of all loads, equipment layouts, equipment foundations, room sizes & finishes details (SER, SMR, SCR, TER, UPS, mobile phone operators rooms), cutouts, recesses, cable ducts within slabs, cable shafts, clean earthmat and earthing terminations.
- (ii) S&T contractors to supply details of equipment located in station public area inc dimensions, locations, support details, interface with wall and ceiling finishes, acoustic requirements(if any).
- (iii) Civil to design and build rooms, room finishes, equipment foundations, shafts/galleries, cutouts & recesses in stations and at tunnel cross passages, cable ducts within slabs, clean earthmat, earthing risers through base slab to earthing terminations. Civil to provide trenches in UPS room as per the drawings given by UPS contractor and shall provide trench covers with the required openings in the covers.
- (iv) Civil to design and build architectural finishes in public areas with provision for coms fixtures including cutouts & provisions in architectural finishes for passage of services and installation of fixtures.

- (v) Signalling contractors to provide false floor in SER. Telecom contractor to provide false floor in TER. Civil to provide false floor in SCR and TOM.

F. CIVIL WITH AFC

- (i) AFC contractor to supply details of all equipment layouts, equipment foundations, room sizes & finishes details (TOMS, EFO, SCR), cutouts, recesses, cable ducts within slabs/screed.
- (ii) AFC contractor to supply details of fare gates and barriers located in station public area inc dimensions, locations, support details & interface with floor finishes. The barriers will be provided by the AFC contractor to close the entire gap upto wall.
- (iii) Civil to design and build rooms, room finishes, equipment foundations, cutouts & recesses, cable ducts within slabs, architectural finishes in public areas with provision for fare gates & barriers.

G. CIVIL WITH ESCALATORS

- (i) Escalator contractor to supply shaft & pit dimensional data, end and intermediate support details, earthing requirement, equipment loads, cutout & recess details, lifting hook locations & details, services routes, delivery route and method of erection, ecp recess dimensions, SCR equipment layout
- (ii) Civil contractor to design and build escalator shaft with top and bottom supports, finishes meeting the escalator requirements at top/bottom and sides of escalator, lifting hooks, pit, drainage and provision for cable and sprinkler pipe routing, ecp recess, SCR layout and earthing terminals.

H. CIVIL WITH LIFTS

- (i) Lift contractor to supply shaft dimensional data and details of cutouts, recesses, lifting beams, drainage, provision for surface mounted fixtures,
- (ii) Civil contractor to design and build lift shaft with cutouts, recesses, provision for lifting beams, drainage, rain shelter as per drawing and internal shaft plaster & paint finish

I. CIVIL WITH TRACKWORK

- (i) Civil to provide openings for rail lowering at least at every alternate station or at alternate locations such that maximum hauling of rails is 2 Kms. The openings should be 20m in length and 5m in width unless agreed otherwise with the track work contractor. An area for rail storage at ground level and an access route from the public road thereto are to be provided by the civil contractor.
- (ii) The timing for closure of these openings is to be agreed with the track work contractor and approved by the Engineer.
- (iii) Track contractor to provide details for drainage of the track to the tunnel cross passage sumps and to station trackside drains.

- (iv) Civil and track work contractors to jointly inspect the tunnels and station track areas before track concreting commences. The track work contractor is to hand over the tunnels after completing his works in the same condition as recorded in the joint survey.
- (v) The track work contractor will be responsible for disposal of waste water resulting from his works such that the tunnels are maintained in an environmentally acceptable condition at all times.

APPENDIX B

KEY & ACCESS DATES

1 KEY DATES

The work includes a number of stages. These stages, which are inter-related with, and essential to, the completion of the PAS/PIDS/MCLK systems, are to be achieved by the Key Dates.

If the identified stage is not achieved by the stated Key Date, liquidated damages may become applicable as set out in the Contract.

1.1 STAGE 1 – Key Date 1 (KD1) : Preliminary Design Submission & Approval

Achievement: Submission to, and concurrence by, the Employer's Representative of the Preliminary System Design which consists of details as specified in the Employer's Requirements for this JP/JS15B Tender (Contract Forms – Appendix 1 – Annexure C- A6, A7 & A8)

1.2 STAGE 2 – Key Date 2 (KD2) : Final Design Submission & Approval

Achievement: Submission to, and concurrence by, the Employer's Representative of the Final Design which consists of all the documents as specified in the Employer's Requirements for this JP/JS15B Tender (Contract Forms – Appendix 1 – Annexure C– B2,B3,B4)

1.3 STAGE 3 – Key Date 3 (KD3) : Delivery of equipments for PAS/PIDS/MCLK systems at Contractor's Premises in Jaipur.

Achievement: Delivery of equipments for Public Address System, Passenger Information Display System and Master Clock System of the specified quantity at Contractor's Premises in Jaipur and their inspection by Employer's Representative.

1.4 STAGE 4 – Key Date 4 (KD4): Completion of PAS/PIDS/MCLK Systems.

Achievement: Putting into service PAS, PIDS & MCLK Systems after completion of Installation Tests and Partial Acceptance Tests (PAT) over the appropriate section. This achievement shall also include the commissioning of required system of PAS, PIDS & MCLK at OCC.

1.5 STAGE 5 – Key Date 5 (KD5): Completion of System Acceptance Tests (SAT) and Integrated Testing & Commissioning (ITC).

Achievement: This Key Date relates to the following:

Completion of the System Acceptance Tests (SAT) and Integrated Testing & Commissioning (ITC) activity for the full section, OCC & Depot.

1.6 STAGE 6 – Key Date 6 (KD6): Completion of Contract

Achievement: Delivery of Contract Spares, Delivery of as Built Drawings , Completion of DLP requirement to the satisfaction of Employer's Representative, Issue of Performance

Certificate in accordance with GCC/SCC. Completion of Period of Supervision of Maintenance.

2 ACCESS DATES

The JP/JS15B Contractor shall require access to information as well as to various locations at stations/guide-ways, etc., in stages, in order to plan his activities for time-bound completion of his obligations under the Contract. The dates on which such access becomes available are indicated in Clause 4 of this Appendix and shall mean access by the midnight.

The Contractor shall develop his Work Plan based on these Access Dates. If, in the course of construction, the achievement of these access points must be shifted in time, to be either earlier or later, such adjustments shall be notified to the Contractor for modification of the Work Plan. If such readjustment cannot be accommodated without changes to the Key Dates and/or the level of effort, then the Contractor shall notify the Employer's Representative of such conditions for resolution under the terms of the Contract.

JP/JS15B contractor shall give all inputs required for meeting the Access Dates defined hereunder to other Designated Contractors in a timely manner to match the programme schedule of the designated contractor. In any case, all these inputs must have been given by JP/JS15B contractor and agreed jointly between the designated contractors at least 16 weeks before the stated access date.

2.1 The Access Dates are defined as hereunder, which are for planning purposes only.

2.1.1 AD1A: Access to Equipment Rooms at stations

By this date, the JP/JS15B Contractor will have shared access to the Telecom Equipment Room as well as the UPS (S&T) Room for JP/JS15B use (UPS Room will be shared with Signal and AFC contractor(s)).

Prior to such access, civil and electrical works specified below will have been completed:

- Wall finishes, false ceiling (if any) and doors/ windows
- Cable support structures from main cable guide-ways along the track to the above rooms for optical fibre cables/coaxial cables/power cables
- Installation (not commissioning) of electrical lighting fixtures.

2.1.2 AD1B: Equipment Rooms - Permanent AC Power and Air Conditioning Availability

By this date, the provision of permanent power and Air conditioning in the Telecom Equipment Room shall have been completed.

2.1.3 AD1C: General Access

This date represents the beginning of a period during which general access to all areas of the facilities must be available to the JP/JS15B Contractor. The exact point in time at which such areas shall be provided shall be developed and agreed to through interface meetings with the concerned contractors. Beyond this access point, the JP/JS15B

contractor shall have continuous, albeit not exclusive, access to these areas. By this date, the general areas at stations shall be available for JP/JS15B contractor for laying, clamping and termination of cables at various locations.

3 Schedule Of Key Dates:

SN	Key Date	Choti Chaupar-Badi Chaupar Section
1	KD1	Within 10 weeks from LOA
2	KD2	Within 20 weeks from LOA
3	KD3	Within 40 weeks from LOA
4	KD4	20 weeks prior to ROD*
5	KD5	10 Weeks prior to ROD*
6	KD6	31.03.2020

* Tentative Date for Revenue Operation Date(ROD) is 31.03.2018

Note: Section shall also include commissioning of required systems at the Mansarovar OCC.

4 Schedule of Access Dates

SN	Section	AD1A	AD1B	AD1C
1	Choti Chaupar-Badi Chaupar			

APPENDIX C

SECTIONS

1. East-West Corridor

(Section: Choti Chaupar-Badi Chaupar)

Section has 2 stations and Operation Control Centre will be at Mansarovar.

- 1) **Choti Chaupar**
- 2) **Badi Chaupar**

APPENDIX D**CABLE SPECIFICATIONS****1 INTRODUCTION****1.1 General**

1.1.1 This specification covers the design and construction requirements for low smoke, zero halogen/low halogen cables for cabling system for all sub systems of telecommunication systems, except equipment specific cables, for JMRTS .System specific specifications of each type of cable are also detailed in this specification.

1.1.2 Cables shall comply with the latest version of the relevant requirements of British Standards , IEC standard , ASTM standards, ITU recommendations or equivalent international standards.

1.1.3 All cables shall have continuous operating life of atleast 25 years.

1.1.4 All cables used in external or open areas shall be the armoured type and shall be able to with stand rain and ultra violet rays. As a minimum ,all Telephone, Public Address, CCTV , Data and Power cables laid in outdoor ducts/ trenches/trays from the Station(e.g to Ancilliray Buildings) and within the Outdoor Depot area (eg. one building to another) ,shall be armoured type . Optical Fibre for all areas shall be armoured type.

1.1.5 The Employer's Representative shall have free access to the works of the manufacturer and to be present at all reasonable times and shall be given facilities by the manufacturer to inspect the manufacturing of the cables at any stage of manufacture. He shall have the right to reject in whole or part of any work or material that does not conform to the terms of this specification or and may order the same to be removed/ replaced or altered at the expense of the manufacturer.

1.1.6 The Contractor shall satisfy the Employer's Representative by producing certificate from a recognized testing laboratory or otherwise that the materials used and the cable itself is of the highest possible standards and complies with all relevant specifications. In case of no relevant test certificates being available tests shall be carried out by the Contractor (manufacturer) as those laid down with relevant specification but this shall not preclude any test desired by the Employer's Representative to determine the quality of the cable.For Cables as per RDSO/TEC specifications , the Contractor shall have to get the cables inspected by RDSO/TEC and all cost therein has to be borne by the Contractor.

1.2 Fire and Smoke Performance Requirements**1.2.1 General**

1.2.1.1 It is essential that hazardous conditions arising from overheating or ignition of cables especially in the underground areas are avoided.

- 1.2.1.2 The cables for installation in underground/tunnel areas shall be manufactured from fire retardant/ resistant, low smoke, zero halogen materials.(FRLSOH)
- 1.2.1.3 The cables for installation in elevated/at-grade section shall be manufactured as per Indian Railways RDSO/TEC specifications , wherever available in TEC/RDSO specifications for a particular cable type. Wherein the RDSO/TEC specifications are not available then the specifications as laid down herein shall be complied with.
- 1.2.1.4 The requirements described herein below shall meet the anti-termite, pest resistant properties as far as possible and mechanical & electrical properties of the cables both during and after installation to meet the other requirements of the specifications.
- 1.2.1.5 The contractor shall comply in general with the pertinent requirements of NFPA 130 (Fixed Guideway Transit system 2007 edition issued by the US National Fire Protection Association) .
- 1.2.1.6 All insulation shall be moisture and heat resistant, with temperature ratings appropriate to the application conditions and in no case lower than 60 degree C.(except Data)
- 1.2.2 Flammability**
- 1.2.2.1 The bedding and oversheath of the cable shall have a minimum oxygen index of 30 when tested in accordance with ASTM D2863/BS 2782: Part 1: Method 141 /NES 715.
- 1.2.2.2 The temperature index of the bedding and oversheath of the cable shall not be less than 250 ° C when tested in accordance with ASTM D2863/ BS 2782: Pat 1 : Method 143/ NES 715.
- 1.2.3 Fire Resistance**
- 1.2.3.1 Unless otherwise specified for the fire resistant requirements, all cables shall comply with reduced fire and flame propagation requirements of IEC 60332-1 & 60332-3 Cat C for single and bunched cables respectively. Loudspeaker cables in addition shall be of fire survival type to ensure circuit integrity for three hours during fire as per IEC 60331.
- 1.3 Corrosive and Acid Gas Emission**
- The level of hydrochloric acid of the fire retardant low smoke, zero halogen compound (filler bedding , oversheath , etc.) and the insulation of the cable shall not be greater than 0.5% when tested in accordance with BS 6425/IEC 60754: Part 1. In the case of fire retardant, low smoke, low halogen compound (filler bedding over sheath etc.) and the insulation of the cables, the level of the hydrochloric acid shall not exceed 20%. Corrosion and acid gases are defined as those, which are determined as hydrochloric acid.

1.4 Smoke Emission

- 1.4.1 The value of the smoke generated shall meet the requirements of transmittance $\geq 40\%$ as per IEC 1034/BS 6724).

2. OPTICAL FIBRE CABLE

In addition to the requirements specified in section 1 of appendix D of Chapter 5 of this PS, following specifications shall be complied with by Optical Fibre Cables for Underground Section used inside the tunnel, if any. For the Elevated/At-Grade Section and for any Optical Fibre Cable being laid outside the station limits and which is either buried under the earth or is laid on the via-duct, the Specifications shall be in accordance with the armoured OFC TEC /RDSO specifications no. IRS TC/55:2000 with latest amendments. The Contractor shall get these cables inspected from RDSO/TEC and all cost of inspection shall be borne by the Contractor.

2.1 ITU-T Standards

The cable shall comply with the ITU-T Recommendations G.652 (03/93) for single mode fibre.

2.2 Optical Requirements – Single Mode Fibre

Type	Single Mode
Mode Field Diameter (nominal)	
• depressed clad fibre	9 μ m +/- 10%
• matched clad fibre	9.5 μ m +/- 10%
Mode field concentricity error	< 1.0 μ m
Cladding Diameter	125 μ m +/- 2 μ m
Optical Attenuation	
• at 1310 nm	< 0.38 dB/Km (cabled fibre)
• between 1285 to 1330 nm	< 0.38 +/- 0.02 dB/Km (uncabled fibre)
• at 1550 nm	< 0.25 dB/Km (cabled fibre)
Chromatic Dispersion (1285-1330 nm)	< 3.5 ps/nm. Km
Cut off wave length for 2 m fibre section	1320 nm maximum

2.3 Construction Requirements

2.3.1 Features

The cable shall be tight buffered or loose tube type.

2.3.2 Bedding

The bedding of the cable shall consist of an extruded layer of reduced flame propagation low smoke zero halogen/low halogen compounds complying with the fire performance requirements specified in clause 1 of the specification.

2.3.3 Armoured

Armour for the cable shall consist of single layer of stainless steel tape corrugated transversely for lateral strength and to make the cable rodent and termite proof. The armour shall be electrically continuous and bounded to the outer sheath with an overlap of 10% min. Armoured cable shall be suitable for direct underground burial and inside ducts.

The thickness of stainless steel tape to alloy AISI 304 or 305 shall not be less than 0.125 mm. The height of the corrugation shall be minimum 0.6mm and the pitch shall be 2.5 mm maximum. Outer jacket of 1.8 mm minimum thickness HDPE shall be provided over the steel tape throughout the length of the cable.

2.3.4 Moisture Barrier

Cable core shall be covered with a continuous layer of a non-hygroscopic dielectric material applied longitudinally or helically with an overlap. The cable core shall be fitted with suitable material to avoid moisture.

2.3.5 Oversheath

The Oversheath of the cable shall be an extruded layer of anti-corrosion, reduced flame propagation, low smoke zero halogen/low halogen compound complying with the fire performance requirements specified in clause 1 of the specifications.

2.3.6 Identification

2.3.6.1 Each fibre shall be colour-coded to provide easy unit identification.

The Oversheath of the cable shall be embossed with cable type and manufactures name.

2.3.7 RIP Cord

2.3.7.1 Suitable Rip cord (s) shall be provided which shall be used to open the sheath (s) and the armour of the cable. The Rip cord (s) shall be properly waxed to avoid wicking action and shall not work as a water carrier.

2.4 Mechanical Requirement**2.4.1 Tensile Strength (Test IEC 794-1-E₁)**

2.4.1.1 The cable shall have sufficient strength to withstand a load of $9.8 \times w \times 1.3$ Newton, where w is mass of 1 Km of cable in Kg. This load shall be sustained for 10 minutes, and shall not produce elongation of cable fibre exceeding 0.25 % and shall not cause permanent damage to constituent parts of the cables. The change in attenuation loss shall not be more than 0.05 dB/Km.

2.4.2 Compressive Stress (Test IEC 794-1- E₃)

2.4.2.1 The fibre and component parts of the cable shall not suffer permanent damage and change in attenuation shall not be more than 0.05 dB/Km. When subjected to a compressive load of 4000 N applied between two plates of dimensions 100 mm x 100 mm. The load shall be applied for 60 seconds.

2.4.3 Impact (Test IEC 794-1-E₄)

- 2.4.3.1 The fibre and component part of the cable shall not show any cracks or break when the cable is exposed to 10 impacts each having an energy of 50 Newton from a height of 0.5 m with impacting surface radius of 300mm. The change in attenuation shall not be more than 0.05 dB/Km

2.4.4 Kinks (Test IEC 794- 1 – E₁₀)

- 2.4.4.1 Bending radius with rated pulling tension as specified above shall be approximately 20x outer diameter. When a sample of length 10 times the minimum bending radius of the cable is subjected to kinking it shall not cause break in any fibre and kink shall disappear after normalising the cable. The change in attenuation shall not be more than 0.05 dB/Km.

2.4.5 Bending Radius

- 2.4.5.1 The cable shall be flexible such that bending radius without pulling tension shall be approximately 20 x outer diameter without causing any damage to the cable.
- 2.4.5.2 Bending radius without pulling tension shall be less than 700mm for all optical cables.

2.4.6 Length of Cable Drum

- 2.4.6.1 Length of cable shall be so manufactured or supplied to avoid any joint in the section between the stations. Joints if any shall be in the Telecommunication equipment rooms at stations, depot & OCC. Wastage of cable on account of small residual pieces shall be avoided.

2.5 Environmental Requirement

- 2.5.1 The cable shall be of outdoor type and operating in temperature range of 0° C to 55° C and humidity 100%.
- 2.5.2 No deterioration in cable performance shall result during storage at temperatures – 20 °C to +65° C and temporarily upto + 70 °C.
- 2.5.3 The cable shall be able to withstand ultraviolet radiation from sunlight without significant reduction in the service life of the cables.

2.6 Testing

- 2.6.1 Test method of the cable shall conform to the ITU-T Recommendations G.652 for the single mode fibre cable and relevant IEC specifications.
- 2.6.2 Test results and certificates shall be submitted for review by the Employer's Representative

3. OPTICAL PATCH CORD AND PIGTAIL

3.1 Standard

3.1.1 All patch cords (or jumpers) and pigtails shall be fitted with one type of high quality optical connector such as FC/PC connectors for the single mode patch cord/pigtail at the factory. The manufacturer shall indicate the type of connector offered for the Employer's Representative to choose a suitable type. The optical type specified on the transmission equipment shall be compatible with the optical fibre termination. The coupling loss of the connector shall be less than 0.3 dB repeatedly

3.1.2 All single mode optical patch cords and pigtails shall comply with ITU-T Recommendation G.652.

3.2 Optical Requirements

Single mode optical patch cords and pigtails shall be same as for single mode fibre cable at clause 2.2 of this specification except the cut off wavelength which shall be 1240 nm maximum for patch cords and pig tails.

4. Not Used.

5. Not Used.

6. Not Used

7. LOUDSPEAKER CABLE

In addition to the requirements specified in section 1 appendix D of this PS following specifications shall be complied with by Loudspeaker cables :

7.1 Construction Requirements

7.1.1 Conductors

7.1.1.1 The conductors shall be of stranded, high conductivity annealed copper wire complying with all the requirements of IEC 60228 and BS 6360.

7.1.1.2 Cables for fixed installations shall have conductors with stranding to table II class 2 of IEC 60228, and flexible cables shall have stranded conductors to table II class 5 of IEC 60228.

7.1.1.3 Conductors shall be smooth, uniform in quality, free from scale, spills, splits and any other defects. There shall be no joints in individual strands except those made in the base rod or wire before final drawing.

7.1.2 Insulation

7.1.2.1 The Sheath and Jacket insulation shall consist of extruded low smoke halogen free/low halogen material.

7.1.2.2 The nominal thickness of Jacket insulation shall be as specified in BS 6724/BS3573.

7.1.2.3 The insulation shall not break down when spark tested in accordance with BS 5099.

7.1.3 Core Identification

7.1.3.1 The insulated cores shall be clearly identified by colours, and the identification scheme shall be in accordance with IEC 60189/BS 4808.

7.1.3.2 The required number of pairs shall be laid up in concentric layer to form a compact symmetrical cable.

7.1.4 Pairs

7.1.4.1 The insulated cores shall be twisted together to form pairs.

7.1.4.2 The attenuation of each pair shall be measured and shall not exceed 0.88 dB/km at 800Hz at a temperature of 20°C.

7.1.5 Bedding

7.1.5.1 The bedding shall consist of an extruded layer of low smoke zero halogen/low halogen bedding compound. When tested in accordance with BS 6425/IEC 754 Part 1, the level of HCl shall not be greater than 0.5%. In the case of low halogen bedding compound the level of HCL shall not be greater than 8.0 %.

7.1.6 Screening

7.1.6.1 Screening shall be achieved by the use of laminated tape, consisting of an aluminium foil bonded to a polyester film for the strength, applied to the cable with an overlap so that full 100% coverage of the conductors is afforded. The spray-on types of construction shall not be provided.

7.1.6.2 A drain wire or continuity conductor, laid under and in contact with the aluminium foil shall be provided and shall be in accordance with BS 5308 Clauses 7 and 10 as appropriate. The tinned annealed copper conductor, which may be solid or a stranded construction, in keeping with current manufacturing techniques, shall have a minimum cross-sectional area of 0.5 sq. mm.

7.1.6.3 The maximum resistance of the drain wire or continuity conductor provided shall meet with the requirements of IEC 60228/BS 6360.

7.1.7 Armour

7.1.7.1 General

7.1.7.1.1 Armouring the cables, when specified, shall be by means of galvanised steel wire or tape. In addition to providing protection against accidental damage the armour shall also form a resistive barrier against the ingress of rodents.

7.1.7.2 Wire Armour

7.1.7.2.1 Armouring shall be of galvanised steel wire to BS 5467. The direction of lay of the armour shall be left hand, and the wire shall be sized in accordance with the manufacturer's recommendations.

7.1.7.3 Tape Armour

7.1.7.3.1 The cable shall be armoured with a steel tape wound or lapped to at least 30% minimum. Steel tape thickness shall comply with the relevant British Standard.

7.1.7.3.2 The metal flat tape shall consist of a single flat tape applied helically and directly over the bedding sheath with a suitable lay and overlap as specified in BS 2870/IEC60502-1. Alternatively, two tapes may be applied each with a slight gap, the second tape covering the gap of the first.

7.1.8 Oversheath

7.1.8.1 The oversheath of the cable shall be an extruded layer of anticorrosion, reduced flame propagation, low smoke zero halogen / low halogen compound complying with the fire performance requirements specified in Clause 1 of this Appendix.

7.2 Electrical Requirements

Conductor Resistance	12.6 ohm/km maximum
Insulation Resistance	100 M ohm-km minimum
Mutual Capacitance at 800 Hz	160 nF/km maximum
Attenuation at 800 Hz	0.88 dB/km maximum
Inductance	0.75 mH/km maximum

7.3 Mechanical Requirements

Maximum pulling tension	35 Newtons
Minimum bending radius	7.5 x outer diameter
Operational conditions	0°C to 55°C

7.4 Cable Construction Identification

7.4.1 Not required for loudspeaker cable.

7.5 Testing**7.5.1 Electrical Test**

7.5.1.1 Electrical Tests as specified in BS 3573 shall be carried out on every length of installed cable and shall include the following as a minimum:

- (1) Conductor resistance;
- (2) Insulation resistance; and
- (3) Mutual capacitance.

7.5.2 Mechanical Test

7.5.2.1 Mechanical test as specified in BS 3573 shall be carried out and shall include the following as a minimum:

- (1) Conductors - Elongation test;
- (2) Insulation - Elongation;
- (3) Insulation - Breaking force;
- (4) Insulation - Resistance to compression;
- (5) Insulation - Retraction;
- (6) Metal sheath thickness;
- (7) Dimensions of magnetic screen tapes; and
- (8) Extruded anti-corrosion flame retardant sheath thickness.

7.5.3 Fire Performance Test

7.5.3.1 Fire performance tests shall be carried out and include the following as a minimum:

- (1) Oxygen index measurement (type and sample test);
- (2) Temperature index measurement (type and sample test);
- (3) Flame propagation (type test);
- (4) Corrosive & acid gas emission (type and sample test); and
- (5) Smoke emission (type and sample test).

7.5.4 Test Results

7.5.4.1 Test results and certificates shall be submitted for review by the Employer's Representative.

8 MICROPHONE CABLE

In addition to the requirements specified in section 1 appendix D of this PS following specifications shall be complied with by Microphone cables (for cables not having RDSO/TEC specifications) :

8.1 Construction Requirements

8.1.1 Conductors

8.1.1.1 The conductors shall be of stranded, high conductivity annealed copper wire complying with all the requirements of IEC 60228 and BS 6360.

8.1.1.2 Cables for fixed installations shall have conductors with stranding to table II class 2 of IEC 60228, and flexible cables shall have stranded conductors to table II class 5 of IEC 60228.

8.1.1.3 Conductors shall be smooth, uniform in quality, free from scale, spills, splits and any other defects. There shall be no joints in individual strands except those made in the base rod or wire before final drawing.

8.1.2 Insulation

8.1.2.1 The Sheath and Jacket insulation shall consist of extruded low smoke halogen free/low halogen material.

8.1.2.2 The nominal thickness of the insulation shall be as specified in BS 6724/BS3573.

8.1.2.3 The insulation shall not break down when spark tested in accordance with BS 5099.

8.1.3 Core Identification

8.1.3.1 The insulated cores shall be clearly identified by colours, and the identification scheme shall be in accordance with IEC 60189/BS 4808.

8.1.4 Pairs

8.1.4.1 The insulated cores shall be twisted together to form pairs.

8.1.4.2 The attenuation of each pair shall be measured and shall not exceed 1.5dB/km at 1kHz at a temperature of 20°C.

8.1.5 Bedding

8.1.5.1 The bedding shall consist of an extruded layer of low smoke zero halogen/low halogen bedding compound. When tested in accordance with BS 6425/IEC 754 Part 1, the level of HCL shall not be greater than 0.5%. In the case of low halogen bedding compound the level of HCL shall not be greater than 8.0%.

8.1.6 Screening

8.1.6.1 Screening shall be achieved by the use of laminated tape, consisting of an aluminium foil bonded to a polyester film for the strength, applied to the cable with an overlap so that full 100% coverage of the conductors is afforded. The spray-on types of construction shall not be provided.

8.1.7 Oversheath

8.1.7.1 The oversheath of the cable shall be an extruded layer of anticorrosion, reduced flame propagation, low smoke zero halogen/low halogen compound complying with the fire performance requirements specified in Clause 1 of this Appendix.

8.2 Electrical Requirements

Conductor Resistance	89 ohm/km maximum
Insulation Resistance	50 M ohm/km minimum
Mutual Capacitance at 1 kHz	135 nF/km maximum

8.3 Mechanical Requirements

Maximum pulling tension	25 Newtons
Minimum bending radius	5 x outer diameter
Operational conditions	0°C to 55°C
Relative humidity	up to 95%

8.4 Cable Construction Identification

8.4.1 Not required for microphone cable.

8.5 Testing**8.5.1 Electrical Test**

8.5.1.1 Electrical Tests as specified in BS 3573 shall be carried out on every length of installed cable and shall include the following as a minimum:

- (1) Conductor resistance;
- (2) Insulation resistance; and
- (3) Mutual capacitance.

8.5.2 Mechanical Test

8.5.2.1 Mechanical test as specified in BS 3573 shall be carried out and shall include the following as a minimum:

- (1) Conductors - Elongation test;
- (2) Insulation - Elongation;
- (3) Insulation - Breaking force;
- (4) Insulation - Resistance to compression;
- (5) Insulation - Retraction;
- (6) Metal sheath thickness;
- (7) Dimensions of magnetic screen tapes; and
- (8) Extruded anti-corrosion flame retardant sheath thickness.

8.5.3 Fire Performance Test

8.5.3.1 Fire performance tests shall be carried out and include the following as a minimum:

- (1) Oxygen index measurement (type and sample test);

- (2) Temperature index measurement (type and sample test);
- (3) Flame propagation (type test);
- (4) Corrosive & acid gas emission (type and sample test); and
- (5) Smoke emission (type and sample test).

8.5.4 Test Results

8.5.4.1 Test results and certificates shall be submitted for review by the Employer's Representative.

9. DATA CABLE (UTP Cable CAT - 6)

9.1 In addition to the requirements specified in section 1 appendix D Chapter 5 of this PS following specifications shall be complied with by Data UTP cables. However for the underground section, the low smoke/zero halogen requirements additionally, shall be essential.

9.2. The cable shall as a minimum comply to the following:

- UTP CAT-6 Cable shall be 4 pair UTP cable of 23 AWG Solid Bare copper and polyolefin Insulation.
- Applicable Standard: ISO/IEC 11801 category -6 or better.
- Insulation Resistance: 100M Ohms, Capacitance <250nf/Km

10 DATA CABLE (UTP CAT-5e)

In addition to the requirements specified in section 1 appendix D (Chapter 5) of this PS following specifications shall be complied with by Data UTP cables. However for the underground section, the low smoke/zero halogen requirements additionally, shall be essential.

10.1 The cable shall as a minimum comply to the following:

- (1) The cable shall be FTP Category 5e cable.
- (2) Characteristic Impedance: 100 +/- 15 Ohms.
- (3) Coupling attenuation @ 30 Mhz : 45 Db/100m
- (4) Conductor diameter: 0.50 mm minimum.
- (5) ACR at 100 Mhz: 16 Db/100m.(minimum)

10.2 Test results and certificates shall be submitted for review by the Employer's Representative

11 LOW VOLTAGE POWER CABLE

11.1 Low Voltage Power Cable for Underground Sections shall comply with the following requirements :

11.1.1 Conductors

11.1.1.1 Cables shall be rated to minimum 1000 volt.

11.1.1.2 The conductors shall be of stranded, high conductivity annealed copper wire complying with all the requirements of IEC 60228 and BS 6360. The conductor size to be minimum 2.5 Sq mm.

11.1.1.3 Not used.

11.1.1.4 Cables for fixed installations shall have conductors with stranding to table II class 2 (7 strands / 30 of 0.025 mm dia) of IEC 60228, and flexible cables shall have stranded conductors to table II class 5 of IEC 60228.

11.1.1.5 Conductors shall be smooth, uniform in quality, free from scale, spills, splits and any other defects. There shall be no joints in individual strands except those made in the base rod or wire before final drawing.

11.1.2 Insulation

11.1.2.1 The cable insulation shall consist of extruded low smoke zero halogen material for the underground section.

11.1.2.2 The nominal thickness of the insulation shall be as specified in BS 6724 (for armoured & unarmoured).

11.1.2.3 The insulation shall not break down when spark tested in accordance with BS5099 or UTE C 32022.

11.1.3 Core Identification

11.1.3.1 Core identification shall be as follows:

Number of Cores	Core Colours
Single	Red or Black
Two	Red , Black
Three	Red, Yellow, Blue
Four	Red, Yellow, Blue, Black

11.1.3.2 Black denotes the neutral conductor and the other colours denote the phase colours.

11.1.4 Armour

General: Armouring the cables, when specified (i.e outdoor), shall be by means of galvanised steel wire or tape. In addition to providing protection against accidental damage the armour shall also form a resistive barrier against the ingress of rodents.

Tape Armour: The cable shall be armoured with a steel tape wound or lapped to at least 30% minimum. Steel tape thickness shall comply with the relevant British Standard.

The metal flat tape shall consist of a single flat tape applied helically and directly over the bedding sheath with a suitable lay and overlap as specified in BS2870/IEC-60502-1. Alternatively, two tapes may be applied each with a slight gap, the second tape covering the gap of the first.

11.1.5 Oversheath

11.1.5.1 The oversheath of the cable shall be an extruded layer of anticorrosion, reduced flame propagation, low smoke zero halogen compound complying with the fire performance requirements specified in Clause 1 of this Appendix for the underground section.

11.1.6 Cable Current Carrying Capacity and Design Parameters

11.1.6.1 The maximum continuous current carrying capacity, and the factors for determining such ratings for the cable shall be based on IEC 60287 or IEC 60502 (calculation to be given) and on the conditions obtained on Site.

11.1.7 Cable Construction Identification

11.1.7.1 The oversheath of the cable shall be embossed with the Electric Cable 0.6/1 KV.

11.1.7.2 A means of identifying the manufacturer, year of manufacture, owners identification, conductor size and insulation type shall be provided throughout the length of the cable. The identification shall be embossed onto the oversheath of the cable but it shall not effect the spacing of the legend specified above.

11.1.8 Fire and Smoke Performance Requirement

11.1.8.1 It is essential that hazardous conditions arising from overheating or ignition of cables especially in the underground areas are avoided.

11.1.8.2 The cables for installation in underground sections shall be manufactured from fire retardant/ resistant, low smoke, zero halogen materials.

11.1.8.3 The contractor shall comply in general with the pertinent requirements of NFPA 130 (Fixed Guideway Transit system 2007 edition issued by the US National Fire Protection Association).

11.1.8.4 All insulation shall be moisture and heat resistant, with temperature ratings appropriate to the application conditions and in no case lower than 60 degree C.

11.1.8.5 The Bedding and Oversheath of the cable shall have a minimum Oxygen Index of 30 when tested in accordance with ASTM-D 2863/ NES 715.

11.1.8.6 The Temperature Index of Bedding and Oversheath of the cable shall not be less than 250 Degree Celcius when tested in accordance with ASTM-D 2863/ NES 715.

- 11.1.8.7 Under fire condition of Bedding and Oversheath, minimum average light transmission of 40% shall be available when tested in accordance with BS 6724.
- 11.1.8.8 The level of Hydrochloric Acid gas evolved from Oversheath of cable under fire condition shall not be more than 0.5% when tested in accordance with IEC 60754-1.
- 11.1.8.9 Cables shall be Fire Retardent and shall meet the requirement of IEC60332-1 for Ignition Resistance and Flame Propagation under specified condition. Similarly Bunched Cables shall be Fire Retardent and shall meet the requirement of IEC 60332-3 for Ignition Resistance and Flame Propagation under specified condition.
- 11.1.8.10 The value of the smoke generated (A0) of the low voltage power cables shall meet the requirements of IEC 1034 (BS 6724 : Clause 17.4).
- 11.1.9 Testing**
- 11.1.9.1 All cable type tests shall be in accordance with BS 6724, in case of armoured cables and as per IEC 60502-1 for unarmoured cables.
- 11.1.9.2 Test results and certificates shall be submitted for review by the Employer's Representative.
- 11.2 Low Voltage Power Cable for Elevated/At Grade Section** shall as per IS 1554 (for non flexible type). For flexible cables, flexible conductors can be used.
- 11.2.1 Low Voltage Power Cable shall be of Copper conductors. The conductors shall be of stranded, high conductivity annealed copper wire complying with all the requirements of IEC 60228/BS 6360. The conductor size to be minimum 2.5 sq mm.
- 11.2.2 Fire and Smoke Performance**
- 11.2.2.1 The Bedding and Oversheath of the cable shall have a minimum Oxygen Index of 30 when tested in accordance with ASTM-D 2863./NES 715.
- 11.2.2.2 The Temperature Index of Bedding and Oversheath of the cable shall not be less than 250 Degree Celcius when tested in accordance with ASTM-D 2863./NES 715.
- 11.2.2.3 Under fire condition of Bedding and Oversheath, smoke generated shall meet the requirements of transmittance $\geq 40\%$ as per IEC 1034/BS 6724.
- 11.2.2.4 The level of Hydrochloric Acid gas evolved from Oversheath of cable under fire condition shall not be more than 20% when tested in accordance with IEC 60754-1.
- 11.2.2.5 Cables shall be Fire Retardant and shall meet the requirement of IEC 60332-1 for Ignition Resistance and Flame Propagation under specified condition. Similarly Bunched Cables shall be Fire Retardant and shall meet the requirement of IEC 60332-3 for Ignition Resistance and Flame Propagation under specified condition.
- 11.2.2.6 Test results and certificates shall be submitted for review by the Employer's Representative

APPENDIX E : CONTRACT SPARES:**SPARES FOR PAS/PIDS/MCLK**

S No.	Item	Total
1.	PIDS /PA Integrated Workstation for station (Workstation, Monitor, Mics, Keyboard, Mouse, Speakers, Headphone etc)	1
2.	All type of PCB cards including mother board and power supply unit of PIDS, PIDS Control & Switching Equipment, PIDS LED Modules (For Platform LCD Panels)	2 of each type
3.	All type of PCB cards including mother board and power supply unit of PIDS, PIDS Control & Switching Equipment, PIDS LED Modules (For Concourse LCD Panels)	2 of each type
4.	PIDS Platform Display Board complete (LCD Type)	1
5.	PIDS Concourse Display Board complete (LCD Type)	1
6.	PA Control Panel	1
7.	PA System Pre-Amplifier/Amplifier (M400)	10% population for Each type
8.	PA Speakers	50
9.	PA System noise sensing & feedback equipment	2
10.	Station Sub-Master Clock Complete (With connecting cables & connectors)	1
11.	Indoor Digital Clocks (Synchronized)	2
12.	Outdoor Digital Clocks (Synchronized)	1
13.	Analogue Station Clocks (Double Sided) (Synchronized)	1
14.	Fuses of all types	Three (3) times the quantity in use
15.	Terminals of all types(including WAGOs)	10% population for Each type
16.	Surge Protection Devices(SPDs)	10% population for Each type
17.	Glass & LED light arrangement for Analogue clock (Double Sided)	Three (3) times the quantity in use

APPENDIX H**MMI Provision Schedule****OCC at Mansarovar**

MMI Provision Schedule			
Location	Position	Workstation/Control Panel	
		Type	Quantity
OCC/Mansarovar	Traffic Controller-1 (TC-1)	CCTV Control Panel (Station Surveillance)	1
	Traffic Controller-2 (TC-2)	CCTV Control Panel (Station Surveillance)	1
	Chief Controller (CC)	CCTV Control Panel (Station Surveillance)	1
	Traction Power Controller-1 (TPC-1)		
	Traction Power Controller-2 (TPC-2)		
	Auxiliary Systems Controller (ASC)		
	Rolling Stock Controller-1 (RSC)		
	Rolling Stock Controller-2 (RSC)		
	Assistant to Chief Controller (ACC)		
	Fault Management Controller		
	Security Controller		
		CCTV Workstation(all stations and OCC Surveillance) & associated equipment	2
	CSS / In OCC Building		
		CCTV Workstation(all stations and OCC Surveillance) & associated equipment	1
BCC to Operate from other location (Location to be decided later on)	BACK UP POSITIONS		
		CCTV Workstation for all stations	1
		RAU	1

SCR – At each station	Station Controller	Radio Control Panel	1
		PIDS/PAS Workstation+ PAS Control Panel	1
		CCTV Workstation(Station Surveillance)	1
Security Control Stations (Police Control Booth)	Security Controller	CCTV Workstation(Station Surveillance)	1
On each Platform (PSB) All stations		PAS Control Panel	1 at each platform (PSB)

APPENDIX M**EARTHING POLICY & TRANSIENT PROTECTION - FOR TELECOMMUNICATION SYSTEMS****1.0 OBJECTIVES**

Earthing shall be provided for all indoor & outdoor Telecommunication installations to achieve the following objectives:

- (1) To provide the safety to the operating & maintenance personnel against the electric shock on account of any potential (voltage) appearing on exposed parts with respect to earth or due to electromagnetic or due to electrostatic induction.
- (2) To ensure safe & reliable operation of the equipment by limiting or eliminating the the induced voltages and transients in the Telecommunication equipments.
- (3) To protect the equipment against build up of unduly high voltages which can cause dielectric (Insulation) breakdown or damage to the equipment or their parts.
- (4) To serve as common voltage reference point wherever required.

2.0 POLICY

- (1) The Earthing system shall meet or exceed the requirements of IEEE 1100, NFPA 780 and IEC 1024 or relevant International standards.
- (2) Earthing and other protection devices shall be designed to accomplish the following minimum requirements but not limited to:
 - (a) Protect personnel and equipment from electrical hazards, including lightning.
 - (b) Reduce potential to system neutrals.
 - (c) Reduce or eliminate the effects of electrostatic and electromagnetic interference arising from within the JMRTS on account of Traction voltages, Traction return current, Rolling stock characteristics and other extraneous sources.
 - (d) Provide a proper earthing method for all equipment enclosures, cabinets, drawers, assemblies and sub-assemblies.
 - (e) Provide a clean zero-volt reference point where required.
- (3) The earthing system shall be so designed so as to give earth resistance with in the stipulated limits (as given below) at all locations and under all climatic conditions.
- (4) Any electrical joints in the earthing system shall be protected from moisture ingress by using proper wrapping, sealing with waterproof tapes, or such other measures.
- (5) For the purpose of measurement of earth resistance, a small interconnecting copper strip of appropriate cross-section shall be provided in the ring earth in a small manhole chamber so that the ring earth can be broken from the loop.

- (6) The earthing methods, design and details shall be submitted to the Employer's Engineer for review.

2.1 Stations area (Indoor Equipments)

2.1.1 Main Earth (For Elevated and Underground stations):

Main earth (< 2 Ohm) bus bar shall be provided in the TER, SCR & UPS (S&T) room by another Project/E&M Contractor with copper strip at each location consisting of minimum 20 holes (10 per row). This strip shall be used by JP/JS15B Contractor and also all other Telecom Contractors, to extend their individual earths to their respective cables and racks/equipments.

2.1.2 Clean Earth:

- (B) For underground stations:** Provision and extension of clean earth (< 1 ohm) up to TER to be done by other project/E&M contractor. The earthing to be terminated in TER on copper strip with a copper bus bar having minimum 20 holes

- 2.1.3 In order to ensure a captive earth connection to the cabinets and racks in TER, a minimum cross-section of 16 mm² copper wire must be used for earthing.

- 2.1.4 The cabinets within a row are to be conductively connected by means of screws and contact washers. Two or more rows are interconnected via the EB and if necessary, also by additional earthing cables. In case that one of the cabinets/racks is removed, it must be ensured that the other cabinets in the row remain earthed.

3.0 OUT DOOR INSTALLATIONS

- 3.1 Following out door installations are required to be earthed to the nearest Main Building earth by using a minimum 16 mm² copper wire, to be provided by the respective Telecomm Contractor for his equipment:-

- (1) Metallic sheath & armouring of all cables leading out of TER.
- (2) Location Boxes.
- (3) Display Boards at Platforms & Concourse, Racks.
- (4) Clocks at Platforms & Concourse.
- (5) Emergency Phones in Tunnels/Platforms
- (6) Any other installation as may be necessary to cover complete scope of works under the Telecommunication Contract.

- 3.2 The contractor shall design earthing requirements and implement them to suit requirements of various sub systems. The contractor may make use of Buried Earth Conductor along the main line, if provided by the traction contractor, as per interface specifications. Contractor shall also use suitable safety methods such as screen of wire mesh (earthed) for safety of maintenance staff wherever there is infringement of equipment installation in the signal clearance zone as per IR, RE practices.

4.0 GUIDELINES FOR TRANSIENT PROTECTION & LIGHTNING PROTECTION

4.1 General

- 1) Despite the provision of earthing as specified above (1 ohms), failures of communication equipment do occur on account of finite earth resistance, particularly high voltage transient.
- 2) Typically, a transient is temporary, usually short duration, surge voltage of limited energy. Electronic equipment with high input impedance is inherently more susceptible to transients. Physical distance from the transient source does not necessarily guarantee immunity from the transients.

4.1.1 Requirements for effective transient and surge protection:

1. An effective transient protection system must protect the communication equipment from transients of the following specifications as minimum:
 - a) BS EN 60950-1:2006: Specification for Safety of Information technology equipment including electrical business equipment.
 - b) BS EN 61326(Annex A): Electromagnetic Compatibility (EMC): Generic standards immunity for Industry environments.
 - c) BS EN 41003:1999: Specification for safety requirements for equipment to be connected to telecommunication networks.
 - d) BS 61010-1:2003/A2:1995: Safety requirements for electrical equipment for measurement, control & laboratory use. Part 1: General requirements.
 - e) Underwriters Laboratory safety std 497A: Secondary protectors for Communication Circuits.
2. Peak transient of up-to 700 Volts on the DC Power Supply line for several microseconds.
3. Average transient duration of 2 microseconds with a repetition frequency of 15 kHz to 100 kHz.
4. For short duration transient (<5ms) the variation approaches a sine-wave.
5. For longer duration transients (<5ms) the variation approaches rectangular pulses with an initial rate of rise upto 5×10^4 Volts per second.

Suitable electronic devices (Hybrid Circuitry such as a combination of silicon avalanche diode – also called Transzorbs, high impedances in combination of Gas discharge Tubes) having high surge handling capability, fast response time, low clamping voltage, etc., shall be incorporated in the communication equipment subsystems offered, to ensure that the latter withstands the conditions mentioned in 4.1.1 above without any damage or permanent degradation in performance throughout the system lifetime.

The selection criteria for such devices shall include, but not limited to, the following:

- a. Reverse standoff Voltage: At least twice the maximum operating voltage and allowing operation over the temperature range:
 - i. Operating temperature range -40° to $+85^{\circ}$ C
 - ii. Storage temperature range -40° to $+100^{\circ}$ C

- b. Pulse Power Rating: This shall have a value to handle the peak pulse power of the transients and ensure their decay in less than 10% of the rise time for the worst pulse likely to be encountered from all possible sources including lightning and transients from overhead traction power system.
- c. SPD should be capable enough to handle a surge current 10kA (of 8/20mA impulse per line) for Power & Telecom Network application.
- d. SPD should be of Auto Resetting type, once surge is diverted

4.1.2 Surge protection devices shall be provided on both the power and data cables as detailed in Table below as a minimum:

Sub-system	Surge Protection for equipment in Platform area and Depot area (Outdoor)			Surge Protection for equipment in room (indoor)		
	Equipment	Power Line	Data Line	Equipment	Power Cable	Data Line
FOTS				Cable Armour	Yes at one end	
				Data Network Equipment	no	*2
PAS	Speaker	N/A	No	PA amplifier output	N/A	1*
	Call Station at PSB	N/A	*1	Mixer	No	No
Telephone	Telephone at PSB	N/A	No	MDF	N/A	Yes
	Emergency Telephone at ends of platform and in the Tunnel	*1	*1	MDF (incoming MTNL telephone line)	N/A	Yes
Clock	Slave Clock (in platform area), Depot Sheds	Yes	Yes	Sub-master Clock / changeover switch	No	Yes
PID	PID in platform area	Yes	Yes	PID cabinet	No	Yes
CCTV	CCTV camera	Yes	Yes	CCTV cabinet	No	Yes
	CCTV Monitor	Yes	Yes	CCTV Monitor	No	Yes
SMPS				SMPS_NIC	Yes	*1
Radio	Antenna and GPS Cable	N/A	No	Antenna and GPS Cable	N/A	Yes
LCX Cable	Start of tunnel	-	Yes		-	Yes

Legend

*1 - yes, if not internally protected. *2 internally protected.

4.1.3 Lightning Protection

- 4.1.3.1 While the station buildings shall be provided with the lightning protection arrangements, the protection against lightning surges travelling through conductors into equipment's side shall be done by the Telecommunication contractor using appropriate devices.

The lightning protection modules for the indoor equipment of the electronic systems are to be positioned on the cable terminal rack. The modules will be fixed between indoor and outgoing cables.

- 4.1.3.2 Earthing and other protective measures in preceding paras are given only as indicative guidelines. Telecomm Contractor shall design, manufacture, install and be responsible for safe and correct working of all equipment/subsystems under the scope of Telecommunication. To achieve this objective, Telecomm. Contractor shall submit his proposals requiring any changes/modifications in above. Telecomm. Contractor shall also submit his proposal for protection devices at power lines, data communication lines and equipment parts and else where for review.

Appendix N:

Corridor	Section	Station	Design, Supply and Installation of Base Frame, False Floor & Under False floor Cable Trays with required risers for wall mounted units in TER of Station along with TER taken over from Civil / E&M.
East – West	Choti Chaupar- Badi Chaupar		
		Choti Chaupar	JP/JS14B
		Badi Chaupar	JP/JS14B

APPENDIX O**CONDUITS AND ACCESSORIES****1. General**

- (a) All conduits and fittings shall be heavy gauge, hot-dipped galvanized welded steel complying with BS 4568: Part 1 Class 4, BS EN 50086 or equivalent Indian Standards and shall be of screwed classification.
- (b) All conduit fittings and components shall be in accordance with BS 4568: Part 2.
- (c) Conduit terminations at apparatus subject to vibration or movement shall be made in heavy gauge sheathed flexible metallic conduit. Adaptors shall have male threads for connection to the rigid conduit system via an adaptable box.
- (d) The minimum size of conduit shall be 20 mm diameter.
- (e) To satisfy requirements for earth fault loop impedance, the layout of conduit, trunking and ducting and routing of cables shall ensure that the maximum circuit lengths allowable are not exceeded.
- (f) Separate conduits system shall be provided for low voltage circuit, extra low voltage circuits, fire alarm circuits and emergency lighting circuit as stipulated in BS 7671.
- (g) Inspection-type conduit bends, elbows and tees shall not be permitted.
- (h) All boxes and conduit accessories shall be fully weatherproof when used in outdoor locations and tunnels. Weatherproof boxes and conduit accessories shall also be used in locations other than outdoors where specified.
- (i) Covers for external application shall have machined faces, and shall be provided with neoprene type gaskets. No box shall be fixed in such a position as to be inaccessible on the completion of the building structure or other services.
- (j) All draw boxes and junction boxes shall comply with the appropriate BS or equivalent IS and be of ample size to permit the cables being drawn in and out. They shall be made of galvanized malleable iron with jointing surfaces machined to ensure a dust-tight joint. All circular boxes shall be provided with long spouts, internally threaded, incorporating a shoulder for the proper butting of the conduit and a tapped 5 mm hole in the base to accept a solid brass earth terminal.
- (k) The ends of all conduits shall be reamed to remove all burrs or sharp edges after the screw threads have been cut. All dirt, paint or oil on the screwed threads of the conduit, sockets and accessories shall be removed before installation.
- (l) The ends of the conduits shall butt solidly in all couplings. Where conduits connect to distribution boards, trunking, switch and fuse units, single and multiple switch boxes, etc, they shall be connected to the apparatus by means of a conduit coupling and hexagon male smooth bore hot dip galvanized bush., compression washers and sockets.
- (m) All conduits shall be kept 80 mm clear of water, gas and other services. All necessary equipotential bonding shall be installed including that for piped services, in accordance with BS 7671.

- (n) No water shall be allowed to enter the conduit at any time and all conduits shall be arranged with adequate ventilation and drainage.
- (o) Where an exposed galvanized surface has been cut or otherwise damaged it shall be repaired by application of a zinc rich epoxy primer with a generous overlap on the existing sound metal coating. Exposed threads and connections shall be similarly treated. The epoxy primer shall be used strictly in accordance with the manufacturer's instructions.
- (p) Not used.
- (q) All bends shall be made on Site to suit Site conditions. Bending of conduit shall be done without the use of heat, using a bending tool that complies with the British Standard appropriate to the conduit material. An adequate number of suitably sized hot-dip galvanized cast iron draw-in boxes shall be provided in conduit runs to enable cables to be drawn in easily and without damage. Draw – in boxes shall be provided in conduit at the following maximum intervals:

(1) Straight run	8 m,
(2) Run with one or two bends	6 m,
(3) Run with three bends	4 m,
(4) Run with four bends	2.5 m.
- (r) All conduits shall be swabbed through before wiring is commenced and cables shall not be drawn into any section of the system until all conduits and draw boxes for that particular section are fixed in position.
- (s) Not used.
- (t) All conduit systems shall be electrically and mechanically continuous and substantially water - tight after installation.
- (u) Wiring shall be carried out on the loop - in system and no joints other than the looping-in points will be allowed.
- (v) No cables installed in conduits shall be laced.
- (w) No conduit shall be under mechanical stress.
- (x) Temporary plugs shall be fitted to open ends of conduit and ducting to prevent ingress of water and solid material.

2. Surface Conduit

- (a) All conduit boxes and accessories for surface conduits shall be of a type manufactured specifically for that purpose.
- (b) All surface mounted conduits shall be run neatly on the surface of the building and truly vertical and horizontal, substantially supported at 1200 mm centres on vertical runs and 900 mm centres on horizontal runs. The false ceilings shall not carry the weight of the conduit or any equipment rigidly connected to it. Conduit shall be supported in accordance with BS 7671, or other international standards independently of the suspended ceilings.

3. Flexible Steel Conduits

- (a) The flexible conduits shall be of good quality material.

- (b) The contractor shall try to make use of the flexible conduit to the least extent as possible. Where flexible steel conduit is employed, the length shall not exceed 2.5 meter.

APPENDIX P**ANNUAL MAINTENANCE CONTRACT FOR PIDS/PAS/MCK (AMC)****1. Terms & Conditions of AMC work**

- 1.1 Contractor shall quote the price for comprehensive Annual Maintenance Contract for two years beyond the Defect Liability Period in Schedule 6(b), Section 4 of Bidding Documents, which shall not be considered for the evaluation of the bid . However, the Employer reserves the right to enter into AMC.
- 1.2 During AMC, contractor shall store sufficient number of spares to meet with any failure for which no extra payment will be made. The contractor has to submit the comprehensive list of spares, consumables, tools etc required for maintaining the system during AMC period to Employer for review and approval. This activity shall be completed three months prior to completion of DLP period.
- 1.3 List of the staff proposed to be deployed for the AMC shall be submitted along with their CVs to the Employer's Representative for review and approval. The approved list of the staff responsible for attending the failure shall be displayed at OCC and these two underground stations of Phase 1B with their address and contact numbers.
- 1.4 The scope of maintenance activities shall include supervision of scheduled and unscheduled maintenance, as and when required by employer, including all routine inspections and service overhauls as may be required for the PAS/PIDS/MCK systems. The contractor is required to submit the AMC plan to Employer for review and approval minimum three months prior to completion of DLP period.
- 1.5 Contractor shall maintain a round the clock centralized location where all the failures shall be reported including on Holidays/ Sundays. A complaint number shall be given as soon as the failure is reported.
- 1.6 The Contractor shall attend all the failures reported by the Employer or his representative. In case a failure cannot be attended at site, the Contractor shall arrange to remove the equipment from site and restore later upon rectification of the failure. In the meanwhile, the Contractor shall arrange, free of cost, temporary replacement before removing the defective equipment
- 1.7 The Contractor shall replace, free of cost, the components which may be necessary as a result of removal of the wear and tear during the period of contract.
- 1.8 The Contractor's Engineer shall check all the system once a month for its perfect working and record the observations in the log book maintained by the Employer with his signature in addition to day to day attending of faults when reported by Employer's Representative.
- 1.9 Penalties shall be levied in case failures are not attended in stipulated time as specified below. Penalty shall be deducted from the AMC charges.

S.No.	Description	Penalty
1.	For attending and rectification of failures(time to be taken from time of information given through email, SMS, Phone etc)	
a)	Beyond MTTR(Mean Time to Restore) upto 1	No financial penalty, however excess time taken

	day	will be cumulatively added to cater extension, if any, of AMC as given at Sr no. 3 below.
b)	Within 1 day to 5 days	Rs. 500/- per day
c)	After 5 days	Rs. 1000/- per day
2.	If any required manpower is not available	Rs. 500/- per person per day
3.	Extension of AMC period	50% of excess time taken in attending and restoration calculated by adding time in 1(a),(b),(c) & 2 above
4.	Maximum Penalty	5% of AMC Value

- 1.10 Any failures/defects observed in the system during the currency of the AMC shall have to be rectified by the contractor before the completion certificate for AMC is issued

2. Hardware Failure Reports

- 2.1 For each hardware failure that occurs the Contractor shall investigate the failure and prepare a report on its cause(s). The report shall clearly show:

- (1) The observed symptoms;
- (2) The most likely cause of the failure;

- 2.3 All such reports will be retained as part of the permanent quality assurance record for the system, which shall be subject to inspection by the Employer's Representative.

3. Software Failure Reports

- 3.1 For each software failure that occurs, the Contractor shall generate a software failure report.

- 3.2 All such reports will be retained as part of the permanent quality assurance record for the system, which shall be subject to inspection by the Employer's Representative.

- 3.3 The report shall clearly show:

- (1) The observed symptoms;
- (2) The likely cause;
- (3) The operator input.

- 3.4 The report shall also clearly show the following information which shall be entered when the failure has been investigated:

- (1) The actual cause of the failure;
- (2) The corrective action taken; and
- (3) All software modules affected.

- 4.0** Man Power need to be deployed as per the requirement of work fronts as made available.

Key managers need to be mobilized within one month from the date of issue of LOA.

- 5.0** The work of AMC beyond DLP shall be awarded by JMRC if so desires through a supplementary contract, however the contractor shall be bound to execute the same.
- 6.0** The prices for AMC shall be inclusive of service tax. Bidders need to submit the performance guarantee for an amount of 10% of supplementary contract value at the time of signing of supplementary agreement.



Procurement of Works

JAIPUR METRO RAIL CORPORATION LIMITED

BIDDING DOCUMENT

for

Procurement on Direct Contract Mode

of

DC No.- JP/JS15 (Phase-1B)

**BID DOCUMENTS FOR DESIGN, MANUFACTURE, SUPPLY,
INSTALLATION TESTING & COMMISSIONING OF TELEPHONE
SYSTEM FOR JMRC PHASE 1B**

PART-II REQUIREMENTS

Section 6 – Employer's Requirements

Volume – III Safety, Health and Environment (SHE) Manual

JAIPUR METRO RAIL CORPORATION LTD.

Khanij Bhawan, Tilak Marg,

C- Scheme, Jaipur (Rajasthan) PIN-302005

Country: India



JAIPUR METRO RAIL CORPORATION LIMITED

SAFETY, HEALTH AND ENVIRONMENT (SHE) MANUAL

CONDITIONS OF CONTRACT ON
SAFETY, HEALTH AND ENVIRONMENT
(NOVEMBER 2013)



Safety, Health and Environment (SHE) Manual



Safety, Health and Environment (SHE) Manual

LIST OF CONTENTS

SL.NO	CONTENTS	PAGE NO.
PART – I : SHE MANAGEMENT		
1.0	General	7
2.0	SHE targets and goals	8
3.0	Compliance	8
4.0	Contractor SHE policy and plan	10
5.0	Designer's Role	11
6.0	Contractor SHE Organisation	12
7.0	Contractor SHE Committee	14
8.0	ID card and first day at work, SHE orientation training	17
9.0	SHE training	17
10.0	SHE inspection	18
11.0	SHE audit	20
12.0	SHE communication	24
13.0	SHE submittals to the Employer	24
14.0	Accident reporting and investigation	25
15.0	Emergency preparedness plans	28
16.0	Experts / Agencies for SHE services	28
PART – II : SAFETY		
17.0	Housekeeping	30
18.0	Working at Height	31
19.0	Overhead protection	40
20.0	Slipping, Tripping, Cutting, Drowning and Falling Hazards	40
21.0	Lifting Appliances and Gear	40
22.0	Launching operation	44
23.0	Construction machinery	45



Safety, Health and Environment (SHE) Manual

24.0	Machine and general area guarding	46
25.0	Manual lifting and carrying of excessive weight	46
26.0	Site electricity	46
27.0	Lighting	50
28.0	Hand Tools and Power Tools	51
29.0	Welding, gouging and cutting	53
30.0	Dangerous and harmful environment	54
31.0	Fire prevention, protection and fighting system	54
32.0	Corrosive substances	55
33.0	Demolition	55
34.0	Excavation and tunnelling	56
35.0	Work permit system	57
36.0	Traffic management	58
37.0	Work adjacent to live railways	60
38.0	Batching plant and casting yard layout	60
39.0	Personal Protective Equipments (PPEs)	61
40.0	Visitors to site	63

PART – III : OCCUPATIONAL HEALTH AND WELFARE

41.0	Physical fitness of workmen	65
42.0	Medical Facilities	65
43.0	Noise	67
44.0	Ventilation and illumination	69
45.0	Radiation	69
46.0	Welfare measures for workers	70

PART – IV : ENVIRONMENTAL MANAGEMENT

47.0	Air Quality	73
48.0	Water Quality	74
49.0	Archaeological and Historical Preservation	75
50.0	Landscape and Greenery	76



51.0	Felling of Trees	76
52.0	Fly Ash	76
53.0	Waste	77
54.0	Hazardous Waste Management	77
55.0	Energy Management	78

PART – V : PENALTY AND AWARDS

56.0	Charges to be recovered from contractor for unsafe act or condition	80
57.0	Stoppage of work	88
58.0	Awards	88

1.	Appendix 1 : Memorandum of understanding	90
2.	Appendix 2 : SHE requirements as per BOCWA & BOCWR	92
3.	Appendix 3 : Contents of contractors SHE Plan	95
4.	Appendix 4 : Employers' workplace policy on HIV/AIDS prevention and control for workmen engaged by contractors	97
5.	General Instruction 1 : SHE manpower requirement	98
6.	General Instruction 2 : Qualification and experience of SHE professionals	100
7.	General Instruction 3 : Minimum requirements of SHE monitoring and Audio-visual equipments	102
8.	General Instruction 4 : Training of Contractor's Employee/Staff	104
9.	General Instruction 5 : ID card format	105
10.	General Instruction 6 : SHE training detail for Managers and Supervisors..	106
11.	General Instruction 7 : SHE training matrix	108
12.	General Instruction 8 : Days to be observed for creating SHE awareness..	109
13.	General Instruction 9 : SHE posters	110
14.	General Instruction 10 : Experts / Agencies for SHE services	113
15.	General Instruction 11 : Minimum lighting required	117
16.	General Instruction 12 : Warning traffic sign	118
17.	Sample Form 1 : Formation of site SHE committee	119
18.	Sample Form 2 : Minutes of SHE committee meeting	120



PART – I : SHE MANAGEMENT



1.0 General

1.1 Scope

- 1.1.1 This document defines the principal requirements of the Employer on Safety, Health and Environment (SHE) associated with the contractor / sub-contractor and any other agency to be practiced at construction worksites at all time.

1.2 Definition / languages

1.2.1 In this document

- i) The use of 'shall' indicates a mandatory requirement.
- ii) The use of 'should' indicates a guideline that is strongly recommended.
- iii) The use of 'may' indicates a guideline that is to be considered.
- iv) 'SHE' means Safety, Health and Environment.
- v) **"Employer"** means JAIPUR METRO RAIL CORPORATION LIMITED (JMRC), its legal successors and assignees
- vi) **"Designer"** means the Contractor, or part of the group forming the contractor, person, firm or company or group of companies, or any replacement, carrying out the Design of Works or part thereof.
- vii) Chief Safety Officer means an officer nominated by JMRC who is overall responsible for monitoring all SHE functions prescribed in this document.
- viii) BOCWA means Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996
- ix) BOCWR means Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Central Rules, 1998
- x) RBOCWR means Rajasthan Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules, 2009
- xi) CIIBC means Chief Inspector of Inspection of Building and Other Construction as appointed by Govt. of Rajasthan.

1.3 Application of this document

- 1.3.1 This document applies to all aspects of the contractor's scope of work, including all aspects conducted by sub-contractors and all other agencies. There shall be no activity associated to the contract, which is exempted from the purview of this document.

1.4 Purpose of this document

- 1.4.1 The objective of these guidelines is to ensure that adequate precautions are taken to avoid accidents, occupational illness and harmful effects on the environment during construction.

1.4.2 This document:

- i) Describes the SHE interfaces between Employer and the Contractor.
- ii) Details the processes by which the contractor shall manage SHE issues while carrying out the work under the contract.
- iii) Describes by reference, the practices and procedures as given in the JMRC Project Safety, Health & Environment manual for best SHE performance.



- 1.4.3 These requirements shall be read together with JMRC Project SHE Manual, OHSAS 18001-1999, Occupational Health and Safety Management System and ISO 14001: 2004 Environmental Management Systems. Definition of key terms used in these requirements related to OHSAS 18001 and ISO 14001 standard are found in JMRC's Project SHE Manual.

2.0 'SHE' Targets and Goals

- 2.1 The SHE targets, goals and aim for the Works are to achieve:
- i) Zero total recordable injuries.
 - ii) Zero reportable environmental incidents
 - iii) All personnel inducted in accordance with the approved contractor SHE plan
 - iv) Total compliance of conducting inspections and audits as per approved SHE plan
 - v) 100% incident recording and reporting
 - vi) 100% adherence of usage of appropriate PPEs at work.
 - vii) Executing construction work with least disturbance to the environment, adjoining road users and traffic.

3.0 Compliance

3.1 Memorandum of Understanding (MOU)

- 3.1.1 A Memorandum of Understanding placed at **Appendix No.: 1** shall be executed before the award of contract by the contractor with regard to various provisions on Safety, Health and Environment to be practiced during the construction work.

3.2 JMRC's SHE Policy and Management Systems

- 3.2.1 The construction works shall be undertaken in accordance with JMRC's SHE Policy and Management Systems as amended from time to time provided in Project SHE Manual.

3.3 Indian statutory requirements

3.3.1 Primary statutory regulations

- 3.3.1.1 **Contractor shall develop thorough understanding about Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act 1996, Central Rules 1998, Rajasthan BOCW Rules 2009, Building and Other Construction Workers' Welfare Cess Act, 1996 and Central Rules, 1998 and Rajasthan Building Construction Workers' Welfare Board Rules, not only to satisfy the Inspectors' perspective but the use of legislation as the strong tool for effective SHE management at construction worksites. Contractor is strongly advised to practice the principle of voluntary compliance.**

- 3.3.1.2 In order to facilitate the contractor for better understanding on the various provisions of the above Act and Rajasthan Govt. Rules, a tabulated information highlighting the Sections/Rules referring to the corresponding registration of contractors, maintenance of registers and records, hours of work and wages, welfare, medical facilities and safety requirements are given in **Appendix No.: 2**. It is an indicative one and not a limiting list.



3.3.2 In addition, the construction works shall be undertaken in accordance with all applicable legislation including amendment made hereunder and Indian statutory requirements listed below but not limiting to:

- i) The Metro Railways (Construction of Works) Act 1978 and rules made thereunder
- ii) The Metro Railways (Operation and Maintenance) Act 2002 and rules made thereunder
- iii) The Electricity Act 2003 and The Indian Electricity Rules 1956
- iv) National Building Code, 2005
- v) The Factories Act, 1948, Rajasthan Factories Rules 1951.
- vi) Motor Vehicles Act as amended in 1994 and The Central Motor Vehicles Rules, 1989.
- vii) Indian Road Congress Code IRC: SP: 55-2001 'Guidelines on Safety In Road Construction Zones.
- viii) The Petroleum Act, 1934 and Rules 2002
- ix) Gas Cylinder Rules, 2004
- x) Indian Explosives Act. 1884, along with the Explosives substance Act 1908 and the Explosives Rules 1983
- xi) The (Indian) Boilers Act, 1923, Rajasthan Boiler Rules, 1954
- xii) The Public Liability Insurance Act 1991 and Rules 1991
- xiii) Minimum Wages Act, 1948 and Rules 1950
- xiv) Contract Labour Act, 1970 and Rules 1971
- xv) Child Labour (Prohibitions & Regulations) Act, 1986 and Rules 1988
- xvi) Environment Protection Act, 1986 and Rules 1986
- xvii) Air (Prevention and control of Pollution) Act, 1981 and Rules 1982
- xviii) Water (Prevention and Control of Pollution) Act, 1974 and Rules 1975
- xix) The Noise Pollution (Regulation & Control) Rules, 2000
- xx) Notification on Control of Noise from Diesel Generator (DG) sets, 2002
- xxi) Recycled Plastic Usage Rules, 1998
- xxii) Notification, Central Ground Water Board, Act January 1997
- xxiii) Manufacture, Storage & Import of Hazardous Chemicals Rules, 1989
- xxiv) The Hazardous Waste (Management & Handling) Rules, 1989
- xxv) Hazardous Waste Management Rules 1989 (amended 1999)
- xxvi) The Bonded Labour System (Abolition) Act, 1976 and Rules 1976
- xxvii) Batteries (Management and Handling) Rules, 2012
- xxviii) Fly ash utilization notification, Sept 1999 as amended in August 2003

3.3.3 The Employee's Compensation Act, 1923 along with allied Rules

3.3.3.1 The contractor shall ensure that all his employees / workmen are covered under 'Employee Compensation Act' and shall pay compensation to his workmen as and when the eventuality for the same arises.

3.3.4 Notwithstanding the above Act/Rules, there is nothing in those to exempt the contractor from the purview of any other Act or Rule in Republic of India for the safety of men and materials.

3.3.5 If the requirements stated in this document are less stringent than or in conflict with the country's applicable legislation, the latter shall apply.



- 3.4 International Standards, Guidelines & ISO Certifications
- 3.4.1 The works should be undertaken in accordance with the applicable international guidelines, standards and specifications on SHE and every contract shall aim to achieve ISO certifications listed below during the currency of the contract:
- OHSAS 18001-1999 : Occupational Health and Safety Management System.
ISO 14001-2004 : Environmental Management Systems.
- 3.4.2 The process of certification shall start immediately after the award of the work and complete within reasonable time. Towards this, the contractor shall undertake the required steps including appointment of ISO consultant for obtaining the certification on Occupational Health and Safety Management System and Environment Management System.
- 3.4.3 **In case of failure on the part of the contractor, the Employer at the cost of the contractor shall do the same.**
- 4.0 Contractor SHE Policy and Plan**
- 4.1 The contractor as per Section 39 of the BOCW Act shall formulate a SHE policy and get it approved by DG/CIIBC respectively and display it at conspicuous places at work sites in Hindi and a local language understood by the majority of construction workers.
- 4.2 Within 4 weeks of the notification of acceptance of the tender, the Contractor shall submit a detailed and comprehensive Contract specific SHE Plan. The SHE Plan shall include detailed policies, procedures and regulations which, when implemented, will ensure compliance of the contract provisions. The SHE Plan shall include the following but not be restricted to:
- i) A statement of the Contractor's policy, organisation and arrangements for SHE
 - ii) The name(s) and experience of person(s) within the Contractor's proposed management who shall be responsible for co-ordinating and monitoring the Contractor's SHE performance;
 - iii) The number of SHE staff who shall be employed on the Works, their responsibilities, authority and line of communication with the proposed Contractor's agent;
 - iv) A statement of the Contractor's policy and procedures for identifying and estimating hazards, and the measures for addressing the same;
 - v) A list of SHE hazards anticipated for this Contract and sufficient information to demonstrate the Contractor's proposals for achieving effective and efficient health and safety procedures;
 - vi) A description of the SHE training courses and emergency drills which shall be provided by the Contractor, with an outline of the syllabus to be followed;
 - vii) Details of the safety equipment which shall be provided by the Contractor, including personal protective equipment;
 - viii) A statement of the Contractor's policy and procedures for ensuring that Contractor's Equipment used on the Project Site are maintained in a safe condition and are operated in a safe manner;
 - ix) A statement of the Contractor's policy and procedures for ensuring that sub-contractors comply with the Contractor's safety plan;
 - x) A statement of the Contractor's disciplinary procedures with respect to SHE related matters, and



- xi) A statement of the Contractor's procedure for reporting and investigating accidents, dangerous occurrences or occupational illnesses
- 4.3 The Contractor shall, from time to time and as necessary are required by the Employer to produce supplements to the SHE Plan such that it is at all times a detailed, comprehensive and contemporaneous statement by the Contractor of his site safety, industrial health and environment obligations, responsibilities, policies and procedures relating to work on Site. Any and all submissions of supplements to the SHE Plan shall be made to the Employer in accordance with the agreed procedures.
- 4.4 If at any time the SHE plan is, in the Employer's opinion, insufficient or requires revision or modification to ensure the security of the Works and the safety of all workmen upon and visitors to the Site, the Employer may instruct the Contractor to revise the SHE plan and the Contractor shall within 7 days submit the revised plan to the Employer for review.
- 4.5 Any omissions, inconsistencies and errors in the SHE Plan or the Employer's acceptance or rejection of the SHE Plan and/or supplements thereto shall be without prejudice to the Contractor's obligations with respect to site safety, industrial health and environment and shall not excuse any failure by the contractor to adopt proper and recognised safety practices throughout the execution of the Work.
- 4.6 The Contractor shall adhere to the SHE Plan and shall ensure, as far as practically possible, that all sub-contractors of all tiers require that contracting parties each have a copy of the Site SHE Plan and comply with its provisions.
- 4.7 The details of contents to be covered in the site SHE plan are given in **Appendix No.: 3**

5.0 Designer's role

5.0 Designer's role in Safety, Health and Environment

- 5.1 Designer's primary role includes to minimise the risk to health and safety of those who are going to construct, maintain, clean, repair, dismantle or demolish the structures and any one else like adjoining road users/general public, who might be affected by the work.
- 5.2 General philosophy
 - 5.2.1 When considering health and safety in designer's work, they shall be expected to do what is reasonable at the time the design is prepared. It may be possible for hazards, which cannot be addressed at the feasibility stage to be looked at during detailed design. In deciding what is reasonably practicable, the risk to health and safety produced by a feature of the design has to be weighed against the cost of excluding the feature. The overall design process does not need to be dominated by a concern to avoid all risks during the construction phase and maintenance. However, a judgement has to be made by weighing up one consideration against another so the cost is counted not just in financial terms, but also those of fitness for purpose, aesthetics, buildability or environmental impact. By applying these principles, it may be possible to make decisions at the design stage, which will avoid or reduce risks during construction work. In many cases, the large number of design considerations will allow a number of equally valid design solutions. What is important is the approach to the solutions of design problems. This should involve a proper exercise of judgement, which takes account of health and safety issues.
- 5.3 Hierarchy of Risk Control



- 5.3.1 Designers shall need, so far as reasonably practicable, to avoid or reduce risks by applying a series of steps known as the hierarchy of risk control or principles of prevention and protection. The steps to be adopted shall include the following:
- i) consider if the hazard can be prevented from arising so that the risk can be avoided (eg, alter the design to avoid the risk);
 - ii) if this cannot be achieved, the risk should be combated at source (eg, ensure the design details of items to be lifted include attachment points for lifting);
 - iii) failing this, priority should be given to measures to control the risk that will protect all people;
 - iv) only as a last resort should measures to control risk by means of personal protection be assumed (eg, use of safety harnesses).

5.4 Duty to provide health and safety risks in the drawing itself

- 5.4.1 In case of situations where the designers have carried out the design work and concluded that there are risks, which was not reasonably practicable to avoid, detailed information shall be given about the health and safety risks, which remain. This information needs to be included with the design to alert others to the risks, which they cannot reasonably be expected to know. This is essential for the parties who have to use the design information.

- 5.4.2 If the designers' basic design assumptions affect health or safety, or health and safety risks are not obvious from the standard design document, the designer shall provide additional information. The information shall include a broad indication of the assumptions about the precautions for dealing with the risks. The information will need to be conveyed in a clear manner; it shall be included on drawings, in written specifications or outline method statements. The level of detail to be recorded will be determined by the nature of the hazards involved and the associated level of risk.

5.5 Employer's approval

- 5.5.1 Every structure like scaffold, false work, launching girder, earth retaining structures etc. shall have its design calculations included in the method statements in addition to health and safety risks. Employers' designer or his approved proof check consultants as applicable as per the contract conditions shall approve all these designs.

- 5.6 Any non-standard structures like trestles made up of re-bars or structures which are very old, corroded, repaired for many times etc. for which no design calculations can be made accurately from any national standards, shall not be allowed to be used at sites even for short duration.

- 5.7 If any of the above mentioned clauses are not adhered to, penalty shall be imposed depending upon the gravity of the unsafe act and/or condition.

6.0 Contractor SHE Organisation

6.1 Education and Experience

- 6.1.1 The contractor shall appoint the required SHE personnel as prescribed in General Instruction **JMRC/SHE/GI/001** (enclosed at the end) based upon the statutory requirement and establish the safety organisation based upon the contract value. The minimum educational qualification and the work experience are given in General Instruction **JMRC/SHE/GI/002**.



- 6.1.2 **In order to effectively interact on labour welfare matters with the Employer and the statutory authorities enforcing the labour welfare legislations every contractor shall employ a full time Labour Welfare Officer duly qualified and experienced as per Clause 6.1.1.**
- 6.2 Conduct and competency
 - 6.2.1 The conduct and functioning of the contractor SHE personnel shall be monitored by the Employer. Any default or deficiency shall attract penalty as per details given under penalty clause 56.0 of this document.
 - 6.2.2 The Contractor shall ensure that all personnel are competent to perform the job assigned to them. In the event that the Contractor is unable to demonstrate the competency of any person whose activities can directly impact on the Works' SHE performance, the Employer shall remove that person from the site without any procedural formalities.
- 6.3 Approval from Employer
 - 6.3.1 The name, address, educational qualification, work experience and health condition of each personnel deployed for SHE jobs shall be submitted to the Employer in the format prescribed for the purpose for comments and approval well before the start of the work. Only on approval by the Employer these personnel are authorised to work. In case any of the SHE personnel leaves the contractor the same shall be intimated to the Employer. The contractor shall recruit new personnel and fill up the vacancy.
- 6.4 **Responsibility of SHE personnel**
 - 6.4.1 **For all works carried out by the contractor and his sub-contractors, the responsibility of ensuring the required SHE manpower lies with the main contractor only. The minimum required manpower indicated by the Employer includes the sub-contractors' work also. It shall be the responsibility of the main contractor to provide required SHE manpower for all the works executed by all contractors. Necessary conditions shall be included in all sub-contract documents executed by the main contractor.**
- 6.5 Employment status of SHE personnel
 - 6.5.1 No contractor shall engage SHE manpower from any outsourcing agencies in which case the effectiveness would be lost. All SHE manpower shall be on the payroll of the main contractor only and not on the payroll of any subcontractor or outsourcing manpower agencies etc. This condition does not apply to positions like traffic marshals who are engaged almost on a daily requirement basis.
- 6.6 Reporting of SHE personnel
 - 6.6.1 All SHE personnel are to report to the Chief SHE Manager who shall report directly to the Chief Project Manager. The Employer shall monitor adherence to this procedure at all times. In case of non-adherence penalty shall be levied as indicated in the penalty clause.
- 6.7 **Inadequate SHE personnel**



- 6.7.1 In case if the contractor fail to provide the minimum required manpower as illustrated in General Instruction JMRC/SHE/GI/001, or fail to fill up vacancies created within 14 days, the same shall be provided by the Employer at contractor's cost. Any administrative expenses involved to provide the same like paper advertisement or manpower consultant charges, etc shall also be at the cost of contractor.
- 6.8 Prohibition of performance of other duties
- 6.8.1 As per Schedule VI of RBOCWR no SHE personnel shall be required or permitted to do any work which is unconnected to, inconsistent with or detrimental to the performance of the SHE duties for respective category mentioned in General Information JMRC/SHE/GI/001
- 6.9 Facilities to be provided to SHE personnel
- 6.9.1 As per schedule VIII of BOCWR, the contractor shall provide all SHE personnel with such facilities, equipment and information that are necessary to enable him to dispatch his duties effectively.
- 6.9.2 The minimum Employer's requirements of such facilities / equipments to be provided for SHE personnel are given in the General Instruction JMRC/SHE/GI/003.
- 7.0 Contractor SHE Committee**
- 7.1 All employees should be able to participate in the making and monitoring of arrangements for safety, industrial health and environment at their place of work. The establishment of site SHE committees in which employees and Contractor and sub-contractor management are represented can increase the involvement and commitment of employees. The contractor shall ensure the formation and monitor the functioning of contractor SHE committees.
- 7.2 Terms of Reference
- 7.2.1 The Terms of Reference for the committee shall be as follows;
- i) To establish company safety policies and practices
 - ii) To monitor the adequacy of the contractor's site SHE plan and ensure its implementation
 - iii) To review SHE training
 - iv) To review the contractor's monthly SHE report.
 - v) To identify probable causes of accident and unsafe practices in building or other construction work and to suggest remedial measures.
 - vi) To stimulate interest of Employer and building workers in safety by organizing safety week, safety competition, talks and film-shows on safety, preparing posters or taking similar other measures as and when required or as necessary.
 - vii) To go round the construction site with a view to check unsafe practices and detect unsafe conditions and to recommend remedial measures for their rectifications including first-aid medical and welfare facilities.
 - viii) Committee team members should perform a site inspection before every committee meetings and to monitor SHE inspection reports.
 - ix) To bring to the notice of the Employer the hazards associated with use, handling and maintenance of the equipment used during the course of building and other construction work



Safety, Health and Environment (SHE) Manual

- x) To suggest measures for improving welfare amenities in the construction site and other miscellaneous aspect of safety, health and welfare in building or other construction work.
- xi) To look into the health hazards associated with handling different types of explosives, chemicals and other construction materials and to suggest remedial measures including personal protective equipment.
- xii) To review the last safety committee meeting minutes and to take action against persons/sub-contractors for non-compliance if any.

7.3 Within 14 days of award of contract, the SHE committee shall be constituted and notification regarding the same shall be communicated to the members and employees as per the format provided in **Form No.: SF 001**

7.4 Site SHE Committee meeting shall be conducted at least once in a **month** with the minimum members listed below:

Chairman	Project Manager
Secretary	SHE Manager (In-charge)
Members	<ul style="list-style-type: none"> i) Labour Welfare Officer ii) In charge of plant and machinery iii) In charge of site electrics iv) In charge of stores. v) Senior Managers/ Engineers heading different sub functions. vi) Sub – contractor's representative vii) Labour Contractor's representative viii) Workers' representative ix) Co-contractor representative. x) SHE staffs
Employer's Representatives	JMRC SHE in charge and other representatives

7.5 Construction SHE Committee meeting shall be conducted at least once in a **week** with the minimum members listed below:

Chairman	Project Manager
Secretary	SHE Manager (In-charge)
Members	<ul style="list-style-type: none"> i) Labour Welfare Officer ii) In charge of plant and machinery iii) In-charge of site electrics iv) Senior Managers / Engineers heading different sub functions v) Sub- Contractor's representative vi) Labour contractor's representative vii) Workers' representatives viii) All SHE Staffs



- 7.6 Co-contractors' participation
- 7.6.1 In case of depot, station and other contiguous areas where more than one main contractors are working together, the Employer shall instruct the other contractors to join for the monthly SHE committee meeting of the main civil contractor, so as to discuss and decide about the common provision of security, lighting, toilet, drinking water etc. and sharing the maintenance cost of the same etc.
- 7.6.2 **The general principle for sharing the cost shall be either based on the contract value of works executed at the contiguous area or the daily average number of workmen employed by each contractor in the contiguous area.**
- 7.7 Minimum time between two monthly SHE Committee meetings
- 7.7.1 A minimum period of **21 days** shall be maintained between any two SHE monthly committee meetings.
- 7.8 **Agenda**
- 7.8.1 The Secretary shall circulate the agenda of the meeting at least seven working days in advance of the scheduled date of the meeting to all members.
- 7.8.2 The agenda should broadly cover the following:
- i) Confirmation of minutes
 - ii) Chairman's review/overview of site SHE performance / condition
 - iii) Previous month SHE statistics
 - iv) Incident and Accident Investigation / dangerous occurrence / near miss report
 - v) Site SHE inspection
 - vi) Sub-contractors' SHE issues
 - vii) Safety presentation by Members
 - viii) Report from Employer
 - ix) Matters arising
 - x) Any other business
- 7.9 Minutes of the meeting
- 7.9.1 The Minutes of the meeting shall be prepared as per the format provided at **Form No.: SF-002** and sent to all members within 2 working days preferably by mail/fax followed by hardcopy. Safety Committee meeting minutes shall also be displayed in the notice board for wider publicity to all concerned.
- 7.10 **Disciplinary Action**
- 7.10.1 The chairman shall inform the members of any outstanding issues in the meeting and in case of repeated offence/ non-compliance by some members or other co/sub contractors and propose suitable disciplinary action including provisions of monetary penalty as per the relevant contract clauses, the Employer shall ensure that the same is implemented.



8.0 ID Card and First day at work, SHE orientation training

- 8.1 The Contractor shall ensure that all personnel working at the site receive an induction SHE training explaining the nature of the work, the hazards that may be encountered during the site work and the particular hazards attached to their own function within the operation. The training shall cover the contents as given in the General Instruction **JMRC/SHE/GI/004.**
- 8.2 **All personnel shall be issued a photo identity card of size 85mm x 55mm duly signed by the authorized representative of the contractor before they are engaged for any work as per the format given in the General Instruction **JMRC/SHE/GI/005.****
- 8.3 Contractor shall also issue a personnel SHE handbook in a language known to the workers, which provides information on SHE and emergency procedures that all personnel working on contract are required to know and the need to follow. Contractor shall ensure that this is distributed and its content introduced to all personnel working at the site.

9.0 SHE Training

- 9.1 The behaviour of people at all levels of the contractor is critical for SHE performance.
- 9.2 The contractor shall organise quality SHE training to engage Managers, supervisors and other personnel in behavioural change and improve safety performance.
- 9.3 The Contractor shall analyse the training requirements for all the employees and initiate a training program to demonstrate that all persons employed, including subcontractors, are suitably qualified, competent and fit. This will include:
- i) Detailed Job descriptions for all personnel, to include their specific SHE responsibilities
 - ii) Specification of qualifications, competency and training requirements for all personnel
 - iii) Assessment and recording of training needs for all personnel, including subcontractors' employees in the workforce, vendor representatives and site visitors
 - iv) A system for assessing new hirers e.g. previous training
 - v) A means of confirming that the system is effective
 - vi) A matrix and schedule of training requirements, covering general, task-specific and SHE-related training, showing the training frequency and interval between refresher courses
 - vii) Timely, competent delivery of training courses
- 9.4 The contractor shall arrange behavioural-based training programmes for all the executives to identify, recognise and eliminate unsafe act and unsafe conditions.
- 9.5 The minimum Employer's requirement of training needs for various categories of employees are given in general instruction **JMRC/SHE/GI/006**
- 9.6 The contents of SHE training to Managers/Supervisors as given in general instruction **JMRC/SHE/GI/007** shall be conducted.
- 9.7 **The refresher-training programme to all employees shall be conducted once in six months.**



- 9.8 **Toolbox talk as given in the Employer's Project SHE manual shall be conducted to all high-risk workmen everyday.**
- 9.9 **On-the spot practical skill development training on height safety including scaffold safety, crane safety, welding safety, electrical safety, traffic safety for marshals shall also be conducted to all foremen/ workmen who were associated to the concerned jobs.**
- 9.10 **Daily Safety Oath as given in Project SHE manual shall be taken by every employee including workman without fail.**
- 9.11 **All vehicle drivers including Hydra operators shall be trained on defensive driving at any Government authorized Institute or Maruti Institute of Driver Training and Research at Wazirabad Road, Adjoining Loni Road Flyover, Delhi-110094. All vehicle drivers shall also undergo refresher training on defensive driving provided by the same institute once in 6 months.**
- 9.12 All the above listed training programmes except at Clause **9.11** shall be organised by the contractor only after taking approval from the Employer for the training faculty / organisation, content and durations.
- 9.13 **In case of failure on the part of the contractor to provide all the above-mentioned training programs to all employees in time, the same shall be provided by the Employer through accredited agencies if required by formulating a common scheme to all contractors. Any administrative expenses and training fee towards the same shall be at the cost of the contractor.**
- 10.0 SHE Inspection**
- 10.1 The contractor shall evolve and administer a system of conducting SHE inspections and other risk management analysis on a periodical basis.
- 10.2 The purpose of SHE inspection is to identify any variation in construction activities and operations, machineries, plant and equipment and processes against the SHE Plan and its supplementary procedures and programs.
- 10.3 Following SHE inspections program shall be adopted.
- i) Planned General Inspection
 - ii) Routine Inspection
 - iii) Specific Inspection
 - iv) Other Inspection
- 10.3.1 Planned General Inspection
- 10.3.1.1 Planned general inspections are performed at predetermined intervals and it usually involves the representation from both Contractor and the Employer.
- 10.3.1.2 Inspections that will be classified under this inspection program are:
- i) Monthly contractor and subcontractors site safety committee Inspection.
 - ii) Weekly safety inspection by construction supervisors (Contractors and Sub-contractors).



- iii) Daily safety inspection by contractor site SHE team.

10.3.2 Routine Inspection

- 10.3.2.1 Routine inspections are often referring to the inspection of work site, equipment and temporary structures performed by site and equipment operators and temporary structure erectors.

Inspections that will be classified under this inspection program are:

- i) Daily Inspection of plant and equipment by operator
- ii) Weekly Inspection of scaffold by scaffolding supervisor
- iii) Monthly Inspection of electrical hand tools by competent electrical supervisor
- iv) Quarterly Inspection of temporary electrical systems by competent electrical supervisor
- v) Half-yearly inspection of lifting machinery, lifting appliances, equipment and gears by Govt. approved competent person.

- 10.3.2.2 The list mentioned above is not exhaustive. Contractor may add additional categories. Contractors' Site SHE Manager will ensure that a system of routine inspections are carried out periodically to all plants, equipment, powered tools and any other temporary structures that will pose a hazard to operators and workmen.

10.3.3 Specific Inspection

- 10.3.3.1 Specific inspections are performed on activities without a predetermined date. Competent supervisors usually perform inspections for ensuring an activity whether it is executed in accordance to a general set of rules; method statement submitted or developed procedures.

The following are examples that will be commonly performed as required on the construction site:

- i) Inspection performed before a heavy lifting operation.
- ii) Inspection performed before and after the entry of person into a confined space.
- iii) Inspection performed before and after a welding and gas cutting operation.
- iv) Inspection of formwork before concreting by formwork erector.

The list mentioned above is not exhaustive. The contractor shall ensure that a competent supervisor inspects all high-risk processes and activities.

10.3.4 Other Inspection

Other inspections includes the following:

- i) Mandatory Inspections by Labour Department of Government.
- ii) JMRC site SHE management team

- 10.3.5 The contractor shall prepare all required safety inspection checklist for all activity operations and equipment. Checklists will be prepared based on the Indian standards, rules and regulations and Employer's requirements. The formats provided in the Project SHE manual may be referred.

- 10.3.6 All inspection records and reports will be properly kept and filed for audit purpose. Inspection reports of Planned General Inspection and Routine Inspection will be used for discussion during Safety Committee Meetings.



11.0 SHE Audit

11.1 General

11.1.1 The purpose and scope of SHE audit is to assess potential risk, liabilities and the degree of compliance of construction Safety, Health & Environmental plan and its supplementary procedures and programs against applicable and current SHE legislation regulations and requirements of the employer.

11.1.2 Project Manager holds the ultimate responsibility in ensuring implementation of SHE audit program during the construction work.

11.2 Monthly Audit Rating Score (M A R S)

11.2.1 **Monthly Audit Rating Score (MARS) will be performed once in a month. A team consisting of Project manager and Employer representative based on the pre-designed score-rating format will conduct it. The details of the pre-designed monthly audit score rating formats are given in the Project SHE manual.**

11.2.2 This Monthly SHE Audit Rating Score (MARS) report will enable the Employer to evaluate the general compliance by the Contractor with the Conditions of Contract, the Employer's Project SHE Manual and the Contractor's site specific SHE Plan.

11.2.3 Monthly Audits will be conducted in accordance with JMRC Guidelines. The Project Manager accompanied by the Employer's representatives shall carry out the Audit. The Contractor's senior manager and SHE in-charge should also be invited to attend.

11.2.4 Timing

The Monthly Audit Rating Score (MARS) should be conducted at least 7 days prior to the scheduled date of Monthly SHE Committee meeting.

11.2.5 Evaluation

11.2.5.1 The numerical scoring has been weighed on a 1-10 scale. The audit team will use their observations noted in evaluating the points to be awarded against each of the elements of the audited section. Wherever some topics and sub-topics are not applicable the score rating need not be given. The overall audit ratings shall be achieved by:

$$\text{Overall Audit rating} = \frac{\text{Actual Score Achieved}}{\text{Maximum Possible Score}} \times 100$$

11.2.5.2 The criticality of the required actions for the respective sections of the Audit will be classified as:

Sl. No.	Score	Description	Action
1	< 60%	Immediate	Require Contractor to rectify within 24 hours and confirm in writing to Employer
2	< 75%	Improvement Necessary	Contractor rectification within 7 days and



Safety, Health and Environment (SHE) Manual

			confirmed in writing to Employer
3	< 90%	Improvement Desirable	Contractor rectification within one month and confirmed in writing to Employer

11.2.6 Report

A copy of each Audit Report will be sent to Employer and to all subcontractors, with whom it will then be discussed in detail at the Monthly SHE Committee Meeting in order to ensure that any corrective actions are agreed upon.

11.3 Monthly Electrical Safety Audit

11.3.1 A team comprising of contractor's senior SHE (Electrical) engineer and Employer's representative shall conduct monthly electrical safety audit covering the following and submit the report to Employer.

- i) Electrical accidents investigation findings and remedy
- ii) Adequacy of power generation and power requirements
- iii) Power distribution and transmission system in place
- iv) Updated electrical single line diagram showing the current condition of power source and distribution including the IP44 DBs arrangement.
- v) Electrical protection devices – selection, installation and maintenance.
- vi) Earth or ground connection and earth pit maintenance details
- vii) Education and training of electrical personnel undertaken
- viii) Routine electrical inspection details
- ix) Electrical maintenance system and register.
- x) Name plate details of major electrical equipment
- xi) Classified zones in the site, if any.

11.4 External SHE Audit

11.4.1 **External SHE audits are to be conducted by external agencies that are competent with ISO qualified auditors with the prior approval of the Employer.**

11.4.2 **Areas of competence of Audit team**

11.4.2.1 **Practical understanding of BOCW Act and Rules, statutory requirements on health/medical and welfare of workmen, construction hazards and its prevention and control, traffic management, electrical safety, rigging, safety of construction equipment and environment management.**

11.4.2.2 **Audit shall be conducted as per the guidelines of ISO, ILO, and national standards. Audit report shall also be presented as per the above formats.**

11.4.3 **External SHE audit shall be conducted on a quarterly basis throughout the currency of the contract.**

11.4.4 Targets of SHE Audit:

The contents and coverage of the external audit shall include the following items



11.4.4.1 SHE management:

- i) Organization
- ii) Communication and Motivation
- iii) Time office
- iv) Inspection
- v) Emergency preparedness
- vi) Budget allocation
- vii) Education and Training
- viii) Work permit system

11.4.4.2 Technical:

- i) Building and Structure
- ii) Construction operational safety
- iii) Material safety
- iv) Hand tools and Power tools
- v) Electrical system
- vi) Safety Appliances
- vii) Fire prevention and control
- viii) Housekeeping
- ix) Maintenance and Machinery safety
- x) First-aid and Medical Facilities
- xi) Welfare measures
- xii) Environmental Management

11.4.5 Audit Documents:

11.4.5.1 Contractor shall make the below listed documents available for the review by the Audit team.

- i) **SHE policy**
- ii) **SHE manual**
- iii) **SHE Rules and Regulation**
- iv) **SHE organization chart**
- v) **Annual SHE objectives / programs**
- vi) **Accident / near miss statistics and analysis**
- vii) **SHE Training program / records for all personnel**
- viii) **Operating manuals and maintenance manual of all equipments**
- ix) **Safe worthiness certificates of all lifting appliances and gears**
- x) **Medical fitness record for all personnel**
- xi) **Risk identification, assessment and control details**
- xii) **Environmental management reports**
- xiii) **Emergency management records including mock drill**

11.4.6 Audit Preparation:



- i) Audit team members are required to gather information by observations through interviews and by checks of hardware and documentation.
- ii) Audit team shall prepare checklist to cover all parts based on SHE legislations rules and regulations and JMRC requirements.
- iii) Audit team members shall verify the facts and findings leading to the identified gaps and weakness.
- iv) Audit leader has overall responsibility for reaching a conclusion.

11.4.7 Reporting:

11.4.7.1 Audit report shall be prepared and directly sent to the Employer within 7 days of conducting the audit with a copy to the contractor.

11.4.8 Report contents:

- i) Executing summary - based on the finalized checklists as written the findings to the Employer by the audit team members, the audit leader will compile a concise and accurate summary of observations and findings.
- ii) Introduction - this will contain basic information regarding the facilities or organization audited, the specific audit dates (inclusion of those for preparation and post-audit activities).
- iii) Principal positive findings - This will contain the summary of positive aspects as observed by the auditors. It will also contain highlights of those issue, which may warrant dissemination as best practice regarding methodology used or achievement.
- iv) Audit Findings - All audit findings as detailed in the audit checklists shall be grouped together as priority 1 and 2 as detailed below in a separate listing.
 - a) Priority 1: Actions to rectify gaps or weakness should generally be implemented within two-weeks time, if risk potential is high or unacceptable.
 - b) Priority 2: Actions should be generally implemented or rectified with a maximum of 3 – 4 weeks, if not rectified would create a likelihood of minor injury or business loss.

11.4.9 Conformity Report & Action by Employer

11.4.9.1 The auditor shall inspect the site after 14 days of conducting initial audit for checking the adequacy of implementation of items maintained under priority 1 by the contractor and shall submit a conformity / non-conformity report to the Employer with a copy to the contractor.

11.4.9.2 The auditor shall again inspect after 28 days of conducting initial audit for checking the adequacy of implementation of items mentioned under priority 2 by the contractor and shall submit a conformity / non-conformity report to the Employer with a copy to the contractor.

11.4.9.3 In case of non-conformity of items mentioned by auditor, the Employer shall take necessary steps including stoppage of work and or imposing any penalty for getting the item implemented.

11.4.10 Failure of contractor to conduct External SHE Audit

11.4.10.1 **If the contractor fails to conduct the external SHE audit in time, the Employer at the cost of contractor shall get it done.**



12.0 SHE Communication

- 12.1 The contractor shall take every effort to communicate the Safety, Occupational health and Environment management measures through posters campaigns / billboards / banners / glow signs being displayed around the work site as part of the effort to rise safety awareness amongst to the work force. Posters should be in Hindi, English and other suitable language deemed appropriate. Posters / billboards / banners/ glow signs should be changed at least once in a month to maintain the impact.
- 12.2 The contractor shall also observe important days as listed in General Instruction **JMRC/SHE/GI/008** and printing and displaying safety signage and posters as listed in General Instruction **JMRC/SHE/GI/009**.
- 12.3 The list indicated are the minimum requirements of the Employer and the contractor is encouraged to further the SHE communication activities by formulating suitable reward schemes for safety performers and any other activities, which deem fit for the purpose.

13.0 SHE Submittals to the Employer

- 13.1 The contractor's SHE management should send the following reports to the Employer periodically:
- i) Daily Reporting of total no of workmen (as given in Clause **13.2**)
 - ii) Monthly SHE Report (as given in Clause **13.3**)
 - iii) SHE Committee Meeting Minutes (as given in Clause **7.9.1**)
 - iv) SHE Inspection Reports
 - v) SHE Audit Reports
 - a) Monthly Audit Rating Score (MARS) report
 - b) External SHE Audit
 - c) Electrical Safety Audit
 - vi) Air and Noise Quality monitoring report
- 13.2 **Daily Reporting of total no of workmen**
- 13.2.1 **The contractor shall report to the Employer the total no of workmen engaged by all including any subcontractor within 2 hours of starting of any shift in any day. This reporting shall be the primary duty of the Chief SHE Manager of the contractor and reporting shall be through tele-fax / email. The onus of checking the receipt of the same by the Employer lies with the contractor. If the information is not received or received more than 2 hrs after starting of the shift, penalty shall be levied as per relevant clause.**
- 13.3 Monthly SHE Report
- 13.3.1 The contractor shall prepare a monthly SHE report consisting of the following and submit 3 copies within 7th of next month to the Employer as specified in the Project SHE manual.
- i) Monthly man-hour details as specified in the Project SHE manual
 - ii) Monthly accident / incident details as specified in the Project SHE manual
 - iii) SHE committee details



- iv) Details of SHE training conducted in the month
- v) SHE Inspection
- vi) SHE internal audit details like electrical audit etc.
- vii) SHE Communication activities under taken in the month indicating the number of posters displayed and balance availability in stock.
- viii) Air quality / Noise monitoring details
- ix) Toolbox talks details
- x) PPE details: Quantity purchased, issued to the workmen and stock available.
- xi) Details on IP 44 panel boards, lighting poles, welding and cutting equipments, Ladders, Hoists, tools & tackles.
- xii) Monthly Lux meter study results
- xiii) Housekeeping
- xiv) Barricade maintenance details
- xv) No of critical excavations
- xvi) Health & Welfare activities
- xvii) Safety walk conducted by Contractors' Project Manager in the month
- xviii) SHE Activities Planned for next month

14.0 Accident reporting and investigation

14.1 Reporting to Employer

14.1.1 All accidents and dangerous occurrences shall immediately be informed verbally to the Employer. This will enable the Employer to reach to the scene of accident / dangerous occurrences to monitor/assist any rescue work and/or start conducting the investigation process so that the evidences are not lost.

14.1.2 Reports of all accidents (fatal / injury) and dangerous occurrences shall also be sent within 24 hours as per format provided in the Employer's Project SHE manual.

14.1.3 No accident / dangerous occurrences is exempted from reporting to the Employer.

14.1.4 Any wilful delay in verbal and written reporting to the Employer shall be penalised as per relevant clause.

14.2 Reporting to Government organisations

14.2.1 In addition to the above verbal and written reporting to the Employer, as per Rule 210 of BOCWR, notice of any accident to a worker at the building or construction site that:

- a) causes loss of life; or
- b) disables a worker from working for a period of 48 hours or more immediately following the accident;
- c) shall forthwith be sent by telegram, telephone, fax, or similar other means including special messenger within four hours in case of fatal accidents and 72 hours in case of other accidents, to:
 - i) the Regional Labour Commissioner (central), wherein the contractor has registered the firm/work
 - ii) the board with which the worker involved was registered as a beneficiary;



- iii) Director General and
- iv) the next of kin or other relative of the worker involved in the accident;

14.2.2 Further, notice of accident shall be sent in respect of an accident which

- (a) causes loss of life; or
- (b) disables the injured worker from work for more than 10 days to
 - i) the officer-in-charge of the nearest police station;
 - ii) the District Magistrate or, if the District Magistrate by order so desires, to
 - iii) the Sub-Divisional Magistrate

14.2.3 In case of an accident causing minor injury, first-aid shall be administered and the injured worker shall be immediately transferred to a hospital or other place for medical treatment.

14.2.4 Where any accident causing disablement that subsequently results in death, notice in writing of such death, shall be sent to the authorities mentioned in clause 14.2.1 and 14.2.2 above within 72 hours of such death.

14.2.5 Reporting of dangerous occurrences:

14.2.5.1 The following classes of dangerous occurrences shall be reported to the Inspector having jurisdiction, whether or not any disablement or death caused to the worker, namely:

- (a) collapse or failure of lifting appliances, or hoist, or conveyors, or similar equipment for handling of building or construction material or breakage or failure of rope, chain or loose gears; or overturning of cranes used in construction work;
- (b) falling of objects from height;
- (c) collapse or subsidence of soil, tunnel, pipe lines, any wall, floor, gallery, roof or any other part of any structure, launching girder, platform, staging, scaffolding or means of access including formwork;
- (d) explosion of receiver or vessel used for storage of pressure greater than atmospheric pressure, of any gas or gases or any liquid or solid used as building material;
- (e) fire and explosion causing damage to any place on construction site where building workers are employed;
- (f) spillage or leakage of any hazardous substance and damage to their container;
- (g) collapse, capsizing, toppling or collision of transport equipment;
- (h) leakage or release of harmful toxic gases at the construction site;

14.2.6 In case of failure of launching girder, lifting appliance, loose gear, hoist or building and other construction work, machinery and transport equipment at a construction site, such appliances, gear, hoist, machinery or equipment and the site of such occurrence shall, as far as practicable, be kept undisturbed until inspected by the Authorities;

14.2.7 Every notice given for fatal accidents or dangerous occurrences shall be followed by a written report to the concerned Authorities under Section 39 of BOCWA and the Director General in the specified Form XIV of BOCWR.

14.3 Accident investigation



14.3.1 General

14.3.1.1 Investigations should be conducted in an open and positive atmosphere that encourages the witnesses to talk freely. The primary objective is to ascertain the facts with a view to prevent future and possibly more serious occurrences

14.3.1.2 Accidents and Dangerous Occurrences which result in death, serious injury or serious damage must be investigated by the Contractor immediately to find out the cause of the accident/occurrence so that measures can be formulated to prevent any recurrence.

14.3.1.3 Near misses and minor accidents should also be investigated by the Contractor as soon as possible as they are signals that there are inadequacies in the safety management system.

14.3.2 Procedure of incident investigation

14.3.2.1 It is important after any accident or dangerous occurrence that information relating to the incident is gathered in an organised way. The following steps shall be followed;

- a) take photographs and make sketches
- b) examine involved equipment, workpiece or material and the environmental conditions
- c) interview the injured, eye-witnesses and other involved parties
- d) consult expert opinion where necessary
- e) identify the specific contractor or sub-contractor involved.

14.3.2.2 Having gathered information, it is then necessary to make an analysis of incident

- a) establish the chain of events leading to the accident or incident
- b) find out at what stage the accident took place
- c) consider all possible causes and the interaction of different factors that led up to the accident, and identify the most probable cause. The cause of an accident should never be classified as carelessness. The specific act or omission that caused the accident must be identified.

14.3.2.3 The next stage is to proceed with the follow-up action

- a) report on the findings and conclusions
- b) formulate preventive measures to avoid recurrence
- c) publicise the findings and the remedial actions taken

14.4 Employers' independent incident investigation

14.4.1 In case of fatal / dangerous occurrence the Employer shall also conduct independent investigation. Contractor and his staff shall extend necessary co-operation and testify about the accident.

14.4.2 The contractor shall take every effort to preserve the scene of accident till the Employer completes the investigation.

14.4.3 All persons summoned by the Employer in connection to witness recording shall obey the instructions without delay. Any wilful suppression of information by any person shall be removed from the site immediately and / or punishable as per relevant penalty clause.



15.0 Emergency preparedness plan

- 15.1 The Contractor shall prepare an Emergency Response Plan for all work sites as a part of the Contractor SHE Plan. The plan shall integrate the emergency response plans of the Contractor and all other subcontractors. The Emergency Response Plan shall detail the Contractor's procedures, including detailed communications arrangements, for dealing with all emergencies that could affect the Site. This include where applicable, injury, sickness, evacuation, fire, chemical spillage, severe weather and rescue.
- 15.2 The contractor shall ensure that an Emergency Response Plan is prepared to deal with emergencies arising out of:
- i) Fire and explosion
 - ii) Collapse of lifting appliances and transport equipment
 - iii) Collapse of building, sheds or structure etc.
 - iv) Gas leakage or spillage of dangerous goods or chemicals
 - v) Bomb threatening, Criminal or Terrorist attack
 - vi) Drowning of workers
 - vii) Landslides getting workers buried floods, Earthquake, storms and other natural calamities.
- 15.3 Arrangements shall be made for emergency medical treatment and evacuation of the victim in the event of an accident or dangerous incident occurring, the chain of command and the responsible persons of the contractor with their telephone numbers and addresses for quick communication shall be adequately publicized and conspicuously displayed in the workplace.
- 15.4 Contractors shall require to tie-up with the hospitals and fire stations located in the neighbourhood for attending to the casualties promptly and emergency vehicle kept on standby duty during the working hours for the purpose.
- 15.5 Contractor shall conduct an onsite emergency mock drill once in every month for all his workers and his subcontractor's workers.
- 15.6 It shall be the responsibility of the contractor to keep the Local Law & Order Authorities informed and seek urgent help, as the case may be, so as to mitigate the consequences of an emergency. Prompt communication to JMRC, telephonically initially and followed by a written report, shall be made by the contractor.

16.0 Experts / Agencies for SHE services

- 16.1 Contractors may utilise the services of experts/agencies empanelled under Rule 250 of BOCWR and Rule 277 of RBOCWR for the purpose of training, internal audit and any other SHE services with prior approval of the Employer.
- 16.2 As an aide to contractors, a list of experts/agencies and the offered service are given in General Instruction **JMRC/SHE/GI/010** for ready reference. In addition to it if the contractor would like to use any expert/agencies' services for any SHE activities the same can also be allowed provided that they are competent and meet to the general requirements of Employer. In every case prior approval of the Employer is mandatory.



PART – II : SAFETY



17.0 Housekeeping

- 17.1 Housekeeping is the act of keeping the working environment cleared of all unnecessary waste, thereby providing a first-line of defence against accidents and injuries.
- 17.2 Contractor shall understand and accept that improper housekeeping is the primary hazard in any construction site and ensure that a high degree of house keeping is always maintained. Indeed "Cleanliness is indeed next to Godliness"
- 17.3 Housekeeping is the responsibility of all site personnel, and line management commitment shall be demonstrated by the continued efforts of supervising staff towards this activity.
- 17.4 General House keeping shall be carried out by the contractor and ensured at all times at Work Site, Construction Depot, Batching Plant, Labour Camp, Stores, Offices and toilets/urinals. Towards this the Contractor shall constitute a special group of house keeping personnel as per General Instruction **JMRC/SHE/GI/001**. This group shall ensure daily cleaning at work sites and surrounding areas and maintain a register as per the approved format by the Employer.
- 17.5 Adequate time shall be assigned to ensure that good housekeeping is maintained. This shall be carried out by team of housekeeping squad.
- 17.6 The contractor shall be responsible to provide segregated containers for disposal of debris at required places and regular cleaning of the same.
- 17.7 Full height fence, barriers, barricades etc. shall be erected around the site in order to prevent the surrounding area from excavated soil, rubbish etc, which may cause inconvenience to and endanger the public. The barricade especially those exposed to public shall be aesthetically maintained by regular cleaning and painting as directed by the Employer. These shall be maintained in one line and level.
- 17.8 The structure dimension of the barricade, material and composition, its colour scheme, JMRC logo and other details shall be in accordance with specifications laid down in tender document.
- 17.9 All stairways, passageways and gangways shall be maintained without any blockages or obstructions. All emergency exits passageways, exits fire doors, break-glass alarm points, fire fighting equipment, first aid stations, and other emergency stations shall be kept clean, unobstructed and in good working order.
- 17.10 Lumber with protruding nails shall be either bent / removed and properly stacked.
- 17.11 All surplus earth and debris are removed/disposed off from the working areas to officially designated dumpsites. Trucks carrying sand, earth and any pulverized materials etc. in order to avoid dust or odour impact shall be covered while moving. **The tyres of the trucks leaving the site shall be cleaned with water, wherever the possibility of spillage on carriageways meant for regular road traffic exists.**
- 17.12 No parking of trucks/trolleys, cranes and trailers etc. shall be allowed on roads, which may obstruct the traffic movement.



Safety, Health and Environment (SHE) Manual

- 17.13 Roads shall be kept clear and materials like: pipes, steel, sand boulders, concrete, chips and brick etc. shall not be allowed on the roads to obstruct free movement of road traffic.
- 17.14 Water logging or bentonite spillage on roads shall not be allowed. If bentonite spillage is observed on road endangering the safety of road users, the contractor shall be penalised as per relevant clause.
- 17.15 Proper and safe stacking of material are of paramount importance at yards, stores and such locations where material would be unloaded for future use. The storage area shall be well laid out with easy access and material stored / stacked in an orderly and safe manner.
- 17.16 Flammable chemicals / compressed gas cylinders shall be safely stored.
- 17.17 Unused/surplus cables, steel items and steel scrap lying scattered at different places within the working areas shall be removed to identified locations(s).
- 17.18 All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from work place to identified location(s).
- 17.19 Empty cement bags and other packaging material shall be properly stacked and removed.
- 17.20 The Contractor shall ensure that all his sub-contractors maintain the site reasonably clean through provisions related to house keeping

18.0 Working at Height

18.1 Definitions

- 18.1.1 "access" and "egress" include ascent and descent.
- 18.1.2 "fragile surface" means a surface, which would be able to fail if any reasonably foreseeable loading were to be applied to it.
- 18.1.3 "line" includes rope, chain or webbing
- 18.1.4 "personal fall protection" means -
(a) a fall prevention, work restraint, work positioning, fall arrest or rescue system, other than a system in which the only safeguards are collective safeguards; or
(b) rope access and positioning techniques;
- 18.1.5 "work at height" means -
(a) work in any place, including a place at or below ground level;
(b) obtaining access to or egress from such place while at work, except by a staircase in a permanent workplace,
where, if protective measures were not taken, a person could fall a distance liable to cause personal injury;
- 18.1.6 "work equipment" means any machinery, appliance, apparatus, tool or installation for use at work (whether exclusively or not) and includes
(a) a guard-rail, toe-board, barrier or similar collective means of protection



- (b) a working platform
 - (c) a net, airbag or other collective safe guard for arresting falls.
 - (d) personal fall protection system
 - (e) ladders
- 18.1.7 “working platform”
- (a) means any platform used as a place of work or as a means of access to or egress from a place of work;
 - (b) includes any scaffold, suspended scaffold, cradle, mobile platforms, trestle, gangway, gantry and stairway which is so used.
- 18.2 Organisation and planning
- The contractor shall ensure that work at height is
- i) properly planned for any emergencies and rescue
 - ii) appropriately supervised; and
 - iii) carried out in a manner, which is reasonably practicable safe.
- 18.3 The contractor shall ensure that work at height is carried out only when the weather conditions do not jeopardise the health or safety of persons involved in the work.
- 18.4 Competence
- The contractor shall ensure that no person engages in any activity, including organization, planning and supervision, in relation to work at height or work equipment for use in such work unless he is competent to do so or, if being trained, is being supervised by a competent person.
- 18.5 Avoidance of risks from work at height
- The contractor shall ensure that work is not carried out at height where it is reasonably practicable to carry out the work safely otherwise than at height.
- 18.6 Where work is carried out at height, the contractor shall take suitable and sufficient measures as given below to prevent, so far as is reasonably practicable, any person falling a distance liable to cause personal injury.
- (a) his ensuring that the work is carried out
 - (i) from an existing place of work; or
 - (ii) (in the case of obtaining access or egress) using an existing means, complying to the requirements as given in **18.15** where it is reasonably practicable to carry it out safely and under appropriate ergonomic conditions; and
 - (b) where it is not reasonably practicable for the work to be carried out in accordance with sub-paragraph (a), his providing sufficient work equipment for preventing, so far as is reasonably practicable, a fall occurring.
- 18.7 Where the measures taken under clause **18.6** do not eliminate the risk of a fall occurring, every contractor shall
- (a) so far as is reasonably practicable, provide sufficient work equipment to minimise -
 - (i) the distance and consequences; or
 - (ii) where it is not reasonably practicable to minimise the distance, the consequences, of a fall; and



- (b) Without prejudice to the generality of clause **18.4**, provide such additional training and instruction or take other additional suitable and sufficient measures to prevent, so far as is reasonably practicable, any person falling a distance liable to cause personal injury.

18.8 Selection of 'work equipment' for work at height

- 1) the contractor, in selecting work equipment for use in work at height, shall
 - a) give collective protection measures priority over personal protection measures; and
 - b) take account of
 - i) the working conditions and the risks to the safety of persons at the place where the work equipment is to be used;
 - ii) in the case of work equipment for access and egress, the distance to be negotiated;
 - iii) the distance and consequences of a potential fall;
 - iv) the duration and frequency of use;
 - v) the need for easy and timely evacuation and rescue in an emergency; and
 - vi) any additional risk posed by the use, installation or removal of that work equipment or by evacuation and rescue from it;
- (2) The contractor shall select work equipment for work at height which:
 - a) has characteristics including dimensions which:
 - (i) are appropriate to the nature of the work to be performed and the foreseeable loadings; and
 - (ii) allow passage without risk; and
 - b) is in other respects the most suitable work equipment, having regard in particular to the purposes specified in **18.5** and **18.6**.

18.9 Fragile surfaces

18.9.1 The contractor shall ensure that no person at work passes across or near, or working on, from or near, a fragile surface where it is reasonably practicable to carry out work safely and under appropriate ergonomic conditions without his doing so.

18.9.2 Where it is not reasonably practicable to carry out work safely and under appropriate ergonomic conditions without passing across or near, or working on, from or near, a fragile surface, every contractor shall,

- (a) ensure, so far as is reasonably practicable, that suitable and sufficient platforms, coverings, guard rails or similar means of support or protection are provided and used so that any foreseeable loading is supported by such supports or borne by such protection;
- (b) where a risk of a person at work falling remains despite the measures taken under the preceding provisions of this regulation, take suitable and sufficient measures to minimise the distances and consequences of his fall.



- 18.9.3 Where any person at work may pass across or near, or work on, from or near, a fragile surface, every contractor shall ensure that
- (a) prominent warning notices are so far as is reasonably practicable affixed at the approach to the place where the fragile surface is situated; or
 - (b) where that is not reasonably practicable, such persons are made aware of it by other means.
- 18.10 Falling objects
- 18.10.1 The contractor shall, where necessary to prevent injury to any person, take suitable and sufficient steps to prevent, so far as is reasonably practicable, the fall of any material or object.
- 18.10.2 Where it is not reasonably practicable to comply with the requirements of **18.9**, every contractor shall take suitable and sufficient steps to prevent any person being struck by any falling material or object which is liable to cause personal injury.
- 18.10.3 The contractor shall ensure that no material or object is thrown or tipped from height in circumstances where it is liable to cause injury to any person.
- 18.10.4 Every employer shall ensure that materials and objects are stored in such a way as to prevent risk to any person arising from the collapse, overturning or unintended movement of such materials or objects.
- 18.11 Danger areas
- 18.11.1 Without prejudice to the preceding requirements of these Regulations, every contractor shall ensure that
- (a) where a workplace contains an area in which, owing to the nature of the work, there is a risk of any person at work
 - i) falling a distance; or
 - ii) being struck by a falling object,which is liable to cause personal injury, the workplace is so far as is reasonably practicable equipped with devices preventing unauthorised persons from entering such area; and
 - (b) such area is clearly indicated.
- 18.12 Inspection of work equipment
- 18.12.1 The contractor shall ensure that, where the safety of work equipment depends on how it is installed or assembled, it is not used after installation or assembly in any position unless it has been inspected in that position.
- 18.12.2 The contractor shall ensure that work equipment exposed to conditions causing deterioration which is liable to result in dangerous situations is inspected
- (a) at suitable intervals; and
 - (b) each time that exceptional circumstances which are liable to jeopardise the safety of the work equipment have occurred,
- to ensure that health and safety conditions are maintained and that any deterioration can be detected and remedied in good time.



- 18.12.3 Without prejudice to paragraph **18.12.1**, the contractor shall ensure that a working platform
- (a) used for construction work; and
 - (b) from which a person could fall 2 metres or more,
- is not used in any position unless it has been inspected in that position or, in the case of a mobile working platform, inspected on the site, within the previous 7 days.
- 18.12.4 The contractor shall ensure that the reports of all inspections are properly maintained and shown to the Employer as and when required.
- 18.12.5 In this clause "inspection",
- (a) means such visual or more rigorous inspection by a competent person as is appropriate for safety purposes;
 - (b) includes any testing appropriate for those purposes,
- 18.13 Inspection of places of work at height
- 18.13.1 The contractor shall so far as is reasonably practicable ensure that the surface and every parapet, permanent rail or other such fall protection measure of every place of work at height are checked on each occasion before the place is used.
- 18.14 Duties of persons at work
- 18.14.1 Any workmen employed by the contractor shall report to the supervisor about any defect relating to work at height which he knows is likely to endanger the safety of himself or another person.
- 18.14.2 Every workmen shall use any work equipment or safety device provided to him for work at height by the contractor, in accordance with
- (a) any training in the use of the work equipment or device concerned which have been received by him; and
 - (b) the instructions respecting that use which have been provided to him by the contractor as per the requirements of the Employer
- 18.15 Requirements for existing places of work and means of access or egress at height
- Every existing place of work or means of access or egress at height shall
- (a) be stable and of sufficient strength and rigidity for the purpose for which it is intended to be or is being used;
 - (b) where applicable, rest on a stable, sufficiently strong surface;
 - (c) be of sufficient dimensions to permit the safe passage of persons and the safe use of any plant or materials required to be used and to provide a safe working area having regard to the work to be carried out there;
 - (d) possess suitable and sufficient means for preventing a fall;
 - (e) possess a surface which has no gap
 - (i) through which a person could fall;
 - (ii) through which any material or object could fall and injure a person; or
 - (iii) giving rise to other risk of injury to any person, unless measures have been taken to protect persons against such risk;



- (f) be so constructed and used, and maintained in such condition, as to prevent, so far as is reasonably practicable -
 - (i) the risk of slipping or tripping; or
 - (ii) any person being caught between it and any adjacent structure;
- (g) where it has moving parts, be prevented by appropriate devices from moving inadvertently during work at height.

18.16 Requirements for guardrails, toe-boards, barriers and similar collective means of protection

- i) Unless the context otherwise requires, any reference in this section to means of protection is to a guardrail, toe-board, barrier or similar collective means of protection.
- ii) Means of protection shall
 - (a) be of sufficient dimensions, of sufficient strength and rigidity for the purposes for which they are being used, and otherwise suitable;
 - (b) be so placed, secured and used as to ensure, so far as is reasonably practicable, that they do not become accidentally displaced; and
 - (c) be so placed as to prevent, so far as is practicable, the fall of any person, or of any material or object, from any place of work.
- iii) In relation to work at height involved in construction work
 - (a) the top guard-rail or other similar means of protection shall be at least 950 millimetres above the edge from which any person is liable to fall;
 - (b) toe-boards shall be suitable and sufficient to prevent the fall of any person, or any material or object, from any place of work; and
 - (c) any intermediate guardrail or similar means of protection shall be positioned so that any gap between it and other means of protection does not exceed 470 millimetres.
- iv) Any structure or part of a structure which supports means of protection or to which means of protection are attached shall be of sufficient strength and suitable for the purpose of such support or attachment.

18.17 Requirements for all Working Platforms

- i) Every working platforms requires a supporting structure for holding it
- ii) Any surface upon which any supporting structure rests shall be stable, of sufficient strength and of suitable composition safely to support the supporting structure, the working platform and any loading intended to be placed on the working platform.
- iii). Stability of supporting structure
Any supporting structure shall
 - (a) be suitable and of sufficient strength and rigidity for the purpose for which it is being used;
 - (b) in the case of a wheeled structure, be prevented by appropriate devices from moving inadvertently during work at height;
 - (c) in other cases, be prevented from slipping by secure attachment to the bearing surface or to another structure, provision of an effective anti-slip device or by other means of equivalent effectiveness;
 - (d) be stable while being erected, used and dismantled; and
 - (e) when altered or modified, be so altered or modified as to ensure that it remains stable.
 - (f) Have suitable base plates and properly footed thereby.
- iv). Stability of working platforms



A working platform shall

- (a) be suitable and of sufficient strength and rigidity for the purpose or purposes for which it is intended to be used or is being used;
- (b) be so erected and used as to ensure that its components do not become accidentally displaced so as to endanger any person;
- (c) when altered or modified, be so altered or modified as to ensure that it remains stable; and
- (d) be dismantled in such a way as to prevent accidental displacement.

v) Safety on working platforms

A working platform shall

- (a) be of sufficient dimensions to permit the safe passage of persons and the safe use of any plant or materials required to be used and to provide a safe working area having regard to the work being carried out there;
- (b) possess a suitable surface and, in particular, be so constructed that the surface of the working platform has no gap
 - i) through which a person could fall;
 - ii) through which any material or object could fall and injure a person; or
 - iii) giving rise to other risk of injury to any person, unless measures have been taken to protect persons against such risk; and
- (c) be so erected and used, and maintained in such condition, as to prevent, so far as is reasonably practicable
 - i) the risk of slipping or tripping; or
 - ii) any person being caught between the working platform and any adjacent structure.

vi) Loading

A working platform and any supporting structure shall not be loaded so as to give rise to a risk of collapse or to any deformation, which could affect its safe use.

vii) Additional requirements for scaffolding

Strength and stability calculations for scaffolding shall be carried out unless

- (a) a note of the calculations, covering the structural arrangements contemplated, is available; or
- (b) it is assembled in conformity with a generally recognised standard configuration.

viii) Depending on the complexity of the scaffolding selected, a competent person shall draw up an assembly, use and dismantling plan. This may be in the form of a standard plan, supplemented by items relating to specific details of the scaffolding in question.

- ix) A copy of the plan, including any instructions it may contain, shall be kept available for the use of persons concerned in the assembly, use, dismantling or alteration of scaffolding until it has been dismantled.
- x) The dimensions, form and layout of scaffolding decks shall be appropriate to the nature of the work to be performed and suitable for the loads to be carried and permit work and passage in safety.



- xi) While a scaffold is not available for use, including during its assembly, dismantling or alteration, it shall be marked with general warning signs in accordance with and be suitably delineated by physical means preventing access to the danger zone.
- xii) Scaffolding may be assembled, dismantled or significantly altered only under the supervision of a competent person and by persons who have received appropriate and specific training in the operations envisaged which addresses specific risks which the operations may entail and precautions to be taken, and more particularly in
 - (a) understanding of the plan for the assembly, dismantling or alteration of the scaffolding concerned;
 - (b) safety during the assembly, dismantling or alteration of the scaffolding concerned;
 - (c) measures to prevent the risk of persons, materials or objects falling;
 - (d) safety measures in the event of changing weather conditions which could adversely affect the safety of the scaffolding concerned;
 - (e) permissible loadings;
 - (f) any other risks which the assembly, dismantling or alteration of the scaffolding may entail.

18.18 Requirements for collective safeguards for arresting falls

- i) Collective safeguard are a safety net, airbag or other collective safeguard for arresting falls
- ii) A safeguard shall be used only if
 - (a) a risk assessment has demonstrated that the work activity can so far as is reasonably practicable be performed safely while using it and without affecting its effectiveness;
 - (b) the use of other, safer work equipment is not reasonably practicable; and
 - (c) a sufficient number of available persons have received adequate training specific to the safeguard, including rescue procedures.
- iii) A safeguard shall be suitable and of sufficient strength to arrest safely the fall of any person who is liable to fall.
- iv) A safeguard shall
 - (a) in the case of a safeguard which is designed to be attached, be securely attached to all the required anchors, and the anchors and the means of attachment thereto shall be suitable and of sufficient strength and stability for the purpose of safely supporting the foreseeable loading in arresting any fall and during any subsequent rescue;
 - (b) in the case of an airbag, landing mat or similar safeguard, be stable; and
 - (c) in the case of a safeguard, which distorts in arresting a fall, afford sufficient clearance.
- v) Suitable and sufficient steps shall be taken to ensure, so far as practicable, that in the event of a fall by any person the safeguard does not itself cause injury to that person.

18.19 Requirements for personal fall protection systems



- i) A personal fall protection system shall be used only if
 - (a) a risk assessment has demonstrated that
 - (i) the work can so far as is reasonably practicable be performed safely while using that system; and
 - (ii) the use of other safer work equipment is not reasonably practicable; and
 - (b) the user and a sufficient number of available persons have received adequate training specific to the operations envisaged, including rescue procedures.
- ii) A personal fall protection system shall
 - (a) be suitable and of sufficient strength for the purposes for which it is being used having regard to the work being carried out and any foreseeable loading;
 - (b) where necessary, fit the user;
 - (c) be correctly fitted;
 - (d) be designed to minimise injury to the user and, where necessary, be adjusted to prevent the user falling or slipping from it, should a fall occur; and
 - (e) be so designed, installed and used as to prevent unplanned or uncontrolled movement of the user.
- iii) A personal fall protection system designed for use with an anchor shall be securely attached to at least one anchor, and each anchor and the means of attachment thereto shall be suitable and of sufficient strength and stability for the purpose of supporting any foreseeable loading.
- iv) Suitable and sufficient steps shall be taken to prevent any person falling or slipping from a personal fall protection system.

18.20 Requirements for Ladders

- 1) Every contractor shall ensure that a ladder is used for work at height only if a risk assessment has demonstrated that the use of more suitable work equipment is not justified because of the low risk and
 - i) The short duration of use; or
 - ii) Existing features on site, which he cannot alter.
- 2) Only metal ladders shall be allowed. Bamboo ladders are prohibited.
- 3) Any surface upon which a ladder rests shall be stable, firm, of sufficient strength and of suitable composition safely to support the ladder so that its rungs or steps remain horizontal, and any loading intended to be placed on it.
- 4) A ladder shall be so positioned as to ensure its stability during use
- 5) A suspended ladder shall be attached in a secure manner and so that, with the exception of a flexible ladder, it cannot be displaced and swinging is prevented.
- 6) A portable ladder shall be prevented from slipping during use by -
 - i) securing the stiles at or near their upper or lower ends;
 - ii) an effective anti-slip or other effective stability device; or
 - iii) any other arrangement of equivalent effectiveness.
- 7) A ladder used for access shall be long enough to protrude sufficiently above the place of landing to which it provides access, unless other measures have been taken to ensure a firm handhold.
- 8) No interlocking or extension ladder shall be used unless its sections are prevented from moving relative to each other while in use.
- 9) A mobile ladder shall be prevented from moving before it is stepped on.



- 10) Where a ladder or run of ladders raises a vertical distance of 9 metres or more above its base, there shall, where reasonably practicable, be provided at suitable intervals sufficient safe landing areas or rest platforms.
- 11) Every ladder shall be used in such a way that
 - (a) a secure handhold and secure support are always available to the user; and
 - (b) the user can maintain a safe handhold when carrying a load unless, in the case of a step ladder, the maintenance of a handhold is not practicable when a load is carried, and a risk assessment has demonstrated that the use of a stepladder is justified because of
 - (i) the low risk; and
 - (ii) the short duration of use.

19.0 Overhead protection

All contractors shall provide overhead protections as per Rule 41 of BOCWR

- i) Overhead protection should be erected along the periphery of every building which is under construction and the building height shall be 15m or above after construction.
- ii) Overhead protection shall be minimum 2m wide and the outer edge shall be 150mm higher than the inner edge and an angle not more than 20° to its horizontal sloping into the building.
- iii) Overhead protection shall not be erected more than a height of 5m from the base of the building.
- iv) Areas of inadvertent hazard of falling of material shall be guarded or barricaded or roped-off thereby by the contractor.

20.0 Slipping, Tripping, Cutting, Drowning and Falling Hazards

As per Rule 42 of BOCWR,

- i) All places should be free from dust, debris or similar materials.
- ii) Sharp projections or any protruding nails or similar objects shall be suitably guarded or shall even be avoided to make the place safe to work.
- iii) Contractor shall not allow workmen to work or use platforms, scaffolds/passageways or any walkways, which has water, or oil or similar substances spilt and has a slipping hazard, unless it is cleaned off or covered or sanded or saw dusted or make it safe with any suitable material.
- iv) When workers are exposed to areas where fall into water is possible, the contractor shall provide suitable and adequate equipment for saving the workers from drowning and rescuing from such hazard. If the Employer considers, the contractor shall provide well-equipped boat or launch, manned with trained personnel at the work place.
- v) Open side or opening where worker, equipment, vehicle or lifting appliance may fall at a building or outside shall be guarded suitably except in places of free access by reasons of nature of work.
- vi) Suitable safety net shall be provided at places of material / man falling is possible in accordance with national standards.

21.0 Lifting Appliances and Gear

- 21.1 (a) Lifting appliances means a crane, hoist machinery, derrick, winch, gin pole, sheer legs, jack, hoist drum, slewing machinery, slewing bearing fasteners, luffing machinery sheaves, pulley blocks, hooks or other equipment used for lifting materials, objects or building workers and



lifting gears means ropes, chain slings, shackles, hooks, lifting lugs, wire ropes, lifting eyebolts and eyenuts and other accessories of a lifting appliance.

(b) Use of “Tractor Transmission Type “Pick and Carry Hydra crane

“Tractor Transmission Type “Pick and Carry Hydra crane – 1st Generation model is prohibited at JMRC works. Contractor shall mobilize ‘Truck Transmission Type’ pick and hydra crane – 2nd Generation model only

21.2 No machine shall be selected to do any lifting on a specific job until its size and characteristics are considered against:

- i) the weights, dimensions and lift radii of the heaviest and largest loads
- ii) the maximum lift height, the maximum lift radius and the weight of the loads that must be handled at each
- iii) the number and frequency of lifts to be made
- iv) how long the crane will be required on site
- v) the type of lifting to be done (for example, is precision placement of loads important?
- vi) the type of carrier required (this depends on ground conditions and machine capacity In its operating quadrants: capacity is normally greatest over the rear, less over the side, and non-existent over the front
- vii) whether loads will have to be walked or carried
- viii) whether loads will have to be suspended for lengthy periods
- ix) the site conditions, including the ground where the machine will be set up, access roads and ramps it must travel, space for erection and any obstacles that might impede access or operation

21.3 The contractor shall ensure that a valid certificate of fitness issued as per clause **21.5** is available for all lifting appliances including synchronised mobile jacks, pre-stressing hydraulic jacks, jacks fitted with launching girders etc. and Employers approval before inducting to the site. **Only after obtaining the approval from the Employer any lifting appliances and gear shall be used.**

21.4 **The laminated photocopies of fitness certificate issued by competent person, the Employers’ approval letter, the operators’ photo, manufacturer’s load chart and competency certificate shall always be either kept in the operator cabin or pasted on the visible surface of the lifting appliances.**

21.5 **All lifting appliances and loose gears shall be clearly marked for its safe working load and identification by stamping or other suitable means.**

21.6 The contractor shall also maintain a register containing a system of identification of all tools and tackles, its date of purchase, safe working load, competent person date of examination etc.

21.7 Test and periodical examination of lifting appliances and gears

21.7.1 All lifting appliances including all parts and gears thereof, whether fixed or movable shall be thoroughly tested and examined by a competent person once at least in every six months or after it has undergone any alterations or repairs liable to affect its strength or stability. Within the validity, if the lifting appliances are shifted to a new site, re-examination by the same competent person for ensuring its safety shall also be done.



- 21.7.2 Contractors can utilise the services of any competent person as defined in Factories Act, 1948 and approved by Chief Inspector of Factories with the permission of the Employer.
- 21.7.3 All alarms and signals like automatic safe load indicators (SLI), boom angle indicators, boom extension indicators, over lift boom alarm, swing alarm, hydraulic safety valves, mechanical radius indicators, load moment indicators etc. shall be periodically examined and maintained always in working condition
- 21.8 Automatic safe load indicators
- 21.8.1 **As stipulated in Rule 100 of RBOCW Rules, every lifting appliances and gears like cranes, hydras etc, if so constructed that the safe working load may be varied by raising or lowering of the jib or otherwise shall be attached with an automatic indicator of safe working loads approved by Bureau of Indian standards/ International certifying bodies which gives a warning to the operator and arrests further movements of the lifting parts.**
- 21.9 Qualification of operator of lifting appliances and of signaller etc
- 21.9.1 The contractor shall not employ any person to drive or operate a lifting machine like crane, hydra etc whether driven by mechanical power or otherwise or to give signals to work as a operator of a riggers or derricks unless he
- i) is above twenty-one years of age and possesses a valid heavy transport vehicle driving licence as per Motor Vehicle Act and Rules.
 - ii) is absolutely competent and reliable
 - iii) possesses the knowledge of the inherent risks involved in the operation of lifting appliances by undergoing a formal training at any institution of national importance acceptable to Employer
 - iv) is medically examined periodically as specified in schedule VII of BOCW Rules.
- 21.10 General requirements of appliances
- 21.10.1 Out-of level
- 21.10.1.1 One of the most severe effects of being out-of fit level is that side loads develop in the boom. Because of side loads all mobile cranes lose capacity rapidly as the degree of out-of-level increases and therefore
- 21.10.2 Boom
- i) The boom is one of the more critical elements of the crane and must be in perfect condition at all time. No boom section with a bent lattice member shall be allowed
 - ii) All welds shall be crack and corrosion free
 - iii) No member of the boom shall be bent
 - iv) All telescopic boom shall be free from cracks, rust, flaking or cracked paint, bulges, greases or varnishes
- 21.10.3 The sweep area (work area) of the construction machinery shall be always free from obstructions.



21.10.4 All hydraulic piping and fittings shall be maintained leak proof.

21.10.5 The operator cab shall possess good and safe:

- i) structure, windows and windshield wipers
- ii) Drivers chair and foot rest
- iii) Control handles
- iv) Cab instrumentation
- v) Telecommunication
- vi) Cab out fitting
- vii) wind indicator with an adjustable set point shall be in a position representative for the wind on the crane. The indicator shall give continuous information regarding constant speeds and gusts.

21.11 Mandatory rigging requirements

21.11.1 Rigging shall be done under experienced and qualified rigger only.

21.11.2 The primary requirement in rigging shall be to assess the weight of load before attempting any lift.

21.11.3 All hooks shall be fitted with Master Rings having certificate of fitness from the competent person, so that the hooks are subjected to balanced vertical loading only.

21.11.4 Only four legged slings shall be allowed which includes master link (ring), intermediate master link (ring) if necessary, chain / wire rope sling, sling hook or other terminal fitting.

21.11.5 Hand spliced slings up to 32mm diameter shall not be used at site for any lifting purpose.

21.11.6 No load shall be slewed over public areas without stopping the pedestrians and road traffic first.

21.11.7 Requirements of outriggers

- i) All outriggers shall be fully extended and all tyres are clear of the ground
- ii) Heavy duty blocking having large bearing area shall be necessary to prevent sinking of floats

21.11.8 All loads shall have tag-lines attached in order to ensure that the load can be controlled at all times.

21.11.9 No close working to any live overhead power line is permitted without the operation of a strict Permit to Work.

21.11.10 Minimum lighting is to be ensured at all lifting operations.

21.12 Failure to do any of the above shall attract penalty from the Employer as per relevant clause



22.0 Launching Operation

- 22.1 As launching operation is one of the riskiest job, the contractor shall take utmost precaution at all stages like; planning, establishing casing yard, casting segments, transporting segments, fabrication and erection of launching girders, launching of segments, pre-stressing, auto launching of girders and dismantling of launching girders.
- 22.2 The contractor shall prepare a comprehensive Method Statement for the launching operation, adhering to the SHE conditions laid down in conditions of contract on SHE and project SHE manual. Particular reference shall be made to the provisions on working at height. As the entire process of launching has to be undertaken at an elevated level the safety of workers and the girder is paramount important. The following general guidelines shall be adhered throughout the launching operation.
- i) Necessary 'working platforms' and fall protection anchorage arrangement shall be provided in the launching girder itself.
 - ii) Provisions for mounting light fittings shall also be made available in the launching girder.
 - iii) The casting yard shall be established ensuring the provision given in clause **38.0**
 - iv) The workmen engaged in fabrication of reinforcement, concreting the segment shall be provided with necessary PPEs including compulsory hand protection gloves.
 - v) Casting and curing of segment shall be undertaken under the direct supervision of the responsible engineer of the contractor.
 - vi) Trucks with valid registration, licence, safe worthiness certificate, Employer's approval certificate, and pollution under check certificate shall only be used for transport of segments
 - vii) Drivers engaged for driving these trucks, shall be trained once in 6 months on defensive driving at any Government authorized Institute or Maruti Institute of Driver Training and Research at Wazirabad Road, Adjoining Loni Road Flyover, Delhi-110094.
 - viii) Drivers shall also have undergone proper medical examination as per relevant clause mentioned under 'Medical Facilities'.
 - ix) The segments shall rigidly secured to the truck with necessary wooden wedges and necessary red indicators/safety tapes provided so that the vehicle is clearly seen by other road users both in day / night time.
 - x) Every launching girder shall have a responsible engineer on duty all the time.
 - xi) All the time from erection to dismantling the area between the two piers wherein launching is in progress shall always be barricaded.
 - xii) Unloading of segments from trucks, lifting of segments, shifting of segments, gluing shall be done under the direct supervision of the approved engineer of the contractor.
 - xiii) Auto launching shall be done only after approval from the Employer. After every auto launching the stability of launching girder shall be ensured.
 - xiv) The vertical deflection of launching girder shall be monitored at all critical stages like with/without loads and after every auto launching.
 - xv) A register containing all important operational details from erection to dismantling of launching girders shall be maintained and made available to Employer whenever called for.
 - xvi) Test certificate for all lifting gears including Macalloy bars shall be maintained at a location closer to the launching girder itself so that it can be referred during all inspections.
 - xvii) Adequate lighting at all time shall be ensured in the entire area of operation.
 - xviii) Access to drinking water & toilet shall be ensured to all workmen engaged for launching process.



- xix) Proper access ladders/stairways shall be maintained for safe ascending / descending of workmen / engineers.

22.3 Non-adherence to any of the clauses mentioned above shall be viewed seriously by the Employer and penalty levied as per relevant clause.

23.0 Construction machinery

23.1 Construction machineries may include dumpers and dump trucks, lift trucks and telescopic handlers piling rigs, vibro hammers, rail welding equipments, mobile elevating work platforms, cranes, tipper lorries, lorry loaders, skip wagons, 360° excavators, 180° backhoe loaders, crawler tractors, scrapers, graders, loading shovels, trenchers, side booms, pavers, planers, chippers, road rollers, locomotives, tankers and bowsers, trailers, hydraulic and mechanical breakers etc.

23.2 Safe worthiness certificate

23.2.1 Every construction equipment shall be in sound mechanical working condition and certified by either competent person under Factories Act or manufacturers' warranty in case of brand new equipments or authorized persons / firms approved by Employer before induction to any site.

23.2.2 Every such certificate shall have the date of purchase, main overhauling undertaken in the past, any accident to the equipment, visual examination details, critical components safety check, list of safety devises and its working condition, manufacturer's maintenance checklist, past projects wherein the equipments were used etc as its minimum content.

23.3 Reverse Horns

23.3.1 All Vehicles shall be fitted with audible reverse alarms and maintained in good working condition. Reversing shall be done only when there is adequate rear view visibility or under the directions of a banksman.

23.4 General operating procedures

- i) Drivers entering site shall be instructed to follow the safe system of work adopted on site. These shall be verbal instructions or, preferably, written instructions showing the relevant site rules, the site layout, delivery areas, speed limits, etc.
- ii) No passengers shall be carried, unless specific seating has been provided in accordance with the manufacturers recommendations.
- iii) Working on gradients beyond any equipments capability shall not be allowed.
- iv) Prevention of dumper and dump truck accidents should be managed by providing wheel stops at a sufficient distance from the edges of excavations, spoil heaps, pits, etc.
- v) The manufacturer's recommended bucket size must not be exceeded in excavators.
- vi) If excavators operating on a gradient which cannot be avoided, it must be ensured that the working cycle is slowed down, that the bucket is not extended too far in the downhill direction, and that travel is undertaken with extreme caution. A large excavator must never be permitted to travel in a confined area, or around people, without a banksman to guide the driver, who should have the excavator attachment close in to the machine, with the bucket just clear of the ground. On wheeled excavators, it is essential that the tyres are in good condition and correctly inflated. If stabilizing devices are fitted, they should be employed when the machine is excavating.



- vii) When the front shovel of the 180⁰ backhoe loaders is being employed, the backhoe attachment shall be in its “travel” position, with the safety locking device in place.
- viii) When operating the backhoe in poor ground conditions, the stabilisers tend to sink into the surface of the ground, reducing stability. Therefore frequent checks shall be made for the stability of the machine. The loading shovel should always be lowered to the ground to stabilise the machine when the backhoe is employed.
- ix) The netting operation of the skip wagons should be carried out prior to lifting the skip to reduce the risks of working on the rear platform
- x) If a tractor dozer is employed on clearing scrub or felling trees, it shall be provided with adequate driver protection.
- xi) When two or more scrapers are working on the same job, a minimum distance of at least 25m shall be kept between them.
- xii) Incase of hydraulic breakers, hydraulic rams and hoses shall be in good working condition

23.5 All wood working machines shall be fitted with suitable guards and devices such as top guard, riving knife, push stick, guards for drive belts and chains, and emergency stop switch easily accessible by the operator.

23.6 Penalty

23.6.1 If any of the above clauses are not adhered, penalty shall be imposed as per relevant clause depending upon the gravity of the unsafe act and or condition.

24.0 Machine and general area guarding

24.1 The contractor shall ensure at the construction site all motors, cogwheels, chains and friction gearing, flywheels, shafting, dangerous and moving parts of machinery are securely fenced or legged. The fencing of dangerous part of machinery is not removed while such machinery is in motion or in use.

25.0 Manual lifting and carrying of excessive weight

25.1 The contractor shall ensure at his construction site of a building or other construction work that no building worker lifts by hand or carries overhead or over his back or shoulders any material, article, tool or appliances exceeding in weight as said below as per Rule 38 of BOCWR, Unless aided by another building worker or device.

Person	Maximum weight in kg.
Adult man	55
Adult woman	30

25.2 No building worker aided by other building worker shall lift or carry weight higher than or exceeding the sum of total of maximum limits set out for each building worker separately as mentioned in the table above.

26.0 Site Electricity

26.1 Competency of Electrical personnel:



- 26.1.1 The contractor shall employ qualified and competent electrical personnel as specified in general instruction **JMRC/SHE/GI/001**.
- 26.2 Assessment of power
- 26.2.1 The contractor shall assess the size and location of the electrical loads and the manner in which they vary with time during the currency of the contract.
- 26.2.2 The contractor shall elaborate as to how the total supply is to be obtained / generated. The details of the source of electricity, earthing requirement, substation / panel boards, distribution system shall be prepared and necessary approval from Employer obtained before proceeding of the execution of the job.
- 26.2.3 **The main contractor shall take consideration, the requirements of the sub / petty contractors' electric power supply and arrive at the capacity of main source of power supply from diesel generators.**
- 26.2.4 **As the sub / petty contractors' small capacity generators create more noise and safety hazard, no small capacity diesel generators shall be allowed for whatsoever the type of job to be executed under this contract.**
- 26.2.5 **If any unsafe noise making small capacity diesel generators are found used by sub / petty contractors the main contractor shall only be penalised.**
- 26.3 **Work on site**
- 26.3.1 **The contractor shall also submit electrical single line diagram, schematic diagram and the details of the equipment for all temporary electrical installation and these diagrams together with the temporary electrical equipment shall be submitted to the Employer's for necessary approval. Failure to do so shall invite penalty as per relevant clause.**
- 26.4 Strength and capability of electrical equipment
- 26.4.1 No electrical equipment shall be put into use where its strength and capability may be exceeded in such a way as may give rise to danger.
- 26.5 Adverse or hazardous environments
- 26.5.1 Electrical equipment which may reasonably foreseeably be exposed to-
- (a) mechanical damage;
 - (b) the effects of the weather, natural hazards, temperature or pressure;
 - (c) the effects of wet, dirty, dusty or corrosive conditions; or
 - (d) any flammable or explosive substance, including dusts, vapours or gases, shall be of such construction or as necessary protected as to prevent, so far as is reasonably practicable, danger arising from such exposure.
- 26.6 Distribution system:
- 26.6.1 The contractor shall provide distribution system for control and distribution of electricity from a main AC supply of 50Hz for typical appliances,



- i) Fixed plant – 400V 3 phase
 - ii) Movable plant fed via trailing cable over 3.75 kW – 400 3 phase
 - iii) Installation in site buildings – 230V single phase
 - iv) Fixed flood lighting – 230V single phase
 - v) Portable and hand tools – 115V single phase
 - vi) Site lighting - 115V single phase
 - vii) Portable hand lamps – 115V single phase
- 26.7 Electrical protection circuits
- 26.7.1 Precautions shall be taken, either by earthing or by other suitable means, to prevent danger arising when any conductor (other than a circuit conductor) which may reasonably foreseeable become charged as a result of either the use of a system, or a fault in a system, becomes so charged. A conductor shall be regarded as earthed when conductors of sufficient strength and current-carrying capability to discharge electrical energy to earth connect it to the general mass of earth.
- If a circuit conductor is connected to earth or to any other reference point, nothing which might reasonably be expected to give rise to danger by breaking the electrical continuity or introducing high impedance shall be placed in that conductor unless suitable precautions are taken to prevent that danger.
- 26.7.2 Appropriate electrical protection shall be provided for all circuits, against over load, short circuit and earth fault current.
- 26.7.3 The contractor shall provide sufficient ELCBs (maintain sensitivity 30 mA) / RCCBs for all the equipments (including Potable equipments), electrical switchboards, distribution panels etc. to prevent electrical shocks to the workers.
- 26.7.4 All protection devices shall be capable of interrupting the circuit without damage to any equipments and circuits in case of any fault may occur.
- 26.7.5 Rating of fuses and circuit breakers used for the protection of circuits should be coordinate with equipment power ratings.
- 26.7.6 Protection against lightning shall be ensured to all equipment kept in open at sites.
- 26.8 Cables:
- 26.8.1 Cables shall be selected after full consideration of the condition to which they shall be exposed and the duties for which they are required. Supply cable up to 3.3 kV shall be in accordance with BS 6346.
- 26.8.2 For supplies to mobile or transportable equipment where operating of the equipment subjects the cable to flexing, the cable shall conform to any of these codes BS 6007 / BS 6500 / BS 7375.
- 26.8.3 Flexible cords with a conductor cross sectional area smaller than 1.5 mm² shall not be used and insulated flexible cable shall conform to BS 6500 and BS 7375.
- 26.8.4 Where low voltage cables are to be used, reference shall be made to BS 7375. The following standards shall also be referred to particularly for under ground cables BS 6346 and BS 6708



- 26.8.5 Cables buried directly in the ground shall be of a type incorporating armour or metal sheath or both. Such cables shall be marked by cable covers or a suitable marking tape and be buried at a sufficient depth to avoid their being damaged by any disturbance of the ground. Cable routes shall be marked on the plans kept in the site electrical register.
- 26.8.6 Cabling passing under the walk way and across way for transport and mobile equipment shall be laid in ducts at a minimum depth of 0.6 meters.
- 26.8.7 Cables that need to cross open areas, or where span of 3m or more are involved, a catenary wire on poles or other supports shall be provided for convenient means of suspension. Minimum height shall be 6 m above ground.
- 26.8.8 Cables carrying a voltage to earth in excess of 65V other than supply for welding process shall have metal armour or sheath, which has been effectively earthed and monitored by the contractor. In case of flexible and trailing cables such earthed metal sheath and/or armour should be in addition to the earth core in the cable and shall not be used as the protective conductor.
- 26.8.9 Armoured cables having an over-sheath of polyvinyl chloride (PVC) or an oil resisting and flame retardant compound shall be used whenever there is a risk of mechanical damage occurring
- 26.9 **Plugs, socket-outlets and couplers:**
- 26.9.1 **The contractor shall ensure plugs, socket-outlets, and couplers available in the construction site as “splash proof” type. The minimum degree of Ingress Protection should be of IP44 in accordance with BS EN 60529.**
- 26.9.2 Only plugs and fittings of the weatherproof type shall be used and they should be colour coded in accordance with the Internationally recognised standards for example as detailed as follows:
- (a) 110 volts : Yellow.
 - (b) 240 volts : Blue.
 - (c) 415 volts : Red.
- 26.10 Connections
- 26.10.1 **Every joint and connection in a system shall be mechanically and electrically suitable for use to prevent danger. Proper cable connectors as per national/international standards shall only be used to connect cables.**
- 26.10.2 **No loose connections or tapped joints shall be allowed any where in the work site, office area, stores and other areas. Penalty as per relevant clause shall be put in case of observation of any tapped joints.**
- 26.11 Portable and hand-held equipments:
- 26.11.1 The contractor shall ensure the use of double insulated or all-insulated portable electrical hand equipment may be used without earthing (i.e. two core cables), but they shall still be used only on 110V because of the risk of damage to trailing leads.



26.12 Other equipments:

- 26.12.1 All equipment shall have the provision for major switch/cut-off switch in the equipment itself.
- 26.12.2 All non-current carrying metal parts of electrical equipment shall be earthed through insulated cable
- 26.12.3 Isolate exposed high-voltage (over 415 Volts) equipment, such as transformer banks, open switches, and similar equipment with exposed energized parts and prevent unauthorised access.
- 26.12.4 Approved perimeter markings shall be used to isolate restricted areas from designated work areas and entryways and shall be erected before work begins and maintained for entire duration of work. Approved perimeter marking shall be installed with either red barrier tape printed with the words "DANGER—HIGH VOLTAGE" or a barrier of yellow or orange synthetic rope, approximately 1 to 1.5 meter above the floor or work surface.

26.13 Work on or near live conductors

- 26.13.1 No person shall be engaged in any work activity on or so near any live conductor (other than one suitably covered with insulating material so as to prevent danger) that danger may arise unless-
 - a) it is unreasonable in all the circumstances for it to be dead; and
 - b) it is reasonable in all the circumstances for him to be at work on or near it while it is live; and
 - c) suitable precautions (including where necessary the provision of suitable protective equipment) are taken to prevent injury.

26.14 Inspection and Maintenance

- 26.14.1 All electrical equipment should be permanently numbered and a record kept of the date of issue, date of last inspection and recommended inspection period.
- 26.14.2 Fixed installations shall be inspected at least at three monthly intervals; routine maintenance being carried out in accordance with equipment manufactures recommendations.

27.0 Lighting:

- 27.1 The contractor shall provide sufficient site lighting, of the right type and at the right place for it to be properly effective. Lighting ought not to introduce the risk of electric shock. Therefore, 230V supplies should be used for those fittings, which are robustly installed, and well out of reach e.g. flood lighting or high-pressure discharge lamps.

27.2 Selection of Luminaries:

The contractor shall select the luminaries as per the area requirement indicated below:

Type of Lighting	Area of Requirement	Luminaries
Area Lighting	Workmen and vehicles to move about in safely.	i) Shovel type: non-symmetrical ii) Symmetrical or non-symmetrical tungsten halogen



Beam flood lighting	Concentrated light over an area from a relatively great distance.	<ul style="list-style-type: none"> i) Portable flood light (Conical beam) ii) Wide angle flood (fan shaped beam) iii) Medium or narrow angle flood (Conical beam)
Dispersive lighting	Lighting for indoor	<ul style="list-style-type: none"> i) Dispersive (Mercury florescent) ii) Cargo cluster iii) Florescent trough
Walkway lighting	Lighting for stairways, ladder ways, corridors, scaffold access routs, etc.	<ul style="list-style-type: none"> i) Well glass unit ii) Bulkhead unit (tungsten filament) iii) Bulk head unit (Florescent)
Local lighting	Lighting on sites and fittings are generally accessible to operatives	<ul style="list-style-type: none"> i) PAR (Parabolic Aluminised Reflector) lamp cluster ii) Festoons (with or without shades) iii) Adjustable florescent work lamp iv) Portable flood lamp (mounted on own cable drum)

27.3 The contractor shall ensure that luminaries should always be placed so that no person is required to work in their own shadow and so that the local light for one person is not a source of glare for the others. Strongly made clamps should be available for attaching luminaries to poles and other convenient supports.

27.4 Luminaries should be robust, resistant to corrosion and rain proof especially at the point of the cable entry.

27.5 The correct type of lamp for each luminaries should always be used and when lamps need to be replaced if shall be in accordance with the supply voltage.

27.6 Lamp holders not fitted with a lamp should be capped off.

27.7 The contractor shall take every effort to illuminate the work site as per the Employer's requirement illustrated in general instruction **JMRC/SHE/GI/0011**.

28.0 Hand Tools and Power Tools

28.1 General

28.1.1 The contractor is wholly responsible for the safe condition of tools and equipment used by his employees and that of his sub-contractors.

28.1.2 Use of short / damaged hand tools shall be avoided and the contractor shall ensure all his hand tools used at his worksite are safe to work with or stored and shall also train his employees (including his sub-contractors) for proper use thereby.



Safety, Health and Environment (SHE) Manual

- 28.1.3 All hand tools and power tools shall be duly inspected before use for safe operation.
- 28.1.4 All hand tools and power tools shall have sufficient grip and the design specification on par with national/international standards on anthropometrics.
- 28.2 Hand tools
- 28.2.1 Hand tools shall include saws, chisels, axes and hatches, hammers, hand planes, screw drivers, crow bars, nail pullers.
- 28.2.2 The contractor shall ensure that,
- i) For crosscutting of hardwood, saws with larger teeth points (no. of points per inch) shall be preferred to avoid the saw jumping out of the job.
 - ii) Mushroom headed chisels shall not be used in the worksite where the fragments of the head may cause injury.
 - iii) Unless hatchet has a striking face, it shall be used as a hammer.
 - iv) Only knives of retractable blades shall be used in the worksite.
 - v) No screwdrivers shall be used for scraping, chiselling or punching holes.
 - vi) A pilot hole shall always be driven before driving a screw.
 - vii) Wherever necessary, usage of proper PPEs shall be used by his employees.
- 28.3 Power tools
- 28.3.1 Power tools include drills, planes, routers, saws, jackhammers, grinders, sprayers, chipping hammers, air nozzles and drills.
- 28.3.2 The contractor shall ensure that
- i) Electric tools are properly grounded or / and double insulated.
 - ii) GFCIs/ RCCBs shall be used with all portable electric tool operated especially outdoors or in wet condition.
 - iii) Before making any adjustments or changing attachments, his workers shall disconnect the tool from the power source.
 - iv) When operating in confined spaces or for prolonged periods, hearing protection shall be required. The same shall also apply to working with equipments, which gives out more noise as mentioned in clause **43.0** of this contract document.
 - v) Tool is held firmly and the material is properly secured before turning on the tool.
 - vi) All drills shall have suitable attachments respective of the operations and powerful for ease of operation.
 - vii) When any work / operation need to be performed repeatedly or continuously, tools specifically designed for that work shall be used. The same is applicable to detachable tool bit also.
 - viii) Size of the drill shall be determined by the maximum opening of the chuck in case of drill bit.
 - ix) Attachments such as speed reducing screwdrivers and buffers shall be provided to prevent fatigue and undue muscle strain to his workers.
 - x) Stock should be clamped or otherwise secured firmly to prevent it from moving.
 - xi) Workers shall never stand on the top of the ladder to drill holes in walls / ceilings, which can be hazardous, instead standing on the fourth or fifth rung shall be recommended.



- xii) Electric plane shall not be operated with loose clothing or long scarf or open jacket.
- xiii) Safety guards used on right angle head or vertical portable grinders must cover a minimum of 180° of the wheel and the spindle / wheel specifications shall be checked.
- xiv) All power tools / hand tools shall have guards at their nip points.
- xv) Low profile safety chain shall be used in case of wood working machines and the saw shall run at high rpm when cutting and also correct chain tension shall be ensured to avoid "kickback".
- xvi) Leather aprons and gloves shall be used as an additional personal protection auxiliary to withstand kickback.
- xvii) Push sticks shall be provided and properly used to hold the job down on the table while the heels moves the stock forward and thus preventing kickbacks.
- xviii) Air pressure is set at a suitable level for air actuated tool or equipment being used. Before changing or adjusting pneumatic tools, air pressure shall be turned off.
- xix) Only trained employees shall use explosive actuated tools and the tool shall also be unloaded when not in use.
- xx) Usage of such explosive actuated tools shall be avoided in case of places where explosive/flammable vapours or gases may be present.
- xxi) Explosive actuated tools and their explosives shall be stored separately and be taken out and loaded only before the time of immediate use.
- xxii) Misfired cartridges of explosive actuated tools must be placed in a container of water and be removed safely from the project.
- xxiii) No worker shall point any power operated / hand tool to any other person especially during loading / unloading.

29.0 Welding, Gouging and Cutting

- 29.1 Gas cylinders in use shall be kept upright on a custom-built stand or trolley fitted with a bracket to accommodate the hoses and equipment or otherwise secured. The metal cap shall be kept in place to protect the valve when the cylinder is not connected for use.
- 29.2 Hose clamp or clip shall be used to connect hoses firmly in both sides of cylinders and torches.
- 29.3 All gas cylinders shall be fixed with pressure regulator and dial gauges
- 29.4 Non-return valve and Flashback arrester shall be fixed at both end of cylinder and torch.
- 29.5 Domestic LPG cylinders shall not be used for Gas welding and Cutting purpose.
- 29.6 DCP or CO₂ type Fire Extinguisher not less than 5 kg shall be fixed at or near to welding process zone in an easily accessible location. Fire Extinguisher should confirm to IS 2190: 1992.
- 29.7 Use firewatchers if there is a possibility of ignition unobserved by the operator (e.g. on the other side of bulkheads).
- 29.8 Oxygen cylinders and flammable gas cylinders shall be stored separately, at least 6.6 meters (20 feet) apart or separated by a fire proof, 1.6 meters (5 feet) high partition. Flammable substances shall not be stored within 50 feet of cylinder storage areas.



- 29.9 Transformer used for electrical arc welding shall be fixed with Ammeter and Voltmeter and also fixed with separate main power switch.
- 29.10 Welding grounds and returns should be securely attached to the work by cable lugs, by clamps in the case of stranded conductors, or by bolts for strip conductors. The ground cable will not be attached to equipment or existing installations or apparatus.
- 29.11 Use a low voltage open circuit relay device if welding with alternating current in constricted or damp places.
- 29.12 Take precautions against the risk of increased fume hazards when welding with chrome containing fluxed consumables or high current metal inert gas (MIG) or tungsten inert gas (TIG) processes.
- 29.13 Avoid being in contact with water or wet floors when welding. Use duckboards or rubber protection.
- 29.14 All electrical installations shall meet the IS: 5571: 1997 and NFPA 70 for gas cylinder storage area and other hazardous areas.
- 29.15 The current for Electric arc welding shall not exceed 300 A on a hand welding operation.

30.0 Dangerous and harmful environment

As per BOCWR Rule 40,

- i) When internal combustion engines are to be used into a confined space or excavation or tunnel or any other workplace where neither natural or artificial ventilation system is inadequate to keep carbon monoxide below 50ppm, exposure of building workers shall be avoided unless suitable measures are taken and provided by the contractor.
- ii) No worker shall be allowed into any confined space or tank or trench or excavation wherein there is given off any dust, fumes / vapours or other impurities which is likely to be injurious or offensive, explosive or poisonous or noxious or gaseous material or other harmful articles unless steps are carried out by the contractor and certified by the responsible person to be safe.

31.0 Fire prevention, protection and fighting system

- 31.1 **The contractor shall ensure that construction site is provided with fire extinguishing equipment sufficient to extinguish any probable fire at construction site. An adequate water supply is provided at ample pressure as per national standard.**
- 31.2 Recharging of fire extinguishers and their proper maintenance should be ensured and as a minimum should meet Indian National Standards
- 31.3 All drivers of vehicles, foreman, supervisors and managers shall be trained on operating the fire extinguishers and fire fighting equipment.
- 31.4 The contractor shall also give consideration to the provision of adequate fire fighting arrangements within the underground and tunnelling operations including the provision of Fire Service compatible hose connections and emergency lighting



- 31.5 As per the RBOCW Rules 2009, Rule 106(a)(vii), all lifting appliances' driver cabin should be provided with a suitable portable fire extinguisher.
- 31.6 Combustible scrap and other construction debris should be disposed off site on a regular basis. If scrap is to be burnt on site, the burning site should be specified and located at a distance no less than 12 metres from any construction work or any other combustible material.
- 31.7 Every fire, including those extinguished by contractor personnel, shall be reported to the Employer representatives.
- 31.8 Emergency plans and Fire Evacuation plans shall be prepared and issued . Mock drills should be held on a regular basis to ensure the effectiveness of the arrangements and as a part of the programme, the Telephone Number of the local fire brigade should be prominently displayed near each telephone on site.

32.0 Corrosive substances

- 32.1 As per BOCWR Rule 44, corrosive substances including alkalis and acids shall be stored and used by a person dealing with such substances at a building / construction site in a manner that it does not endanger the building worker and suitable PPE shall be provided by the contractor to the worker during such handling and work. In case of spillage of such substances on building worker, the contractor shall take immediate remedial measures.

33.0 Demolition

- 33.1 The Contractor shall ensure that
- i) all demolition works be carried out in a controlled manner under the management of experienced and competent supervision.
 - ii) the concerned department of the Government or local authority be informed and permission obtained wherever required. Media shall also be informed regarding this concern.
 - iii) **all glass or similar materials or articles in exterior openings are removed before commencing any demolition work and all water, steam, electric, gas and other similar supply lines are put-off and such lines so located or capped with substantial coverings so as to protect it from damage and to afford safety to the building workers and public.**
 - iv) examine the walls of all structures adjacent to the structure to be demolished to determine thickness, method of support to such adjacent structures
 - v) no demolishing work be performed if the adjacent structure seems to be unsafe unless and until remedial measures like sheet piling, shoring, bracing or similar means be ensured for safety and stability for adjacent structure from collapsing.
 - vi) debris / bricks and other materials or articles shall be removed by means of
 - a) chutes
 - b) buckets or hoists
 - c) through openings through floors or
 - d) any other safe means
 - vii) no person other than building workers or other persons essential to the operation of demolition work shall be permitted to enter a zone of demolition and the area be provided with substantial barricades.



34.0 Excavation and Tunnelling:

34.1 Excavation

34.1.1 The contractor shall ensure

- i) where any construction building worker engaged in excavation is exposed to hazard of falling or sliding material or article from any bank or side of such excavation which is more than one 1.5 m above his footing, such worker is protected by adequate piling and bracing against such bank or side.
- ii) where banks of an excavation are undercut, adequate shoring is provided to support the material or article overhanging such bank.
- iii) excavated material is not stored at least 0.65 m from the edge of an open excavation or trench and banks of such excavation or trench are stripped of loose rocks and the banks of such excavation or trench are stripped of loose rocks and other materials which may slide, roll or fall upon a construction building worker working below such bank
- iv) metal ladders and staircases or ramps are provided, as the case may be, for safe access to and egress from excavation where, the depth of such excavation exceeds 1.5 m and such ladders, staircases or ramps comply with the IS 3696 Part 1&2 and other relevant national standards.
- v) trench and excavation is protected against falling of a person by suitable measures if the depth of such trench or excavation exceeds 1.5 m and such protection is an improved protection in accordance with the design and drawing of a professional engineer, where such depth exceeds 4m.

34.2 Tunnelling

34.2.1 The contractor shall inform in writing to the Director General within 30 days, prior to the commencement of any tunnelling work.

34.2.2 The contractor shall appoint a responsible person for safe operation for tunnelling work as per Rule 121 & 125 of BOCWR.

34.2.3 The contractor shall ensure

- i) every compressed air system in a tunnel is provided with emergency power supply for maintained continued supply of compressed air as per Rule 155 of BOCWR
- ii) watertight bulkhead doors are installed at the entrance of a tunnel to prevent flooding.
- iii) reliable and effective means of communication such as telephone or walkie-talkie are provided and maintained for arranging better effective communication at an excavation or tunnelling work as per Rule 136 of BOCWR.
- iv) all portable electrical hand tools and inspection lamp used in under ground and confined space at an excavation or tunnelling work is operated at a voltage not exceeding 24V.
- v) only flame proof equipment of appropriate type as per IS:5571:2000 and or other relevant national standard is used inside the tunnel



- vi) petrol or LPG of any other flammable substances are not used, stored inside the tunnel except with prior approval from Employer, and also no oxy-acetylene gas is used in a compressed air environment in excavation or tunnelling
- vii) adequate number of water outlets provided for fire fighting purpose, an audible fire alarm and adequate number and types of fire extinguishers are provided and maintained.
- viii) temperature in any working chamber in an excavation or tunnelling work where workers employed does not exceed 29°C as per Rule 165 of BOCWR.
- ix) all working areas in a free air tunnel are provided with ventilation system as approved by the Director General and the fresh air supplied in such tunnel is not less than 6 m³/min for each worker employed in tunnel as per Rule 153 of BOCWR.

34.3 Warning signs and notices:

34.3.1 The contractor shall ensure that

- i) suitable warning signs or notices, required for the safety of building workers carrying out the work of an excavation or tunnelling, shall be displayed or erected at conspicuous places in Hindi and in a language understood by majority of such building workers at such building such excavation or tunnelling work
- ii) such warning signs and notices with regard to compressed air working shall include
 - a) the danger involved in such compressed air work
 - b) fire and explosion hazard
 - c) the emergency procedures for rescue from such danger or hazards.

35.0 Work Permit system

35.1 The Contractor shall develop a Work Permit system, which is a formal written system used to control certain types of work that are potentially hazardous. A work permit is a document, which specifies the work to be done, and the precautions to be taken. Work Permits form an essential part of safe systems of work for many construction activities. They allow work to start only after safe procedures have been defined and they provide a clear record that all foreseeable hazards have been considered. Permits to Work are usually required in high-risk areas as identified by the Risk Assessments.

35.2 A permit is needed when construction work can only be carried out if normal safeguards are dropped or when new hazards are introduced by the work. Examples of high-risk activities include but are not limited to:

- i) Entry into confined spaces
- ii) Work in close proximity to overhead power lines and telecommunication cables.
- iii) Hot work.
- iv) To dig—where underground services may be located.
- v) Work with heavy moving machinery.
- vi) Working on electrical equipment
- vii) Work with radioactive isotopes.
- viii) Heavy lifting operations and lifting operations closer to live power line

35.3 The permit-to-work system should be fully documented, laying down:

- i) How the system works;



- ii) The jobs it is to be used for;
- iii) The responsibilities and training of those involved; and
- iv) How to check its operation;

35.4 A Work Permit authorisation form shall be completed with the maximum duration period not exceeding 12 hours.

35.5 A copy of each Permit To Work shall be displayed, during its validity, in a conspicuous location in close proximity to the actual works location to which it applies.

36.0 Traffic Management

36.1 The basic objective of the following guidelines is to lay down procedures to be adopted by contractor to ensure the safe and efficient movement of traffic and also to ensure the safety of workmen at construction sites.

36.2 All construction workers should be provided with high visibility jackets with reflective tapes as most of viaduct /tunnelling and station works or either above or under right-of-way. The conspicuity of workmen at all times shall be increased so as to protect from speeding vehicular traffic.

36.3 The guiding principles to be adopted for safety in construction zone are to

- i) Warn the road user clearly and sufficiently in advance.
- ii) Provide safe and clearly marked lanes for guiding road users.
- iii) Provide safe and clearly marked buffer and work zones
- iv) Provide adequate measures that control driver behaviour through construction zones.

36.4 Legal permission

36.4.1 In all cases, the contractor shall employ proper precautions. Wherever operations undertaken are likely to interfere with public traffic, specific traffic management plans shall be drawn up and implemented by the contractor in consultation with the approval of local police authorities and/or the concerned metropolitan/civil authorities as the case may be.

36.4.2 Such traffic management plans shall include provision for traffic diversion and selection of alternative routes for transport of equipment. If necessary, the contractor shall carry out road widening before commencement of works to accommodate the extra load

36.5 The primary traffic control devices used in work zones shall include signs, delineators, barricades, cones, pylons, pavement markings and flashing lights.

36.6 The road construction and maintenance signs which fall into the same three major categories as do other traffic signs, that are Regulatory Signs, Warning Signs and Direction (or guidelines) Signs shall only be used. The IRC: 67 (Code of Practice for Road Signs) provide a list of traffic signs. The size, colours and placement of sign shall confirm to IRC: 67.

36.7 Regulatory signs



- 36.7.1 Regulatory signs impose legal restriction on all traffic. It is essential, therefore, that they are used only after consulting the local police and traffic authorities.
- 36.8 Warning signs
- 36.8.1 Warning signs in the traffic control zone shall be utilised to warn the drivers of specific hazards that may be encountered.
- 36.8.2 The contractor shall place detour signage at strategic locations and install appropriate warning signs. In order to minimize disruption of access to residences and business, the contractor shall maintain at least one entrance to a property where multiple entrances exist.
- 36.8.3 A warning sign as given in general instruction **JMRC/SHE/GI/012** shall be installed at all secondary road which merges with the primary road where the construction work is in progress at sufficient distance before it merges with the primary road so as to alert the road users regarding the 'Metro Work in Progress'.
- 36.8.4 Materials hanging over / protruded from the chassis / body of any vehicle especially during material handling shall be indicated by red indicator (red light/flag) to indicate the caution to the road users.
- 36.9 Delineators
- The delineators are the elements of a total system of traffic control and have two distinct purposes:
- i) To delineate and guide the driver to and along a safe path
 - ii) As a taper to move traffic from one lane to another.
- 36.9.1 These channelising devices such as cones, traffic cylinders, tapes and drums shall be placed in or adjacent to the roadway to control the flow of traffic. These should normally be retro-reflectors complying to IRC: 79 - Recommended Practice for Road Delineators.
- 36.9.2 Traffic cones and cylinders
- Traffic cones of 500mm, 750mm and 1000mm high and 300mm to 500mm in diameter or in square shape at base and are often made of plastic or rubber and normally have retro-reflectorised red and white band shall be used wherever required.
- 36.9.3 Drums
- Drums about 800mm to 1000mm high and 300mm in diameter can be used either as channelising or warning devices. These are highly visible, give the appearance of being formidable objects and therefore command the respect of drivers.
- 36.9.4 Barricades
- 36.9.4.1 Full height fence, barriers, barricades etc. shall be erected around the site in order to prevent the working area from the risk of accidents due to speedy vehicular movement. Same the way barricades protect the road users from the danger due to construction equipment and other temporary structures.



36.9.4.2 The structure dimension of the barricade, material and composition, its colour scheme, JMRC logo and other details shall be in accordance with specifications laid down in tender document.

36.9.4.3 All barricades shall be erected as per the design requirements of the Employer, numbered, painted and maintained in good condition and also Barricade in-charge maintains a barricade register in site.

36.9.4.4 **All barricades shall be conspicuously seen in the dark/night time by the road users so that no vehicle hits the barricade. Conspicuity shall be ensured by affixing retro reflective stripes of required size and shape at appropriate angle at the bottom and middle portion of the barricade at a minimum gap of 1000mm. In addition minimum one red light or red light blinker should be placed at the top of each barricade.**

36.9.5 The contractor shall ensure that all his construction vehicles plying on public roads (like dump trucks, trailers, etc.) have proper license to ply on public roads from the State Transport Authority. Drivers holding proper valid license as per the requirements of Motor Vehicles Act shall drive these vehicles

36.9.6 The contractor shall not undertake loading and unloading at carriageways obstructing the free flow of vehicular traffic and encroachment of existing roads by the contractor applying the excuse of work execution.

36.9.7 **Tow away vehicle**

36.9.7.1 **The contractor shall make arrangements keeping tow away van / manpower to tow away any breakdown vehicle in the traffic flow without losing any time at his cost.**

36.9.8 **Cleaning of roads**

36.9.8.1 **The contractor shall ensure the cleanliness of roads and footpaths by deploying proper manpower for the same. The contractor shall have to ensure proper brooming, cleaning washing of roads and footpaths on all the time throughout the entire stretch till the currency of the contract including disposal of sweepage.**

37.0 Work to adjacent railways

37.1 Whenever work is to be conducted in close proximity to the live railways then the following measures shall need to be addressed:

- (a) The rules provided for in the Railway's manual shall be followed.
- (b) No persons are allowed to encroach onto the railway unless specific authority has been given by the owner.
- (c) Adequate protection in accordance with the railway owner's requirements shall be followed. (Provision of Block Inspectors, Flagmen and Lookouts)
- (d) All persons shall wear high visibility clothing at all times.
- (e) Any induction training requirements of the railways shall be strictly observed

38.0 Batching Plant / Casting Yard

- i) The batching plant / casting yard shall be effectively planned for smooth flow of unloading and stacking the aggregates reinforcements and cement, batching plant,



transport of concrete, casting the segment, stacking the segment and loading the segments to the trucks. As far as possible the conflicts should be avoided.

- ii) The batching plant / casting yard shall be barricaded and made as a compulsory PPE zone
- iii) If in case of material unloading area is not maintainable as PPE zone, the same shall be segregated properly and made as a non-PPE zone with appropriate barrications.
- iv) Electrical system shall also be suitably planned so that location of diesel generator, if any, location of DBs, routing of cables and positioning of area lighting poles/masts does not infringe on any other utility and pose danger.
- v) Drainage shall be effectively provided and waste water shall be disposed after proper treatment
- vi) Time office, canteen, drinking water, toilet and rest place shall be suitably located for the easy access to workers. All the facilities shall be properly cleaned and maintained during the entire period of operation.
- vii) Manual handling of cement shall be avoided to a larger extent. Whenever it is absolutely necessary the workmen shall be given full body protection, hand protection and respiratory protection as a basic measure of ensuring better health.
- viii) The PPEs provided to cement handling workmen shall conform to international standards.
- ix) Access roads and internal circulation roads shall be well laid and maintained properly at all time.
- x) Non-adherence to any of the above provision shall be penalised as per relevant penalty clause.

39.0 Personal Protective Equipments (PPEs)

39.1 The contractor shall provide required PPEs to workmen to protect against safety and / or health hazards. Primarily PPEs are required for the following protection

- i) Head Protection (Safety helmets)
- ii) Foot Protection (Safety footwear, Gumboot, etc)
- iii) Body Protection (High visibility clothing (waistcoat/jacket), Apron, etc)
- iv) Personal fall protection (Full body harness, Rope-grap fall arrester, etc)
- v) Eye Protection (Goggles, Welders glasses, etc)
- vi) Hand Protection (Gloves, Finger coats, etc)
- vii) Respiratory Protection. (Nose mask, SCBAs, etc)
- viii) Hearing Protection (Ear plugs, Ear muffs, etc)

39.2 **The PPEs and safety appliances provided by the contractor shall be of the standard as prescribed by Bureau of Indian Standards (BIS). If materials conforming to BIS standards are not available, the contractor as approved by the Employer shall procure PPE and safety appliances.**

39.3 **All construction workers should be provided with high visibility jackets with reflective tapes confirming to the requirement specified under BS EN 471: 1994 as most of viaduct /tunnelling and station works are executed either above or under right-of-way. The conspicuity of workmen at all times shall be increased so as to protect them from speeding vehicular traffic.**

39.4 The contractor shall provide **safety helmet, safety shoe and high visibility clothing** for all employees including workmen, traffic marshal and other employees who are engaged for any work under this contract as per the following requirement.



All employees of the Contractor including workmen	Traffic marshals
<ul style="list-style-type: none"> i) Hard hat with company Logo ii) Safety boots iii) Hi-visibility waistcoat covering upper body and meeting the following requirements as per BS EN 471:1994: <ul style="list-style-type: none"> a) Background in fluorescent orange-red in colour b) Two vertical green strips of 5cm wide on front side, covering the torso at least 500 cm² c) Two diagonal strips of 5 cm wide on back in an 'X' pattern covering at least 570cm² d) Horizontal strips not less than 5cm wide running around the bottom of the vertical strip in front and 'X' pattern at back. e) The bottom strip shall be at a distance of 5cm from the bottom of the vest. f) Strips must be retro reflective and fluorescent g) Waistcoat shall have a side adjustable fit and a side and front tear-away feature on vests made of nylon. 	<ul style="list-style-type: none"> i) Hard hat with reflective tape ii) Safety boots iii) Hi-visibility jacket covering upper body and meeting the following requirements as per BS EN 471:1994 : <ul style="list-style-type: none"> a) Background in fluorescent orange-red in colour b) Jackets with full-length sleeves with two bands of retro reflective material, which shall be placed at the same height on the garment as those of the torso. The upper band shall encircle the upper part of the sleeves between the elbow and the shoulder; the bottom of the lower band shall not be less than 5cm from the bottom of the sleeve. c) Two vertical green strips of 5cm wide on front side, covering the torso at least 500 cm² d) Two diagonal strips of 5 cm wide on back in an 'X' pattern covering at least 570cm² e) Horizontal strips not less than 5cm wide running around the bottom of the vertical strip in front and 'X' pattern at back. f) The bottom strip shall be at a distance of 5cm from the bottom of the vest. g) Strips must be retro reflective and fluorescent.

39.4.1 Colour coding for helmets

Safety Helmet Colour Code (Every Helmet should have the LOGO* affixed /painted)	Person to use
White	JMRC staffs
Grey	All Designers, Architect, Consultants, etc.
Violet	Main Contractors (Engineers / Supervisors)
Blue	All Sub-contractors (Engineers / Supervisors)
Red	Electricians (Both Contractor and Sub-contractor)
Green	Safety Professionals (Both Contractor and Sub-contractor)
Orange	Security Guards / Traffic marshals
Yellow	All workmen



White (with "VISITOR" sticker)	Visitors
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Note: LOGO*

1. Logo shall have its outer dimension 2"X2" and shall be conspicuous
2. Logo shall be either painted or affixed
3. No words shall come either on Top / Bottom of Logo

Logo of the corresponding main contracting company for their employees and sub-contracting company for their employees shall only be used.

- 39.5 In addition to the above any other PPE required for any specific jobs like, welding and cutting, working at height, tunnelling etc shall also be provided to all workmen and also ensure that all workmen use the PPEs properly while on the job.
- 39.6 The contractor shall not pay any cash amount in lieu of PPE to the workers/sub-contractors and expect them to buy and use during work.
- 39.7 The contractor shall at all time maintain a minimum of 10% spare PPEs and safety appliances and properly record and show to the Employer during the inspections. Failing to do so shall invite appropriate penalty as per the provisions of the contract.
- 39.8 It is always the duty of the contractor to provide required PPEs for all visitors. Towards this required quantity of PPEs shall be kept always at the security post.

40.0 Visitors to site

- 40.1 No visitor is allowed to enter the site without the permission of the Employer. All authorised visitors should report at the site office. Contractor shall provide visitor's helmet (White helmet with visitor sticker) and other PPEs like Safety Shoe, reflective jacket, respiratory protection etc. as per requirement of the site.
- 40.2 All Visitors shall be accompanied at all times by a responsible member of the site personnel.
- 40.3 The contractor shall be fully responsible for all visitors' safety and health within the site..



**PART – III : OCCUPATIONAL HEALTH
AND WELFARE**



41.0 Physical fitness of workmen

41.1 The contractor shall ensure that his employees/workmen subject themselves to such medical examination as required under the law or under the contract provision and keep a record of the same.

41.2 The contractor shall not permit any employee/workmen to enter the work area under the influence of alcohol or any drugs.

42.0 Medical Facilities

42.1 Medical Examination

42.1.1 The contractor shall arrange a medical examination of all his employees including his sub-contractor employees employed as drivers, operators of lifting appliances and transport equipment before employing, after illness or injury, if it appears that the illness or injury might have affected his fitness and, thereafter, once in every two years up to the age of 40 and once in a year, thereafter.

- i) The Contractor shall maintain the confidential records of medical examination or the physician authorized by the Employer.
- ii) No building or other construction worker is charged for the medical examination and the cost of such examination is borne by contractor employing such building worker.
- iii) The medical examination shall include: -
 - a) Full medical and occupational history.
 - b) Clinical examination with particular reference to
 - i) General Physique;
 - ii) Vision: - Total visual performance using standard orthorator like Titmus Vision Tester should be estimated and suitability for placement ascertained in accordance with the prescribed job standards.
 - iii) Hearing: - Persons with normal must be able to hear a forced whisper at twenty-four feet. Persons using hearing aids must be able to hear a warning shout under noisy working conditions.
 - iv) Breathing: - Peak flow rate using standard peak flow meter and the average peak flow rate determined out of these readings of the test performed. The results recorded at pre-placement medical examination could be used as a standard for the same individual at the same altitude for reference during subsequent examination.
 - v) Upper Limbs: - Adequate arm function and grip
 - vi) Spine: - Adequately flexible for the job concerned.
 - vii) Lower Limbs: - Adequate leg and foot concerned.
 - viii) General: - Mental alertness and stability with good eye, hand and foot coordination.
 - c) Any other tests which the examining doctor considers necessary

42.1.2. If the contractor fails to get the medical examination conducted as mentioned above, the employer will have the right to get the same conducted by through an agency with intimation to the contractor and deduct the cost and overhead charges.



42.2 Occupational Health Centre

42.2.1 The contractor shall ensure at a construction site an occupational health centre, mobile or static is provided and maintained in good order. Services and facilities as per the scale lay down in Schedule X of BOCWR. A construction medical officer appointed in an occupational health centre possesses the qualification as laid down in Schedule XI of BOCWR.

42.3 Ambulance van and room

42.3.1 The contractor shall ensure at a construction site of a building or other construction work that an ambulance van and room are provided at such construction site or an arrangement is made with a nearby hospital for providing such ambulance van for transportation of serious cases of accident or sickness of workers to hospital promptly and such ambulance van and room are maintained in good repair and is equipped with standard facilities specified in Schedule IV and Schedule V of BOCWR.

42.4 First-aid boxes

42.4.1 The contractor shall ensure at a construction site one First-aid box for 100 workers provided and maintained for providing First-aid to the building workers. Every First-aid box is distinctly marked "First-aid" and is equipped with the articles specified in Schedule III of BOCWR.

42.5 HIV/ AIDS prevention and control

42.5.1 The contractor shall adopt the Employer's Policy on "HIV / AIDS Prevention and Control for Workmen Engaged by Contractors" and the copy of the policy is given in **Appendix No.: 4**.

42.5.2 The Employer will engage a professional agency for implementing the guidelines laid down in the policy and communicate to the contractor.

42.5.3 The Contractor shall extend necessary support to the appointed agency by deputing the workmen to attend the awareness creation programmes.

42.5.4 The contractor shall also extend necessary organizational support to the appointed agency for the effective implementation of the Employers' workplace policy on HIV/AIDS for workmen of the Contractors.

42.5.5 As laid down in the policy the contractor shall identify peer educators (1 for every 100 workers) and refer them for professional training to the Employers' appointed agency for the purpose.

42.5.6 **The peer educators on completion of the training shall serve as the focal point for any information, education and awareness campaign among the workmen throughout the contract period.**

42.5.7 The peer educators will be paid a monthly honorarium as fixed by the Employer for rendering his services in addition to his regular duty.

42.5.8 The total number of peer educators (1 for 100 workers) shall always be maintained by the contractor.



42.5.9 **In case if these peer educators leave the contractor by creating vacancy, then the contractor at his own expense train the new replacement peer educator from the Employers' appointed agency for the purpose.**

42.5.10 It is suggested to the contractor that due care should be taken to select the peer educators from among the group of workmen so that they remain with the contractor throughout the contract period.

42.6 Prevention of mosquito breeding

42.6.1 Measures shall be taken to prevent breeding at site. The measures to be taken shall include:

- i) Empty cans, oil drums, packing and other receptacles, which may retain water shall be deposited at a central collection point and shall be removed from the site regularly.
- ii) Still waters shall be treated at least once every week with oil in order to prevent mosquito breeding.
- iii) Contractor's equipment and other items on the site, which may retain water, shall be stored, covered or treated in such a manner that water could not be retained.
- iv) Water storage tanks shall be provided.

42.6.2 Posters in both Hindi and English, which draw attention to the dangers of permitting mosquito breeding, shall be displayed prominently on the site.

42.6.3 **The contractor at periodic interval shall arrange to prevent mosquito breeding by fumigation / spraying of insecticides. Most effective insecticides shall include SOLFAC WP 10 or Baytex, The Ideal Larvicide etc.**

42.7 Alcohol and drugs

42.7.1 The contractor shall ensure at all times that no employee is working under the influence of alcohol / drugs which are punishable under Govt. regulations.

42.7.2 Smoking at public worksites by any employee is also prohibited as per Govt. regulations.

43.0 Noise

43.1 The Contractor shall consider noise as an environmental constraint in his design, planning and execution of the Works and provide demonstrable evidence of the same on Employer's request. The Contractor shall, at his own expense, take all appropriate measures to ensure that work carried out by the Contractor and by his sub-Contractors, whether on or off the Site, will not cause any unnecessary or excessive noise which may disturb the occupants of any nearby dwellings, schools, hospitals, or premises with similar sensitivity to noise.

43.1.1 Without prejudice to the generality of the foregoing, noise level reduction measures shall include the following:

- i) The Contractor shall ensure that all powered mechanical equipment used in the Works shall be effectively sound reduced using the most modern techniques available including but not limited to silencers and mufflers.
- ii) The Contractor shall construct acoustic screens or enclosures around any parts of the Works from which excessive noise may be generated.



- 43.1.2 The Contractor shall ensure that noise generated by work carried out by the Contractor and his sub-Contractors during daytime and night time shall not exceed the maximum permissible noise limits, whether continuously or intermittently, as given in the project SHE Manual. The same may be varied from time to time by and at the sole discretion of the Employer. In the event of a breach of this requirement, the Contractor shall immediately re-deploy or adjust the relevant equipment or take other appropriate measures to reduce the noise levels and thereafter maintain them at levels which do not exceed the said limits. Such measures may include without limitation the temporary or permanent cessation of use of certain items of equipment.
- 43.1.3 The noise monitoring requirements including monitoring locations are given in the project SHE Manual.
- 43.2 Control Requirements
- 43.2.1 Construction material should be operated and transported in such a manner as not to create unnecessary noise as outlined below:
- i) Perform Work within the procedures outlined herein and comply with applicable codes, regulations, and standards established by the Central and State Government and their agencies.
 - ii) Keep noise to the lowest reasonably practicable level. Appropriate measures will be taken to ensure that construction works will not cause any unnecessary or excessive noise, which may disturb the occupants of any nearby dwellings, schools, hospitals, or premises with similar sensitivity to noise. Use equipment with effective noise-suppression devices and employ other noise control measures as to protect the public.
 - iii) Schedule and conduct operations in a manner that will minimize, to the greatest extent feasible, the disturbance to the public in areas adjacent to the construction activities and to occupants of buildings in the vicinity of the construction activities.
 - iv) The Contractor shall submit to the Employer a Noise Monitoring and Control Plan (NMCP) under contract specific Site Environmental Plan. It shall include full and comprehensive details of all powered mechanical equipment, which he proposes to use during daytime and night time, and of his proposed working methods and noise level reduction measures. The NMCP shall include detailed noise calculations and vibration levels to demonstrate the anticipated noise generation and vibrations by the Contractor.
 - v) The NMCP prepared by the Contractor shall guide the implementation of construction activity. The NMCP will be reviewed on a regular basis and updated as necessary to assure that current construction activities are addressed. It may appear as a regular agenda item in project coordination meetings, if noise is an issue at any location in the contract.
- 43.3 Occupational Noise
- i) Protection against the effects of occupational noise exposure should be provided when the sound levels exceeds the threshold values as provided in Project SHE Manual.
 - ii) When employees are subjected to sound levels exceeding those listed in the Table, feasible administrative or engineering controls should be utilized as given in this document and JMRC's Project SHE Manual.



- iii) If such controls fail to reduce sound levels within the levels of the table, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table.
- iv) When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. Exposure to different levels for various periods of time shall be computed according to the formula and sample computation as given in project SHE Manual.

43.4 Vibration Level

- 43.4.1 In locations where the alignment is close to historical / heritage structures, the contractor shall prepare a monitoring scheme prior to construction at such locations. This scheme for monitoring vibration level at such historical / heritage sites shall be submitted to Employer for his approval. This scheme shall include:
- i) Monitoring requirements for vibrations at regular intervals throughout the construction period.
 - ii) Pre-construction structural integrity inspections of historic and sensitive structures in project activity.
 - iii) Information dissemination about the construction method, probable effects, quality control measures and precautions to be used.
 - iv) The vibration level limits at work sites adjacent to the alignment shall conform to the permitted values of peak p velocity as given in article project SHE Manual.

44.0 Ventilation and illumination

44.1 Ventilation

- 44.1.1 The contractor shall ensure at a construction site of a building or other construction work that all working areas in a free tunnel are provided with ventilation system as approved by the DG/CIIBC and the fresh air supply in such tunnel is not less than 6m³/min for each building worker employed underground in such tunnel and the free air flow movement inside such tunnel is not less than 9m/min.

- 44.1.2 The oxygen level shall not be less than 19.5% in the working environment.

44.2 Illumination

- 44.2.1 The contractor shall take every effort to illuminate the work site as per the Employer's requirement illustrated in general instruction **JMRC/SHE/GI/0011**.
- 44.2.2 **The contractor shall conduct a monthly illumination monitoring by lux meter for all the locations and the report shall be sent to the Employer within 7th of the next month and the same shall be reviewed during the monthly SHE committee meeting.**

45.0 Radiation

- 45.1 The use of radioactive substances and radiating apparatus shall comply with the Govt. regulatory requirements and all subsidiary legislation



- 45.2 Operations involving ionising radiation shall only be carried out after having been reviewed without objection by the Employer's representative and shall be carried out in accordance with a method statement.
- 45.3 each area containing irradiated apparatus shall have warning notices and barriers, as required by the Regulations, conspicuously posted at or near the area.
- 45.4 Radioactive substances will be stored, used or disposed shall be strictly in accordance with the Govt. Enactments.
- 45.5 The contractor shall ensure that all site personnel and members of the public are not exposed to radiation.
- 46.0 **Welfare measures for workers**
- 46.1 Latrine and Urinal Accommodation
- 46.1.1 **The contractor shall provide one latrine seat for every 20 workers up to 100 workers and thereafter one for every additional 50 workers. In addition one urinal accommodation shall be provided for every 100 workers.**
- 46.1.2 When women are employed, separate latrine and urinals accommodation shall be provided on the same scale as mentioned above.
- 46.1.3 Latrine and urinals shall be provided as per Section 33 of BOCWA and maintained as per Rule 243 of BOCWR and shall also comply with the requirements of public health authorities
- 46.1.4 Moving sites
- 46.1.4.1 In case of works like track laying, the zone of work is constantly moving at elevated level or at underground level. In such cases mobile toilets with proper facility to drain the sullage shall be provided at reasonably accessible distance.
- 46.1.5 **In case if the contractor fail to provide required number of urinals and latrines or fail to maintain it as per the requirements of Public Health laws, the Employer shall have the right to provide/maintain through renowned external agencies like "Sulabh" at the cost of the contractor.**
- 46.2 **Canteen:**
- 46.2.1 **In every workplace wherein not less than 250 workers are ordinarily employed the contractor shall provide an adequate canteen conforming to Section 37 of BOCWA, Rule 244 of BOCWR and as stipulated in Rule 247 of BOCWR the charges for food stuff shall be based on 'no profit no loss' basis. The price list of all items shall be conspicuously displayed in such canteen.**
- 46.3 **Serving of tea and snacks at the workplace:**
- 46.3.1 **As per Rule 246 of BOCWR, at a building or other construction work where a workplace is situated at a distance of more than 200 m from the canteen provided under Rule 244(1) of BOCWR, the contractor employing building works shall make suitable arrangement for serving tea and light refreshment to such building works at such place.**



46.4 **Drinking water**

46.4.1 **As per Section 32 of BOCWA the contractor shall make in every worksite, effective arrangements to provide sufficient supply of wholesome drinking water with minimum quantity of 5 litres per workman per day. Quality of the drinking water shall conform to the requirements of national standards on Public Health.**

46.4.2 While locating these drinking water facility due care shall be taken so that these are easily accessible within a distance of 200m from the place of work for all workers at all location of work sites.

46.4.3 All such points shall be legible marked "Drinking Water" in a language understood by a majority of the workmen employed in such place and such point shall be situated within six metres of any washing places, urinals or latrines.

46.5 **Labour Accommodation**

46.5.1 **The contractor shall provide free of charges as near as possible, temporary living accommodation to all workers conforming to provisions of Section 34 of BOCWA. These accommodations shall have cooking place, bathing, washing and lavatory facilities.**

46.6 **Creches**

46.6.1 In every workplace where in more than 50 female workers are ordinarily employed, there shall be provided and maintained a suitable room for use of children under age of 6 yrs, conforming to the provisions of Section 35 of BOCWA.



PART – IV : ENVIRONMENTAL MANAGEMENT



47.0 Air Quality

- 47.1 The Contractor shall take all necessary precautions to minimise fugitive dust emissions from operations involving excavation, grading, and clearing of land and disposal of waste. He shall not allow emissions of fugitive dust from any transport, handling, construction or storage activity to remain visible in atmosphere beyond the property line of emission source for any prolonged period of time without notification to the Employer.
- 47.2 The Contractor shall use construction equipment designed and equipped to minimise or control air pollution. He shall maintain evidence of such design and equipment and make these available for inspection by Employer.
- 47.3 If after commencement of construction activity, Employer believes that the Contractor's equipment or methods of working are causing unacceptable air pollution impacts then these shall be inspected and remedial proposals shall be drawn up by the Contractor, submitted for review to the Employer and implemented.
- 47.4 In developing these remedial measures, the Contractor shall inspect and review all dust sources that may be contributing to air pollution. Remedial measures include use of additional/ alternative equipment by the Contractor or maintenance/modification of existing equipment of the Contractor.
In the event that approved remedial measures are not being implemented and serious impacts persist, the Employer may direct the Contractor to suspend work until the measures are implemented, as required under the Contract.
- 47.5 Contractor's transport vehicles and other equipment shall conform to emission standards fixed by Statutory Agencies of Government of India or the State Government from time to time. The Contractor shall carry out periodical checks and undertake remedial measures including replacement, if required, so as to operate within permissible norms.
- 47.6 The Contractor shall establish and maintain records of routine maintenance program for internal combustion engine powered vehicles and equipment used on this project. He shall keep records available for inspection by Employer.
- 47.7 The Contractor shall cover loads of dust generating materials like debris and soil being transported from construction sites. All trucks carrying loose material should be covered and loaded with sufficient free- board to avoid spills through the tail board or side boards.
- 47.8 The Contractor shall promptly transport all excavation disposal materials of whatever kind so as not to delay work on the project. Stockpiling of materials will only be allowed at sites designated by the Employer. The Contractor shall place excavation materials in the dumping/disposal areas designated in the plans as given in the specifications.
- 47.9 The temporary dumping areas shall be maintained by the Contractor at all times until the excavate is re-utilised for backfilling or as directed by Employer. Dust control activities shall continue even during any work stoppage.
- 47.10 The Contractor shall place material in a manner that will minimize dust production. Material shall be minimized each day and wetted, to minimize dust production. During dry weather, dust control methods must be used daily especially on windy, dry days to prevent any dust from blowing across the site perimeter.



- 47.11 The Contractor shall water down construction sites as required to suppress dust, during handling of excavation soil or debris or during demolition. The Contractor will make water sprinklers, water supply and water delivering equipment available at any time that it is required for dust control use. Dust screens will be used, as feasible when additional dust control measures are needed specially where the work is near sensitive receptors.
- 47.12 The Contractor shall provide a wash pit or a wheel washing and/or vehicle cleaning facility at the exits from work sites such as construction depots and batching plants. At such facility, high-pressure water jets will be directed at the wheels of vehicles to remove all spoil and dirt.
- 47.13 The Contractor shall design and implement his blasting techniques so as to minimise dust, noise, vibration generation and prevention fly rock.
- 47.14 Blasting technique should be consistent not only with nature and quantity of rock to be blasted but also the location of blasting.
- 47.15 The contractor shall give preference to explosives with better environmental characteristics.
- 47.16 The Contractor shall protect structures, utilities, pavements roads and other facilities from disfiguration and damage as a result of his activities. Where this is not possible, the contractor shall restore the structures, utilities, pavements, roads and other facilities to their original or better, failing which the rectification/restoration work shall be carried out at the risk and cost of the contractor.
- 47.17 The Contractor shall submit to the Employer an Air Monitoring and Control Plan (AMCP) under contract specific Site Environmental Plan to guide construction activity insofar as it relates to monitoring, controlling and mitigating air pollution.

48.0 Water Quality

- 48.1 The Contractor shall comply with the Indian Government legislation and other State regulations in existence in Jaipur insofar as they relate to water pollution control and monitoring. A drainage system should be constructed at the commencement of the Works, to drain off all surface water from the work site into suitable drain outlet.
- 48.2 The Contractor shall provide adequate precautions to ensure that no spoil or debris of any kind is pushed, washed, falls or deposited on land adjacent to the site perimeter including public roads or existing stream courses and drains within or adjacent to the site. In the event of any spoil or debris from construction works being deposited or any silt washed down to any area, then all such spoil, debris or material and silt shall be immediately removed and the affected land and areas restored to their natural state by the Contractor to the satisfaction of the Employer.
- 48.3 Due to lowering of potable water supplies in Jaipur and subsequent contamination of ground water, the Contractor is not allowed to discharge water from the site without the approval of the Employer. The Contractor must comply with the requirements of the Central Ground Water Board for discharge of water arising from dewatering. Any water obtained from dewatering systems installed in the works must be either re-used for construction purposes and this water may subsequently be discharged to the drainage system or, if not re-used, recharged to the ground water at suitable aquifer levels. The Contractor must submit his proposals for approval of Employer, on his proposed locations of dewatering of excavation and collection of water for either construction re-use or recharge directly to



aquifers. The Contractor's recharge proposals must be sufficient for recharging of the quantity of water remaining after deduction of water re-used for construction. During dewatering, the contractor shall monitor ground water levels from wells to ensure that draw down levels do not exceed allowable limits. The Contractor will not be permitted to directly discharge, to the drainage system, unused ground water obtaining from the excavation without obtaining approval of Employer or the Agency controlling the system.

- 48.4 The Contractor shall ensure that earth, bentonite, chemicals and concrete agitator washings etc. are not deposited in the watercourses but are suitably collected and residue disposed off in a manner approved by local authorities.
- 48.5 All water and waste products (surface runoff and wastewater) arising on the site shall be collected and removed from the site via a suitable and properly designed temporary drainage system and disposed off at a location and in a manner that will cause neither pollution nor nuisance.
- 48.6 Any mud slurry from drilling, tunnelling, diaphragm wall construction or grouting etc. shall not be discharged into the drainage system unless treatment is carried out that will remove silt, mud particles, bentonite etc. The Contractor shall provide treatment facilities as necessary to prevent the discharge of contaminated ground water.
- 48.7 The Contractor shall discharge wastewater arising out of site office, canteen or toilet facilities constructed by him into sewers after obtaining prior approval of agency controlling the system. A wastewater drainage system shall be provided to drain wastewater into the sewerage system.
- 48.8 The bentonite mixing, treatment and handling system shall be established by the contractor giving due regard to its environmental impacts. The disposal of redundant bentonite shall be carefully considered whether in bulk or liquid form. The disposal location will be advised and agreed with the relevant authorities.
- 48.9 The Contractor shall take measures to prevent discharge of oil and grease during spillage from reaching drainage system or any water body. Oil removal / interceptors shall be provided to treat oil waste from workshop areas etc.
- 48.10 The Contractor shall apply to the appropriate authority for installing bore wells for water supply at site.

49.0 Archaeological and Historical Preservation

- 49.1 The contractor shall seek to accommodate archaeological and historical preservation concerns that may arise due to the construction of the project especially in close vicinity of such areas where such monuments may be located.
- 49.2 The contractor shall consult the Archaeological Survey of India (ASI). Other competent authorities and other parties, on the advise of the Employer, to identify and assess construction effects and seek ways to avoid, minimize or mitigate adverse effects on such monuments.
- 49.3 Adverse effects may include reasonably foreseeable effects caused by the construction that may occur later in time, be farther removed in distance or those that alter, howsoever temporarily, the significance of the structure.



50.0 Landscape and Greenery

- 50.1 As far as is reasonably practicable, the Contractor shall maintain ecological balance by preventing deforestation and defacing of natural landscape. In respect of ecological balance, the Contractor shall observe the following instructions.
- 50.2 The Contractor shall, so conduct his construction operations, as to prevent any avoidable destruction, scarring or defacing of natural surrounding in the vicinity of work.
- 50.3 Where destruction, scarring, damage or defacing may occur as a result of operations relating to Permanent or Temporary works, the same shall be repaired, replanted or otherwise corrected at Contractor's expense. All work areas shall be smoothed and graded in a manner to conform to natural appearance of the landscape as directed by the Employer.
- 50.4 A suggested list of trees/shrubs suitable for planting and landscaping is found in Employer's Project SHE Manual.

51.0 Felling of Trees

- 51.1 The contractor shall identify the number and type of trees that are required to be felled as a result of construction of works and facilities related to Jaipur Metro Project and inform the Employer.
- 51.2 All trees and shrubbery, which are not specifically required to be cleared or removed for construction purposes, shall be preserved and shall be protected from any damage that may be caused by Contractor's construction operations and equipment. The contractor shall not fell, remove or dispose of any tree or forest produce in any land handed over to him for the construction of works and facilities related to Jaipur Metro except with the previous permission obtained from the Forest Department.
- 51.3 The Employer shall arrange permission from the forest department for trees to be felled or transplanted. The Employer will permit the removal of trees or shrubs only after prior approval.
- 51.4 Special care shall be exercised where trees or shrubs are exposed to injuries by construction equipment, blasting, excavating, dumping, chemical damage or other operation and the Contractor shall adequately protect such trees by used of protective barriers or other methods approved by the Employer. Trees shall not be used for anchorage.

52.0 Fly Ash

- 52.1 The Employer may require the contractor to use fly ash as a percentage substitution of cement, in concrete for certain structures and works.
- 52.2 In all such uses of Fly Ash, the contractor shall maintain a detailed record of usage of Fly Ash. The contractor shall also collect related details and provide to the Employer.
- 52.3 The reporting details on consumption of Fly Ash are found in Employer's SHE Manual.



53.0 Waste

- 53.1 The contractor is required to develop, institute and maintain a Waste Management Programme (WMP) during the construction of the project for his works, which may include: -
- i) Identification of disposal sites.
 - ii) Identification of quantities to be excavated and disposed off.
 - iii) Identification of split between waste and inert material
 - iv) Identification of amounts intended to be stored temporarily on site location of such storage.
 - v) Identification of intended transport means and route.
 - vi) Obtaining permission, where required, for disposal.
- 53.2 Such a mechanism is intended to ensure that the designation of areas for the segregation and temporary storage of reusable and recyclable materials are incorporate into the WMP. The WMP should be prepared and submitted to the Engineer for approval.
- 53.3 The Contractor shall handle waste in a manner that ensures they are held securely without loss or leakage thus minimizing potential for pollution. The Contractor shall maintain and clean waste storage areas regularly.
- 53.4 The Contractor shall remove waste in a timely manner and disposed off at landfill sites after obtaining approval of Jaipur Municipal Corporation for its disposal.
- 53.5 Burning of wastes is prohibited. The Contractor shall not burn debris or vegetation or construction waste on the site but remove it in accordance with **50.1** above.
- 53.6 The Contractor shall make arrangement to dispose of metal scrap and other saleable waste to authorized dealer and make available to the Employer on request, records of such sales.

54.0 Hazardous Waste Management

- 54.1 If encountered or generated as a result of Contractor's activity, then waste classified as hazardous under the "Hazardous Wastes (Management & Handling) Rules, 1989, amendments 2000, 2003" shall be disposed off in a manner in compliance with the procedure given in the rules under the aforesaid act.
- 54.2 Chemicals classified as hazardous chemicals under "Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 of Environment (Protection) Act, 1986 shall be disposed off in a manner in compliance with the procedure given in the rules under the aforesaid act.
- 54.3 The contractor shall identify the nature and quantity of hazardous waste generated as a result of his activities and shall file a 'Request for Authorisation' with Rajasthan State Pollution Control Board along with a map showing the location of storage area.
- 54.4 Outside the storage area, the contractor shall place a 'display board', which will display quantity and nature of hazardous waste, on date. Hazardous Waste needs to be stored in a secure place



- 54.5 It shall be the responsibility of the contractor to ensure that hazardous wastes are stored, based on the composition, in a manner suitable for handling, storage and transport. The labelling and packaging is required to be easily visible and be able to withstand physical conditions and climatic factors.
- 54.6 The contractor shall approach only Authorised Recyclers of Hazardous Waste for disposal of Hazardous Waste, under intimation to the Employer.
- 54.7 Submittal of all environment related documents and records pertaining to monitoring and trend analysis on key parameters such as but not limited to consumption/efficient use of resources such as energy, water, material such as cement, fly ash, iron and steel, recycle/reuse of waste etc that shall have demonstrated continual improvement in the implementation of Environmental management System. Failure to do so the employer shall impose appropriate penalty as indicated under penalty clause.

55.0 Energy Management

- 55.1 The contractor shall use and maintain equipment so as to conserve energy and shall be able to produce demonstrable evidence of the same upon Employer's request.
- 55.2 Measures to conserve energy include but not limited to the following:
- i) Use of energy efficient motors and pumps
 - ii) Use of energy efficient lighting, which uses energy efficient luminaries
 - iii) Adequate and uniform illumination level at construction sites suitable for the task
 - iv) Proper size and length of cables and wires to match the rating of equipment
 - v) Use of energy efficient air conditioners
- 55.3 The contractor shall design site offices maximum daylight and minimum heat gain. The rooms shall be well insulated to enhance the efficiency of air conditioners and the use of solar films on windows may be used where feasible.



PART – V : PENALTY AND AWARDS



56.0 Charges to be recovered from contractor for unsafe act or condition

56.1 JMRC has built an image of safety conscious organisation meticulously over a period of three years. Any reportable accident (fatality / injury) results in loss of life and/or property damage. These accidents not only result in loss of life but also damage the reputation of JMRC. Most of the accidents are avoidable and caused preliminary due to contractors' negligence. Hence JMRC shall recover the cost of damages from the contractors for every reportable incident (fatality / injury).

56.2 In addition every JMRC work site is exposed to public scrutiny as the work is executed just on the right-of-way. Any unsafe act / unsafe condition observed by public further damages our reputation. Because of the non-voluntary compliance of contractors to the condition of contract on SHE and project SHE manual, JMRC has been forced to establish safety-enforcing organisation. The cost of established such organisation is to be recovered from contractors for all observed safety violations at sites.

56.3 The following table indicates the Safety, Health and Environment violation (unsafe act / unsafe condition) and charges to be recovered from contractors.

SL. NO.	TOPIC	UNSAFE ACT/UNSAFE CONDITION	DEDUCTIBLE AMOUNT
1.	SHE Policy & Plan	i) SHE policy a) non-compliance of clause 4.1 b) Inadequate coverage, not signed c) Not displayed at prominent locations	Rs.5,000 per single violation, compounded to a maximum of Rs.25,000 at any single instance.
		ii) SHE plan: a) Not as per Employers' content and coverage b) Delay in submission c) Not updated as per employer's instruction as per clause 4.4 d) Copies not provided to all required supervisors / engineers	Rs.1,00,000 per single violation, compounded to a maximum of Rs.2,00,000 at any single instance.
2.	SHE Organisation	i) Not complying to the minimum manpower requirements as mentioned in General Instruction JMRC/SHE/001 ii) Not filling up the vacancies created due to SHE personnel leaving the contractor within 14 days. iii) SHE organisation not provided with required Audio-visual and other equipments as per General Instruction JMRC/SHE/012 iv) Employing through outsourcing	i) Rs.1,00,000 per month for first month and Rs.2,00,000 for subsequent months ii) Rs.50,000 per month for first month and Rs.1,00,000 for subsequent months For items iii), iv), v) and vi) Rs.50,000 for first violation and Rs.1,00,000 for subsequent violations



Safety, Health and Environment (SHE) Manual

		<p>agencies and SHE personal are not in the payroll of the main contractor</p> <p>v) Disobedience / Improper conduct of any SHE personnel.</p> <p>vi) Chief SHE Manager not reporting directly to CPM of contractor.</p>	
3.	SHE committee	<p>i) Failed to formulate or conduct SHE Committee meeting for any month</p> <p>ii) Contractor and Sub-contractor representatives not attending SHE Committee meetings</p> <p>iii) Failed to conduct Site inspection before conducting SHE Committee meeting</p> <p>iv) Failed to send SHE Committee Meeting minutes or Agenda to Employer in time</p> <p>v) Non-adherence of clause 7.7.1</p> <p>vi) Non-adherence of clause 7.9</p>	<p>i) Rs.1,00,000 for the first violation and Rs.5,00,000 for the subsequent violations</p> <p>ii) Rs.5,000 to the contractor of the member who had not attended the meeting for first violation and Rs.25,000 for subsequent violations.</p> <p>For item iii), iv), v) and vi) Rs.25,000 for first violation and Rs.50,000 for subsequent violations</p>
4.	ID card	<p>i) Non-adherence of clause 8.1, 8.2 and 8.3</p>	<p>Rs.1,00,000 for first violation and Rs.2,00,000 for subsequent violations</p>
5.	SHE Training	<p>i) Not complying to the requirements as mentioned in conditions of contract on SHE and project SHE manual with regard to:</p> <p>a) Induction training not given</p> <p>b) Supervisor/engineer/manager training not conducted as per clause 9.6</p> <p>c) Refresher training as per clause 9.7 and 9.11 not conducted</p> <p>d) Tool-box talk not conducted as per clause 9.8</p> <p>e) Skill development training not conducted as clause 9.9</p> <p>f) Daily Safety Oath not conducted as per clause 9.10</p> <p>g) Top management behaviour based SHE training conducted</p>	<p>For item 1 a) to g) Rs.50,000 for first violation on and Rs.1,00,000 for subsequent violations</p>
6.	SHE Inspection	<p>i) Not complying to the requirements as mentioned in conditions of contract on SHE and project SHE manual as per clause 10.0</p> <p>ii) Non compliance of clause 10.3.6</p>	<p>Rs.50,000 for first violation and Rs.1,00,000 for subsequent violations</p>
7.	SHE audit	<p>Internal Audit: MARS</p> <p>i) Not conducted as per SHE Plan</p> <p>ii) Report not sent to Employer</p> <p>iii) Action not taken for any month</p>	<p>For item i) to iii) Rs.50,000 for first violation and Rs.1,00,000 for subsequent violations.</p>



Safety, Health and Environment (SHE) Manual

		<p>External Audit</p> <p>iv) Not conducted as per SHE Plan</p> <p>v) Report not sent to employer</p> <p>vi) Action not taken for any quarter</p>	<p>For item iv) to vi)</p> <p>Rs.1,00,000 for first violation and Rs.2,00,000 for subsequent violations.</p>
8.	SHE Communication	<p>i) Important days to be observed for SHE awareness as furnished by employer not observed</p> <p>ii) Posters as furnished by Employer not printed and displayed</p>	<p>i) Rs.10,000 for first violation and Rs.50,000 for subsequent violations</p> <p>ii) 2,00,000 per contract</p>
9.	SHE Submittals	<p>i) Non compliance of clause 13.1</p> <p>ii) Non compliance of clause 13.2</p> <p>iii) Non compliance of clause 13.3</p>	<p>For item i)</p> <p>Rs.50,000 for first violation and Rs.1,00,000 for subsequent violations</p> <p>For item ii) and iii)</p> <p>Rs.1,00,000 for first violation and Rs.2,00,000 for subsequent violations</p>
10.	Injury and Incidence reporting	<p>i) Fatal accidents</p> <p>ii) Injury accident</p> <p>iii) Abnormal delay in reporting accidents or wilful suppression of information about any accidents / dangerous occurrence as per clause 14.1.4</p> <p>iv) Delay in informing about any accidents / dangerous incidents.</p> <p>v) Non-compliance of the clause 14.4</p>	<p>i. Rs.5,00,000 for first fatality and Rs.10,00,000 for every subsequent fatality.</p> <p>ii. Rs.1,00,000 for first grievously injured person and Rs.2,00,000 for every subsequent grievously injured person (Grievous Injury as defined by Workmen Compensation Act)</p> <p>iii. Rs.1,00,000 for first violation and Rs.2,00,000 for subsequent violations</p> <p>For items iv) and v)</p> <p>Rs.50,000 for first violation and Rs.1,00,000 for subsequent violations</p>
11.	Emergency preparedness Plan	Non-compliance of the clause 15.1,15.2, 15.3, 15.4, 15.5 and 15.6	Rs.1,00,000 for non-compliance of any of the clauses
12.	Housekeeping	<p>i) Housekeeping maintenance register not properly maintained up to date</p> <p>ii) Surrounding areas of drinking water tanks / taps not hygienically cleaned / maintained</p> <p>iii) Office, stores, toilet / urinals not properly cleaned and maintained.</p> <p>iv) Required dustbins at appropriate places not provided / not cleaned.</p> <p>v) Stairways, gangways, passageways blocked.</p>	Rs.10,000 per single violation Compounded to a maximum of Rs.1,00,000 at any single instance



		<ul style="list-style-type: none"> vi) Lumber with protruding nails left as such vii) Openings unprotected viii) Excavated earth not removed within a reasonable time. ix) Truck carrying excavated earth not covered / tyres not cleaned. x) Vehicles / equipments parked / placed on roads obstructing free flow of traffic xi) Unused surplus cables / steel scraps lying scattered xii) Wooden scraps, empty wooden cable drums lying scattered xiii) Water stagnation leading to mosquito breeding 	
13.	Working at Height / Ladders and Scaffolds	<ul style="list-style-type: none"> i) Not using or anchoring Safety Belt ii) Not using Safety Net iii) Absence of life line or anchorage point to anchor safety belt iv) Non-compliance of clause 18.17 v) Using Bamboo ladders vi) Painting of ladders vii) Improper usage (less than 1m extension above landing point, not maintaining 1:4 ratio) viii) Aluminium ladders without base rubber bush ix) Usage of broken / weak ladders x) Usage of re-bar welded ladders xi) Improper guardrail, toe board, barriers and other means of collective protection xii) Improper working platform xiii) Working at unprotected fragile surface xiv) Working at unprotected edges 	Rs.10,000 per single violation Compounded to a maximum of Rs.1,00,000 at any single instance
14.	Lifting appliances and gear	<ul style="list-style-type: none"> i) Non availability of fitness certificate as per clause 21.3 ii) Documents not displayed on the machine or not available with the operator as per clause 21.4 iii) Maximum Safe Working Load not written on the machine as per clause 21.5 iv) Non-compliance of 21.6 v) Non-compliance of 21.7 vi) Automatic safe load indicator not provided or not in working condition as per clause 21.8 vii) Age of the operator less than 21 years or without any licence and non-compliance of other item as per clause 21.9 	Rs.50,000 per single violation Compounded to a maximum of Rs.5,00,000 at any single instance



		<ul style="list-style-type: none"> viii) Non-compliance of 21.10 ix) Non-compliance of any of the items mentioned regarding rigging requirements as per clause 21.11 x) Failure to submit method statement in case of all critical lifting xi) Person riding on crane. xii) Creating more noise and smoke xiii) Absence of portable fire extinguisher in driver cabin xiv) Fail to guard hoist platform xv) No fencing of hoist rope movement area xvi) Hoist platform not in the horizontal position 	
15.	Launching operation	Non-adherence of any of the provisions mentioned in clause 22.2	Rs. 50,000 for first violation and Rs.1,00,000 for subsequent violations .
16.	Site Electrical safety	<ul style="list-style-type: none"> i) Non-compliance of clause 26.1.1 ii) Non-compliance of clause 26.2.4, 26.2.5 iii) Non-compliance of clause 26.3.1 iv) Non-compliance of clause 26.7, 26.8 and 26.9.1 v) Non-compliance of clause 26.10 and 26.13 vi) Non-compliance of clause 28.3.2 vii) Exposed electric lines (fermentative damage) and circuits in the workplace. viii) Inserting of bare wires into the socket ix) Improper grounding for the electrical appliances x) Electrical cables running on the ground xi) Non-compliance clause 27.0 	Rs.10,000 per single violation Compounded to a maximum of Rs.1,00,000 at any single instance
17.	Hand tools and Power tools	<ul style="list-style-type: none"> i) Non-compliance of clause 28.0 	Rs.10,000 per single violation Compounded to a maximum of Rs.1,00,000 at any single instance
18.	Gas Cutting	<ul style="list-style-type: none"> ii) Wrong colour coding of cylinder. iii) Cylinders not stored in upright position. iv) Flash back arrester, non-return valve and regulator not present or not in working condition. v) Fail to put cylinders in a cylinder trolley. vi) Damaged hose. vii) Using domestic LPG cylinders viii) Fail to store cylinder 6.6m away from fire prone materials ix) Fail to use hose clamps x) Fire extinguisher not placed in the vicinity during operation 	Rs.10,000 per single violation Compounded to a maximum of Rs.50,000 at any single instance



Safety, Health and Environment (SHE) Manual

19.	Welding	<ul style="list-style-type: none"> i) Voltmeter and Ammeter not working ii) Improper grounding and return path. iii) Damaged welding cable iv) Bare openings in the cable. v) Non-availability of separate switch in the transformer vi) Non-availability of main switch control to switch off power to the welding unit. vii) Usage of reinforcement rod as return conductor viii) Damaged holder ix) Fire extinguisher not placed in the vicinity during operation 	Rs.10,000 per single violation Compounded to a maximum of Rs.50,000 at any single instance
20.	Fire precaution	<ul style="list-style-type: none"> i) Smoking and open flames in fire prone area ii) Using more than 24V portable electrical appliances in the fire prone area iii) Not proper ventilation in cylinder storage area. iv) Absence of fire extinguishers v) Fire extinguishers not refilled once in a year. vi) Fire extinguisher placed in a not easily accessible location 	Rs.5,000 per single violation Compounded to a maximum of Rs.25,000 at any single instance.
21.	Excavation, Tunnelling and confined space	<ul style="list-style-type: none"> i) Non-compliance of clause 34.1.1 ii) Non-compliance of clause 34.2.3 iii) Non-compliance of clause 34.3 	For any item from i) and ii) Rs.10,000 per single violation Compounded to a maximum of Rs.50,000 at any single instance. For item iii) Rs.10,000 per first violation and Rs.50,000 for subsequent violations
22.	Work permit system	<ul style="list-style-type: none"> i) Non-compliance of clause 35.2 ii) Non-compliance of clause 21.11.9 	For item i) and ii) Rs.50,000 per first violation and Rs.1,00,000 for subsequent violations
23.	Traffic Management	<ul style="list-style-type: none"> i) Non-compliance of clause 36.4.1 ii) Non-compliance of clause 36.8.3 iii) Non-compliance of clause 36.9.2 iv) Non-compliance of clause 36.9.3 v) Non-compliance of clause 36.9.7 vi) Non-compliance of clause 36.9.8 	Rs.1,00,000 per first violation and Rs.2,00,000 for subsequent violations



		<p>a) Barricades</p> <ul style="list-style-type: none"> i) Not Cleaned ii) Not in alignment iii) Not numbered iv) Not painted v) Red lights / reflectors not working vi) Damages not repaired vii) Not secured properly viii) Barricade inspector not employed ix) Protruding parts / portions repaired x) Barricades maintaining register not properly maintained up to date 	Rs.25,000 per single violation Compounded to a maximum of Rs.1,00,000 at any single instance
		<p>b) Contractor Vehicles</p> <ul style="list-style-type: none"> i) Over loading of vehicles ii) Unfit drivers or operators iii) Unlicensed vehicles iv) Absence of traffic marshals v) Absence of reversing alarm vi) Absence of fog light (at winter) vii) Power / hand brakes not in working condition. 	Rs.25,000 per single violation Compounded to a maximum of Rs.1,00,000 at any single instance
		<p>c) Splashing of Bentonite on roads / non-cleaning of tyres of dumpers and transit mixers</p> <ul style="list-style-type: none"> i) Mishandling of bentonite like splashing of bentonite outside specified width of barricading ii) Non-cleaning of tyres of dumpers and transit mixers before leaving the site and thereby creating a traffic safety hazard to road users. 	<p>For item i) and ii)</p> <ul style="list-style-type: none"> a) Rs.1,00,000 on first observation. b) Rs. 2,00,000 on second observation c) Rs. 3,00,000 on third and subsequent observations
24.	Batching plant / Casting yard	Non-adherence of any of the provisions mentioned in clause 38.0.	Rs. 10,000 for single violation compounded to a maximum of Rs.1,00,000 at any single instant.
25.	PPE	<ul style="list-style-type: none"> i) Not having ii) Not wearing (or) using and kept it elsewhere iii) Using damaged one iv) Using wrong type v) Using wrong colour helmet or helmet without logo vi) Using for other operation (e.g. Using safety helmet for storing materials or carrying water from one place to other) vii) Not conforming to BIS standard 	<p>From item i) to vi).</p> <p>Rs.200 per single violation</p> <p>For item vii)</p> <p>Rs.10,000 for first violation and Rs.50,000 for subsequent violations</p> <p>For item viii)</p> <p>Rs.50,000 for first violation and Rs.1,00,000 for subsequent violations</p>



Safety, Health and Environment (SHE) Manual

		viii) Non-compliance of clause 39.6, 39.7 and 39.8	
26.	Occupational Health	i) Fail to conduct Medical examination to workers ii) Absence of ambulance van & room iii) Workers not having ID card iv) Inadequate number of toilets v) Toilets not cleaned properly vi) Absence of water facilities for toilets and washing places vii) Toilet placed more than 500m from the work site viii) Absence of drinking water ix) Absence of first-aid person in work site. x) Absence or inadequacy of first-aid box. xi) Misuse of first-aid box. xii) First-aid box not satisfy the minimum Indian standard. xiii) Smoking inside the construction site xiv) Drink and drive or work xv) Excessive noise and vibration xvi) Canteen not provided xvii) Food stuff not served on no loss no profit basis xviii) Creche not provided xix) Accommodation not provided as per BOCWA xx) Fumigation / insecticides not sprayed to prevent Mosquito breeding xxi) Non-compliance of clause 44.1 and 44.2	Rs.10,000 per single violation Compounded to a maximum of Rs.1,00,000 at any single instance
27.	Labour Welfare measures	i) Non adherence of Labour welfare provisions of BOCWA ii) Fail to register establishment and display the registration certificate at workplace iii) Absence of workers register and records iv) Absence of muster roll and wages register v) Fail to display an abstract of BOCWA and BOCWR	Rs.10,000 per single violation Compounded to a maximum of Rs.50,000 at any single instance
28.	Environmental Management	i) Tyre wash facility not provided ii) Spillage from vehicles not arrest iii) Air monitoring not practiced iv) Noise monitoring not practiced v) The values of air monitoring and noise monitoring not with in acceptable limits vi) Dust control measures at sites not	Rs.10,000 per single violation Compounded to a maximum of Rs.50,000 at any single instance



		practiced	
		vii) Improper disposal of debris / residues	

56.4 **Without limiting to the unsafe acts and or conditions mentioned above in clause 56.3 the Employer shall have the right to deduct charges for any other unsafe act and or condition depending upon the gravity of the situation on a case-to-case basis. The charges shall be in comparison with that of the similar offence indicated in clause 56.3.**

57.0 Stoppage of work

57.1 The Employer shall have the right to stop the work at his sole discretion, if in his opinion the work is being carried out in such a way that it may cause accidents and endanger the safety of the persons and / or property, and / or equipments. In such cases, the contractor shall be informed in writing about the nature of hazards and possible injury / accident.

57.2 The contractor shall not proceed with the work until he has complied with each direction to the satisfaction of Employer

57.3 The Contractor shall not be entitled for any damages / compensation for stoppage of work, due to safety reasons and the period of such stoppage of work shall not be taken as an extension of time for Completion of the Facilities and will not be the ground for waiver of levy of liquidated damages.

58.0 Awards

The following categories will be considered for awards as per the scheme in practice of Employer

- i) For every safe million man hour working without any reportable incidents
- ii) Zero fatality contracts
- iii) 100% adherence to voluntary reporting of all accidents throughout the currency of contract
- iv) Safest project team of the year.
- v) Best SHE team of the year.
- vi) Safest Contractor of the year.



APPENDIX



	JAIPUR METRO RAIL CORPORATION LTD.
APPENDIX NO.: 1	

Memorandum of Understanding between Jaipur Metro Rail Corporation (JMRC) and the Contractor for safe execution of contract work

This Memorandum of Understanding is made and executed by and between Jaipur Metro Rail Corporation Ltd. (JMRC), a Company registered under the Companies Act 1956 and having its registered office at Khanij Bhawan, Udyog Bhawan Premises, Tilak Nagar, C-Scheme, Jaipur-302005 or their authorized representative(s), hereinafter referred to as "EMPLOYER" (which expression shall wherever the context so requires or admits be deemed to mean and include its successors in business and assigns) of the one party
AND

M/s _____ having its registered office at _____ hereinafter referred to as the "CONTRACTOR" (which expression shall wherever the context so requires or admits be deemed to mean and include its successors in business and assigns) of the other party

WITNESSETH THAT

WHEREAS the EMPLOYER gives highest importance to the occupational safety, health and environment during execution of work, seeks cooperation from the CONTRACTOR in this endeavour.

Thus, this Memorandum of Understanding is for promoting the safety, health and environment aspects required to be followed at workplace/site and will be applicable to any site job to be done by the CONTRACTOR
AND

WHEREAS the CONTRACTOR has read all the terms and conditions of the EMPLOYER and whereas the CONTRACTOR has studied the following documents:

- (a) Tender Documents, including Notice Inviting Tender, General Conditions, Special Conditions,
- (b) Conditions of Contract on Safety, Health and Environment and Project Safety, Health and Environment Manual.
- (c) Building and Other Construction Workers (Regulations of Employment and Conditions of Service) Act 1996, Central Rules 1998 and subsequent Rajasthan Government Rules 2009, Building and Other Construction Workers Welfare Cess Act 1996 and Rules 1998 and Rajasthan Building and Other Construction Workers' Welfare Board Rules and
- (d) Indian Electricity Act 2003 and Rules 1956.
- (e) Corresponding International / Bureau of Indian Standard Codes.

The amendments to any of the above rules and any other rules & regulations or procedures, circulars, notices & advices laid down by the EMPLOYER from time to time.

Now it is hereby AGREED AND DECLARED by and between the EMPLOYER and the CONTRACTOR as follows:

Clause - I The CONTRACTOR shall abide by the terms and conditions stipulated in Condition of Contract on Safety, Health & Environment and Project Safety, Health



Safety, Health and Environment (SHE) Manual

& Environment Manual.

- Clause - II The CONTRACTOR shall undertake full responsibility for safe execution of job at work place/site and safety of his personnel and adjoining road users during work.
- Clause - III Without giving any prior notice, the EMPLOYER shall from time to time be entitled to add/or amend any or all terms and conditions with a view to improving safety and occupational health of personnel and safety of work, with immediate effect and the same shall be binding on the CONTRACTOR. The contractor agrees to implement all such amendments, which shall be laid down by the EMPLOYER.
- Clause - IV Besides following the guidelines, safety rules and regulations, safety codes given in various safety procedures/documents mentioned above, the CONTRACTOR shall also prepare detailed method statement which includes job safety analysis wherever there are complicated and hazardous/high risk working involved and get it approved from Employer before execution of work.
- Clause - V Any negligence or violation in implementing any of the provision of the conditions of contract on Safety, Health & Environment and JMRC project Safety, Health & Environment Manual shall be viewed seriously and the contractor is liable to compensate the employer for the loss of reputation. The cost of damage shall be fixed on case-to-case basis.

In witness thereof the Parties hereto by representatives duly authorised have executed this Memorandum of Understanding on _____ day of _____ 20____.

Signed on
For and on behalf of JMRC

Signed on
For and on behalf of (Contractor)

Signature:
Name:
Title:

Signature:
Name:
Title:



	JAIPUR METRO RAIL CORPORATION LTD.
APPENDIX NO.: 2	

Safety, Welfare and Occupational Health requirements as per BOCW Act 1996 and Rules 1998 and Rajasthan BOCW Rules 2009.

(This list has been prepared in chronological order with primary importance to Section of Act and secondary importance to Rules)

- S -** Refers relevant Sections in BOCWA
R - Refers relevant Rules in BOCWR
C - Refers relevant Chapter No. in BOCWR

Sl. No.	1. Items	Relevant Sections / Rules in BOCWA and BOCWR and RBOCWR
2.	Registration of establishment	S – 7, R – 23 to 27
3.	Display of registration certification at workplace	R – 26 (5)
4.	Hours of work	S – 28 R – 234 to 237
5.	Register of overtime	S – 28; S – 29 R – 241(1) Form XXII
6.	Weekly rest and payment at rest	R – 235
7.	Night shift	R – 236
8.	Maintenance of workers registers and records	S – 30 R – 238
9.	Notice of commencement and completion	S – 46 R – 239
10.	Register of persons employed as building workers	R – 240
11.	Muster roll and wages register	R – 241(1) (a); Form XVI and XVII
12.	Payment of wages	R – 248
13.	Display of notice of wages regarding	R – 249
14.	Register of damage or loss	R – 241(1)(a); Form XIX, XX, XXI
15.	Issue of wages book	R – 241(2)(a); Form XXIII
16.	Service certificate for each workers	R – 241(2)(b); Form XXIV
17.	Display an abstract of BOCWA and BOCWR	R – 241(5)
18.	Annual return	R – 242; Form XXV
19.	Drinking water	S – 32
20.	Latrines and Urinals	S – 33 R - 243
21.	Accommodation	S – 34
22.	Creches	S – 35
23.	First-aid boxes	S – 36 R – 231 and Schedule III
24.	Canteens	S – 37 R – 244
25.	Food stuff and other items served in the canteens	R – 245
26.	Supply of tea and snacks in work place	R – 246
27.	Food charges on no loss no profit basis	R - 247
28.	Delhi BOCW welfare Board Rules	R – 250 to 296



29.	Safety committee	S – 38 R – 208
30.	Safety officer	S – 38 R – 209 and Schedule VII
31.	Reporting of accidents and dangerous occurrences	S – 39, R – 210
32.	Procedure for inquiry in to the causes of accidents	R – 211
33.	Responsibility of employer	S - 44 R – 5
34.	Responsibility of Architects, Project engineer and Designers	R – 6
35.	Responsibility of workmen	R – 8
36.	Responsibility for payment of wages and compensation	S – 45
37.	Penalties and Procedures	S – 47; S – 55
38.	Excessive noise, vibration etc	R – 34
39.	Fire Protection	R – 35
40.	Emergency action plan	R – 36
41.	Fencing of motors	R – 37
42.	Lifting of carrying of excessive weight	R – 38
43.	Health, Safety and Environmental Policy	R – 39
44.	Dangerous and Harmful Environment	R – 40
45.	Overhead protection	R – 41
46.	Slipping, Tripping, Cutting, Drowning and Falling Hazards	R – 42
47.	Dust, Gases, Fumes, etc	R – 43
48.	Corrosive substance	R – 49
49.	Eye Protection	R – 45
50.	Head Protection and other protection apparel	R – 46; R – 54
51.	Electrical Hazards	R – 47
52.	Vehicular traffic	R – 48
53.	Stability of structure	R – 49
54.	Illumination	R – 50; R – 124
55.	Stacking of materials	R – 51
56.	Disposal of debris	R – 52
57.	Numbering and marking of floors	R – 53
58.	Lifting appliances and gears	C – VII; R – 55 to 81
59.	Runways and Ramps	C – VIII; R – 82 to 85
60.	Working on or adjacent to water	C – IX; R – 86 & 87
61.	Transport and earthmoving equipments	C – X; R – 88 to 95
62.	Concrete work	C – XI; R – 96 to 107
63.	Demolition	C – XII; R – 108 to 118
64.	Excavation and Tunnelling works	C – XIII; R – 119 to 168
65.	Ventilation	R – 153
66.	Construction, repair and maintenance of step roof	C – XIV; R – 169 to 171
67.	Ladders and Step ladders	C – XV; R – 172 to 174
68.	Catch platform and hoardings, chutes, safety belts and nets	C – XVI; R – 175 to 180
69.	Structural frame and formworks	C – XVII; R – 181 to 185
70.	Stacking and unstacking	C – XVIII; R – 186 & 187
71.	Scaffold	C – XIX; R – 188 to 205
72.	Cofferdams and Caissons	C – XX; R – 206 to 211
73.	Explosives	C – XXI; R – 212 & 213
74.	Piling	C – XXII; R – 214 to 222
75.	Medical Examination for building and other construction worker, Crane operator an Transport vehicle drivers	R – 81; R – 223(a)(iii) and Schedule XII



Safety, Health and Environment (SHE) Manual

76.	Medical examination for occupational health hazards	R – 233(a)(iv)
77.	Charging of workers for Medical Examination	R – 223(b)
78.	Occupational health centres and Medical officers	R – 225 and Schedule X & XI
79.	Ambulance van & room	R – 226 & 227 and Schedule IV & V
80.	Stretchers	R – 228
81.	Occupational health service for building workers	R – 229
82.	Medical examination for occupational health hazards	R – 223(a)(iv)
83.	Emergency care services and emergency treatment	R – 232
84.	Panel of experts and agencies	Central Rule 250 Rajasthan Rule 277
85.	Power of inspectors	Central rule 251 Rajasthan rule 278



	JAIPUR METRO RAIL CORPORATION LTD.
APPENDIX NO.: 3	


CONTENT OF SHE PLAN	
Contract No	
Contractor Name	
Project Name	

1	Project Highlights <ul style="list-style-type: none">i. Title of the contentii. Contractor Numberiii. Brief scope of workiv. Location map/ key planv. Period of the project
2	SHE Policy
3	Site Organisation Chart Chart indicating reporting of SHE personnel
4	Roles & Responsibility Individual responsibility of the <ul style="list-style-type: none">i. Project Managerii. Construction Manageriii. Construction Supervisorsiv. SHE Committee Membersv. SHE Inchargevi. Site Engineersvii. First Line Supervisorsviii. Sub-contractors
5	SHE Committee <ul style="list-style-type: none">i. Details - Chairman, Members, Secretary and Employer's representative,ii. Procedures for effective conduct of meeting
6	SHE Training
7	Subcontractor Evaluation, Selection and Control
8	SHE Inspection
9	SHE Audit
10	Accident Investigation And Reporting Procedures



11	Occupational Health Measures
12	Labour Welfare Measures
13	Risk assessment and mitigation procedures
14	Safe Work Procedures <ul style="list-style-type: none"> i. Work at Height ii. Structural Steel Erection iii. Launching of segments iv. Floor, Wall Openings and Stairways v. Welding, Cutting and Bracing vi. Lifting appliances vii. Work Permit Systems viii. Electrical Equipments ix. Mechanical Equipments x. Excavation xi. Fire Prevention xii. Hazardous Chemicals and Solvents xiii. Ionising Radiation xiv. Lighting xv. Abrasive Blasting
15	Work Permit System
16	List of standard job specific PPEs to be used in the site
17	Maintenance of Regime for construction Equipment and Machinery
18	Traffic management
19	Housekeeping
20	Environmental Management
21	Emergency Management
22	Visitors and Security arrangement



	JAIPUR METRO RAIL CORPORATION LTD.
APPENDIX NO.: 4	

WORKPLACE POLICY ON HIV/AIDS PREVENTION & CONTROL FOR WORKMEN ENGAGED BY CONTRACTORS

“Being mobile in and of itself is not a risk factor for HIV infection. It is the situations encountered and the behaviours possibly engaged in during mobility or migration that increase vulnerability and risk regarding HIV / AIDS.”

UNAIDS, Technical update on ‘Population, Mobility and AIDS’, February 2001, p.5

Jaipur Metro Rail Corporation (JMRC) recognizes HIV / AIDS as a developmental challenge and realizes the need to respond to it by implementing regular HIV / AIDS prevention programmes and creating a non-discriminatory work environment for HIV infected workmen engaged by contractors. For the purpose of making conscientious, sensitive and compassionate decision in addressing the realities of HIV / AIDS, JMRC has established these guidelines based on ILO code of practice on HIV / AIDS.

- ▶ Creating awareness through professional agency using IEC (Information, Education and Communication) package specially designed for migrant workers.
- ▶ Institutional capacity building by training the project implementation team, Safety, Health & Environment (SHE) Managers, establishing linkages for efficient diagnosis and treatment of the affected workers, effective monitoring of implementation and documentation for further learning.
- ▶ Establishing peer educators by selecting them in consultation with contractors and training them through professional agencies so that they become focal point for any information, education and awareness campaigns among the workmen throughout the contract period.
- ▶ Promotion of social marketing of condoms through Rajasthan State Aids Control Society (RSACS).



Safety, Health and Environment (SHE) Manual

	JAIPUR METRO RAIL CORPORATION LTD.
General Instruction : JMRC/SHE/GI/001	

MINIMUM MANPOWER REQUIREMENTS OF SHE ORGANIZATION BASED ON CONTRACT VALUE

	1	2	3	4	5	6
Awarded Contract value (in Cr.)	Chief SHE Manager	Senior SHE Manager	Junior SHE Manager	Safety Steward	Senior SHE (Electrical) Engineer	Junior SHE (Electrical) Engineer
Upto 2	-	-	1	Refer Note 1	-	1
Upto 10	-	1	Refer Note 1		1	Refer Note 2
Upto 25	1	Refer Note 1			1	
Upto 100	1				1	
Upto 250	1				1	
More than 250	1				1	

	7	8	9	10	11	12	13
Awarded Contract value (in Cr.)	*Junior SHE (Fire) Manager / **Senior SHE (Fire) Manager	Occupational Health officer with Necessary Nursing Assistants (Refer Note3)	Environmental Manager	Senior SHE (Traffic) Engineer (Refer Note4)	Barricade Maintenance Squad (Refer Note4)	House Keeping Squad	Labour Welfare Officer
Upto 2	-	-	-	-	Refer Note 5	Refer Note 6	-
Upto 10	-	1 (PT)	1	1			1
Upto 25	1*	1 (PT)	1	1			1
Upto 100	1*	1 (FT)	1	1			1
Upto 250	1**	2(FT)	1	1			1 with support staff
More than 250	2**	2(FT)	1 with support staff	1			1 with support staff

Note 1: Adequate, qualified and trained SHE Professionals with required support staff to be deployed at each worksite at each shift.

Note 2: Adequate, qualified and trained Electrical Engineers / supervisors to be deployed at each worksite at each shift.



Safety, Health and Environment (SHE) Manual

Note 3: (PT) means Part-Time and (FT) means Full-time.

Note 4: Senior SHE (Traffic) Engineer Post and Barricade Manager (including the staff) Posts are applicable to contracts where the work has to be executed either below or over the right-of-way like Viaduct, Tunnel Contracts wherein erection and maintenance of barricades are paramount important.

Note 5: One Barricade Manager supported by required supervisors and workmen

Note 6: One Housekeeping Manager supported by required supervisors and workmen



	JAIPUR METRO RAIL CORPORATION LTD.
General Instruction : JMRC/SHE/GI/002	

MINIMUM QUALIFICATION AND EXPERIENCE FOR (SHE) SAFETY, ELECTRICAL, ENVIRONMENTAL, TRAFFIC ENGG. AND OCCUPATIONAL HEALTH PROFESSIONALS

Sl. No	Designation	Qualification	Experience (in years)
1	Chief SHE Manager	<p>The Chief SHE Manager shall have qualified in any of the following degree/diploma:</p> <ul style="list-style-type: none"> i) Post Graduate Diploma in Industrial Safety & Environmental Management (PGDISEM) from National Institute of Industrial Engineering, Mumbai ii) M.E. in Industrial Safety from NIT, Trichy, Tamil Nadu iii) M.E. in Industrial Safety from Mepco Schlenk Engineering College, Sivakasi, Tamil Nadu iv) B.E. in Fire and Safety Engg. From Cochin University of Science and Engg. Cochin, Kerala v) B.E. with advanced Safety Management Diploma from CLI / RLI Mumbai / Chennai / Kolkata and Kanpur. vi) B.E / B.Arch., with one year Full Time advanced Safety diploma from NICMAR, Hyderabad. vii) B.E/B.Tech with any other equivalent State and Central Govt. recognized full time Degree / Diploma in Safety. viii) International qualifications like CSP (Certified Safety Professional), NEBOSH, MIOSH, MSISO etc. 	2 {for all category except (iv) and 5yrs for category (iv)}
2	Senior SHE Manager (Refer Note 3)	<p>As stated in Sl. No:1 and in addition the following categories:</p> <ul style="list-style-type: none"> i) B.Sc.(Physics/Chemistry/Maths) with one year Full Time advanced Safety diploma from NICMAR, Hyderabad ii) B.Sc. / Diploma in Engg. with advanced Safety Management Diploma from CLI / RLI / Mumbai / Chennai / Kolkata and Kanpur. iii) B.Sc. (Physics/Chemistry/Maths) with One year Full Time diploma in Safety Engineering offered by West Bengal State Technical Education Departments and similar courses by other states. iv) Any Graduate or diploma holder with 7 years of work experience in full fledged SHE department of any Public Sector / Leading Private Sector / MNC / with prior approval of employer on a case to case basis 	2 {for category (i), (ii) and (iii) only}
3	Junior SHE Manager (Refer Note 3)	<ul style="list-style-type: none"> i) Degree in Science / Diploma in Engineering with Govt. recognized safety diplomas from Correspondence 	2 (for category (i) only)



Safety, Health and Environment (SHE) Manual

		course of NICMAR, Annamalai University, National and State Productivity Councils, Other State Technical Education Boards etc. ii) Any Graduate or diploma holder with 5 years of work experience in full fledged SHE department of any Public Sector / Leading Private Sector / MNC / with prior approval of employer on a case to case basis	
4	Safety Steward (Refer Note 3)	Any basic qualification with any SHE related certificate courses.	2
5	Senior SHE (Electrical) Manager	Degree in Electrical Engineering + Govt. recognized Electrical Licence holder	2
6	Junior SHE (Electrical) Manager	Diploma in Electrical Engineering + Govt. recognized Electrical Licence holder	1
7	Senior SHE (Fire) Manager	i) B.E. (Fire) from National Fire Service College, Nagpur ii) B.E (Fire & Safety) from Cochin University iii) Graduate with any Govt. recognized diploma in Fire Safety with 5 years of experience	2 (for category (i) and (ii) only)
8	Junior SHE (Fire) Manager	Any Diploma holder with any Govt. recognized diploma in Industrial Fire Safety.	1
9	Occupational Health Officer	MBBS with Govt. recognized degree/diploma in Industrial/ occupational health	1
10	Environment Manager	Govt. recognized PG Degree / PG Diploma / Degree in Environmental Engineering / Science	2
11	Senior SHE (Traffic) Engineer	Govt. recognized PG Degree / Degree / Diploma in Traffic/Transportation Engineering or Planning	1
12.	House Keeping Squad -Manager	Any Diploma in Engineering	1
13	Barricade Manager	Any Diploma in Engineering	1
14	Labour Welfare Officer	Any Degree with Govt. Recognized Degree / Diploma / P G Diploma in Labour Welfare related fields like Law, Personnel / Industrial Relations etc.	2

Note 1: In some extraordinary cases where the candidate had earlier worked in JMRC Projects they can be considered for the following posts:

- i) Senior SHE Manager
- ii) Junior SHE Manager
- iii) Safety Steward

depending upon the qualification and no. of years of experience on a case to case basis even if they do not possess the prescribed qualification as listed above.

Note 2: In all other cases other than listed under note 3 (i), (ii) and (iii) irrespective their earlier experience with JMRC projects the candidates shall qualify as specified above.



	JAIPUR METRO RAIL CORPORATION LTD.
General Instruction : JMRC/SHE/GI/003	

MINIMUM REQUIREMENTS OF SHE MONITORING AND AUDIO-VISUAL EQUIPMENTS

- For the purpose of minimum requirements of Audio-visual and Other equipment the contracts are categorized into the following groups:

Contract Value (Initial awarded value of contract)	Group
Upto 25 Cr	A
Upto 100 Cr	B
Upto 250 Cr	C
More than 250 Cr	D

- Every contractor falling into the above groups shall provide the following minimum required audio visual aids for conducting weekly review, monthly safety committee and other post review meeting of all fatal and major incidences effectively. These audio-visual equipments are a must for conducting periodical in-house safety presentations in the training programmes.
- In addition to the above portable hand held digital sound level meter (SLM) and portable hand held digital lux meter are also to be provided.

Sl.No	SHE monitoring and Audio-Visual Equipment details	SHE monitoring and Audio-Visual equipment required for			
		Group A Contract	Group B Contract	Group C Contract	Group D Contract
1.	Portable hand held Digital Sound Level Meter (SLM)	1	1	1	1
2.	Portable hand held Digital Lux Meter	1	1	1	1
3.	Laptop Computer with standard configuration including multi media facilities	1	1	1	1
4.	Colour Printer	1	1	1	1
5.	Computer projector with screen	-	1	1	1
6.	Overhead projector	1			
7.	35mm Camera (For taking accident investigation photos in which case the images can not be easily altered)	1	1	1	1



Safety, Health and Environment (SHE) Manual

8.	Digital camera with flash of minimum 4 mega pixel and video facility	1	1	1	2
9.	Digital still camera with flash of minimum 4 mega pixel	1	2	4	6
10.	Portable loudspeaker (for tool-box talk and emergency purpose)	1	1	2	6
11.	Communication facility like mobile phone, walky-talky etc	For all supervisors and managers/engineers working in Safety, Health & Environment			
12.	Accident investigation Kit containing the following:	1	1	1	2
a)	Chalk piece for marking				
b)	Measuring tape for measuring <ul style="list-style-type: none"> Flexible tape – 2m length Metal Foot long scale and Metal tape – 30m 				
c)	Equipment tags				
d)	Multipurpose Flash light				
e)	Barrier tape of 20m length				
f)	Accident investigation Forms and checklists				
g)	Enough Paper for witness recording and other noting				
h)	Emergency Phone Numbers list				



	JAIPUR METRO RAIL CORPORATION LTD.
General Instruction: JMRC/SHE/GI/004	

Training of Contractor's Employees/Staff/Worker's

Contractor shall provide a training/workshop on safety, health & environment (SHE) to all its workers/staff/employees/subcontractors of at least 2 weeks (96 hrs) at the time of induction. Before posting of any his worker's/staff/employees/subcontractors, the contractor shall give a certificate that the said person had undergone the requisite SHE training. Non compliance of the above will invoke penalties as per the condition of contract on SHE, of Tender Document.

The training shall cover following aspects:-

1. Hazard Identification Procedure

Hazards on site:

- Falls
- Earthing work
- Electricity
- Machinery
- Handling materials
- Transport
- Site housekeeping
- Fire

2. Personal Protective Equipment

- What is available?
- How to obtain it?
- Correct use and care.

3. Health

- Site welfare facilities
- Potential health hazards
- First Aid/CPR


4. Duties of the contractor

- Brief outline of the responsibilities of the Contractor by law
- Details of Contractor's accident prevention policy
- JMRC's SHE manual
- Building and other Constructions Welfare Law

5. Employee's Duties

- Brief outline of responsibilities of employee under law
- Explanation of how new employees fit into the Contractor's plan for accident prevention. (induction and orientation).



	JAIPUR METRO RAIL CORPORATION LTD.
General Instruction : JMRC/SHE/GI/005	

ID Card Format

(85 mm x 55mm)

Front side of ID Card:

Name & Address of Main/Sub Contractor	
LOGO of Main/Sub Contractor Company	Location Jaipur Metro Rail Project
Name: Designation: Blood Group: Valid from: Valid up to:	Photo
Contractor's Authorised Signatory with seal	

Backside of ID Card:

Employee Address: _____ _____ _____
<div>1. This card is the property of "XX" (Main / Sub / Labour Contractor) and must be returned on demand and on transfer / cancellation of employment. 2 A charge will be levied for replacement of the card due to loss or theft 3 If found please return to</div>
Main contractors' Address



	JAIPUR METRO RAIL CORPORATION LTD.
General Instruction : JMRC/SHE/GI/006	

SHE Training details for Managers and Supervisors

1. The Law and Safety	2. Policy and Administration
Statutory requirement Appropriate regulations Duties of employer and employee	Effect of incentive on accident prevention Human relations Consultation Safety Officer: duties, aims, objectives
3. Safety and the Supervisor	4. Principles of Accident Prevention
Safety and efficient production go together Accidents affect morale and public relations	Attitudes of management, supervision and operations Methods of achieving safe operations Accident and injury causes
5. Site Inspection	6. Human Behavior
The role of management Hazard Identification Procedure Records results Follow-up procedures Feedback	Motivating agencies Individual behavior Environmental effects Techniques of persuasion
7. Site housekeeping	8. Health
Site organization Relationship of site housekeeping to accident occurrence Site access Equipment storage Material stacking Materials handling	Medical examination Hazard to health on site Sanitation and welfare Protective clothing First Aid/CPR
9. Personal Protective Equipment	10. Electricity
Eye, face, hands, feet and legs Respiratory protective equipment Protection against ionizing radiation	Appreciation of electrical hazards Power tools Arc welding Low voltage system Lighting and power system on sites ELCB, RRCB, Grounding/Ground fault circuit interrupters (GFCIs)
11. Oxygen and Acetylene Equipment	12. Equipment
Cylinder storage and maintenance Condition and maintenance of valves, regulators, and gauges Condition and maintenance of hoses and fittings Pressures	Accidents related to moving parts of machinery Appreciation of principles of guarding Importance of regular maintenance



3. Transportation	14. Excavations
Transport to and from site Hazard connected with site transport Competent drivers Dumpers Tipping trucks Movement near excavations	Method of shoring Precautions while shoring Precautions at edge of excavations Removal of shoring Sheet steel piling
15. Working platforms, Ladders, and Scaffolding	16. Cranes and other Lifting Machines
Hazards connected with the use of ladders Maintenance and inspection Type of scaffold Overloading Work on roofs Fragile material Openings in walls and floors Use of safety belts and nets	Licensing, certification and training required for operation of cranes Slings methods Signaling Access to crane(s) Maintenance and examination Ground conditions Hazards and accident prevention methods connected with the use of different types of cranes/heavy equipment Crane Lift Plan for all lifts
17. Lifting Tackle	18. Fire Prevention and Control
Slings - single and multi-legged Safe working loads (SWLs) Safety hooks and eyebolts Cause of failure Maintenance and examination	Principle causes determining fire Understanding fire chemistry Fire fighting equipment Fire fighting training
19. Communications	
Effective methods of communication (particular interest to non-English speaking workers) Method and preparation of reports Safety committees Safety meeting	



General Instruction : JMRC/SHE/GI/007

SHE Training Matrix

SHE/ Page 108 of 122



Safety, Health and Environment (SHE) Manual

DAYS TO BE OBSERVED FOR CREATING SHE AWARENESS

	JAIPUR METRO RAIL CORPORATION LTD.
General Instruction : JMRC/SHE/GI/008	

1 st Monday to Sunday of January	Road Safety Week (Subjected to confirmation from Ministry of Road Transport, Govt. of India every year.)
16 th February	Kyoto Protocol Day
March	Red Cross Month
May 1 to 7	Emergency Preparedness Week
4 th March	National Safety Day
7 th April	World Health Day
14 th April	Fire Safety Day
April 18 to 22	Earth Week
20 th April	Earth Day
20 th April	Noise Awareness Day
28 th April	ILO World Day for Safety and Health at Work Day
5 th June	World Environmental Day
12 th June	World Day against Child Labours
9 th July	Occupational Health Day
17 th October	World Trauma Day
1 st December	World AIDS Day



	JAIPUR METRO RAIL CORPORATION LTD.
General Instruction : JMRC/SHE/GI/009	

Minimum Requirements of SHE Communication Posters / Signage / Video

- For the purpose of Minimum requirements of SHE Communication Posters / Signages / Video the contracts are categorized into the following groups:

Contract Value (Initial awarded value of contract)	Group
Upto 25 Cr	A
Upto 100 Cr	B
Upto 250 Cr	C
More than 250 Cr	D

- Every contractor falling into the above groups shall prepare a SHE Communication Plan as a part of site specific SHE Plan and shall include the following minimum requirement of Posters / Signages / Video as applicable. In case readymade posters are available in any of the category from National Safety Council, Loss Prevention Association of India or any other safety related organisations they may procure the same and display it. In case the same is not available then the contractors' shall make necessary arrangements to get the posters designed and printed on their own.

All the above are to be detailed in the Site SHE Plan and get an approval from the Employer before displaying the posters.

Table No.: 1 - Minimum No. of Posters

Sl.No	SHE Poster Title	Minimum No. of concepts in each title	No. of Posters / Signage / Video			
			Group A Contract	Group B Contract	Group C Contract	Group D Contract
1.	Safety Culture	5	Each 10	Each 50	Each 75	Each 100
2.	Daily Safety Oath	1 English & 1 Hindi	Each 100	Each 200	Each 500	Each 1000
3.	Mandatory PPE Usage					
a)	Signages to display the messages like PPE ZONE, NO PPE ZONE, HARD HAT AREA etc.	2 types of sizes made up of metal sheet to be mounted at different locations	Each 25	Each 50	Each 75	Each 200
b)	Helmet	5	Each 25	Each 50	Each 75	Each 200



Safety, Health and Environment (SHE) Manual

c)	Shoe	5	Each 25	Each 50	Each 75	Each 200
d)	Goggles & Ear Protection	5	Each 25	Each 50	Each 75	Each 200
e)	Full Body Harness	5	Each 25	Each 50	Each 75	Each 200
f)	Hi-Vi Jacket	5	Each 25	Each 50	Each 75	Each 200
4.	Emergency Management Plan	5	Each 25	Each 50	Each 75	Each 200
5.	Working at Heights	10	Each 25	Each 50	Each 75	Each 200
a)	Ladder, Stairway, Scaffold - Signages to display the messages like SAFE, UNSAFE, FIT FOR USE, AVOID USE etc.	5 types of sizes made up of metal sheet to be mounted at different locations	Each 25	Each 50	Each 75	Each 200
6.	Site Electricity	5	Each 25	Each 50	Each 75	Each 200
7.	Crane Safety	5	Each 25	Each 50	Each 75	Each 200
8.	Slings	5	Each 25	Each 50	Each 75	Each 200
9.	Rigging Procedures	5	Each 25	Each 50	Each 75	Each 200
10.	Excavation	5	Each 25	Each 50	Each 75	Each 200
11.	Occupational Health (Mosquito Control, HIV/AIDS awareness, Dust Control, Noise Control, No Smoking/Spitting, etc.)	10	Each 25	Each 50	Each 75	Each 200
12.	First – Aid	3	Each 25	Each 50	Each 75	Each 200
13.	Labour Welfare Measures (Payment of Minimum Wages, Avoidance of Child labour, Signing in the Muster Roll, In case of accidents-what to do? etc	5	Each 25	Each 50	Each 75	Each 200
14.	Importance of “Safety Handbook”	1	25	50	75	200
15.	Traffic Safety (Speed limit, safe crossing and working within barricaded area etc.)	5	Each 25	Each 50	Each 75	Each 200
16.	Environmental Monitoring (Spillage of Muck, hazardous material, Improper drainage, water spray for dust containment etc.)	5	Each 25	Each 50	Each 75	Each 200
17.	Video in Hindi on PPE usage – 15 minutes duration	1	-	-	-	1



Safety, Health and Environment (SHE) Manual

Note 1: Items mentioned under 17 is **video**. Items under 3 (a) and 5 (a) are **metal signage boards** and all other items are **posters**.

Table No.: 2 – Size of Posters / Signages

Sl.No	Item	Size
1.	Posters – Standard	17"x22" –135 GSM 4 Colour Printing
2.	Posters – Special (Wherever required)	17"x22" card laminated FA Poster
3.	Posters - Mega size (Wherever required)	32"x40" Flex FA Poster
4.	First-Aid Booklet	6"x4"
5.	Safety Handbook	6"x4"
6.	Signages	Small : 12"x6" Big : 24"x12"
7.	Road Traffic Sign Boards	Strictly as per Indian Road Congress (IRC) specifications

Table No.: 3 – Safety Signage Colour (as per IS 9457)

Sl.No	Type of signage	Colour
1	Mandatory	Blue
2	Danger	Yellow
3	Prohibitory	Red
4	Safe conditions	Green



	JAIPUR METRO RAIL CORPORATION LTD.
General Instruction : JMRC/SHE/GI/010	

Experts / Agencies for SHE Services

Sl. No.	Organisation	Services
1.	Bureau Veritas India Pvt. Ltd., B-21 & 22, First Floor, Sector-16, NOIDA-201 301 (U.P.) Phone: 0120 – 2515055, Fax: 0120 - 2515248 E-mail: enp.delhi@in.bureauveritas.com	<ul style="list-style-type: none">• External SHE Audit• SHE Management / Technical Training
2.	Central Labour Institute Post box no: 17851 N.S.Monkikar Marg Sion , Mumbai- 400 022 Tel.: 022- 4092203, Fax: 022 – 4071986 E-mail: cli@dgfasli.nic.in	<ul style="list-style-type: none">• SHE Management / Technical Training
3.	Construction Industry Development Council 801, 8 th Floor, Hemkunt Chambers, 89, Nehru Place,, New Delhi – 110 019	<ul style="list-style-type: none">• SHE Management / Technical Training
4.	Delhi Productivity Council 1E/10, Swami Ramtirath Nagar New Delhi – 110 055 Tel.: 23522835	<ul style="list-style-type: none">• SHE Management / Technical Training
5.	Det Norske Veritas AS, 203, Savitri Sadan 1, 11 Preet Vihar Community Centre, New Delhi-110 092 Phone: 011-2253 1502/2253/1503, 2242 7688/2253 1278 Fax: 011-2253 0247 Website: www.dnv.com	<ul style="list-style-type: none">• External SHE Audit• SHE Management / Technical Training
6.	Dr. A. V. Baliga Memorial trust Link House Bagadur Shah Zafar Marg Press Area, New Delhi – 110 002 Phone: 011 – 23311119	<ul style="list-style-type: none">• HIV / AIDS awareness



7.	DuPont Safety Resources, E.I. DuPont India Private Limited, Arihant Nitco Park 6 th Floor, 90, Dr. Radhakrishnan Salai, Mylapore, Chennai-600 004 Phone: 044-2847 2800, 2847 3752 Fax: 044-2847 3800 Mobile: 9381201040 Website: in.dupont.com	<ul style="list-style-type: none"> • SHE Management Training
8.	EQMS INDIA PVT. LTD. E-49, 1 st Floor, Dazzle House, Jawahar Park, Main Vikas Marg, Laxmi Nagar, Delhi-110 092 Phone: 91-11-220 17639/2204 4754 Fax: 91-91 2201 5150 E-mail: eqms@eqmsindia.org Website: www.eqmsindia.com	<ul style="list-style-type: none"> • ISO Certification • SHE Management / Technical Training
9.	Green Cross Consultants 59, 7 th Cross, 1 st Floor, Jai Bharath Nagar, Banglore-560 033 Phone: 080-2549 6782 E-mail: etgrangan@yahoo.com	<ul style="list-style-type: none"> • SHE Management / Technical Training
10.	HSRTC, PENTASAFE, 201, 2 nd Floor, Town Centre, Andheri Kurla Road, Marol, Andheri (East), Mumbai-400 059 Phone: 022-2850 2210/20/50 Fax: 022-2850 2260 E-mail: training@penta-safe.com Website: www.penta-safe.com	<ul style="list-style-type: none"> • SHE Practical Field Training for Height Safety
11.	Institute of Driving Training & Research, Wazirabad Road, Adjoining Loni Road flyover. New Delhi – 110 094 Phone: 011 – 22813474, 22815833 Fax: 011 - 22811131	<ul style="list-style-type: none"> • SHE Technical Training for Vehicle Drivers.
12.	Institute for Research, Development & Training of Construction Trades & Management, An Educational Institute, Society and Trust, 1 st Floor, UVCE Alumni Association Building, K.R. Circle, Banglore-560 001 Phone: 080-22294291/22243257 Fax: 080-22243257 E-mail: ubrco@vsnl.com Website: www.instructindia.org	<ul style="list-style-type: none"> • SHE Technical /Field Training



13.	International Engineering Company K – 10, South Extension, Part – 2, New Delhi – 110 049 Phone: 011 – 26254761, 26258130 Mobile: 9312260130 E-mail: ashok@intenco.net	<ul style="list-style-type: none"> • Crane and Lifting appliances and Gears Certification • SHE Practical Field Training for Crane Safety
14.	L & T Eutectic 32, Sivaji Marg New Delhi – 110 015 Phone: 011 - 51419538, 51419539 Fax: 011 - 51419600 Website: www.Inteutecticwelding.com	<ul style="list-style-type: none"> • SHE Practical Field Training for Welding Safety
15.	Loss Prevention Association of India Ltd. Warden House, Sir P.M. Road, Mumbai – 400 001 Website: www.lpaidia.org	<ul style="list-style-type: none"> • SHE Management / Technical Training
16.	MFA Crucial Moments Healthcare Pvt. Ltd., 42, Okhla Industrial Estate, Phase – II New Delhi – 110 020 Phone: 011 – 55624000 Fax: 011 – 55624010 E-mail: contact@crucialmoments.net	<ul style="list-style-type: none"> • First-aid Training
17.	Modicare Foundation 4 Community Centre, New Friends Colony, New Delhi – 110 065 Phone: 011 – 5167235059 Fax: 011 – 26915469 E-mail: nivedita@modi.com , nivedita@gmail.com Website: www.modicarefoundation.org	<ul style="list-style-type: none"> • HIV / AIDS awareness
18.	National Safety Council HQ and Institute Building 98A, Sector 15, industrial Area C.B.D Belapur, Navi Mumbai – 400614 Phone: 27579924	<ul style="list-style-type: none"> • SHE Management / Technical Training
19.	NICMAR (National Institute of Construction Management and Research) 910,9 th Floor, Hemkunt Chambers, 89, Nehru Place, New Delhi – 110 019 Phone: 011 – 51618415, 51618417, 51618418 Fax: 011 – 51618416	<ul style="list-style-type: none"> • SHE Management / Technical Training



20.	Quality Growth Services Pvt. Ltd. H-13, Kirti Nagar, New Delhi – 110 015 Fax: 011 – 25431737 / 25438598 / 25918332 E-mail: qgs@qgspl.com Website: www.qgspl.com	<ul style="list-style-type: none"> • ISO Certification
21.	Safety Engineers Association / Safety Educational Trust – India 2/257, First Floor, Dr. Ambedkar Nagar, Manapakkam, Chennai – 600 116 Phone: 044 – 22523461 E-mail: safetrustindia@rediffmail.com	<ul style="list-style-type: none"> • SHE Management / Technical Training
22.	SHE Management Consultancy & Support Services, 145 A, Pocket-VI, (DDA Flats), Kondli Gharoli, Mayur Vihar-II, Delhi-110 096 Fax: 011-2262 5015 Mobile: 9811153873 E-mail: r_k_p@vsnl.net	<ul style="list-style-type: none"> • SHE Management / Technical Training
23.	St. Johns' Ambulance Red Cross Road New Delhi – 110 001	<ul style="list-style-type: none"> • First-aid Training
24.	Vexil Business Process Services Pvt. Ltd. 208, A/4, Savitri Nagar, New Delhi – 110 017 Mobile: 9350232714, 98102832201, 9350232716 E-mail: info@vexilbps.com Website: www.vexilbps.com	<ul style="list-style-type: none"> • Emergency Preparedness Mock drill • SHE Management / Technical Training
25.	Welding Research Institute Bharat Heavy Electricals Ltd. (BHEL) Trichirappalli, Tamil Nadu – 620 014 Phone: 0431 – 2577029, 2577283 Fax: 0431 – 2520770 E-mail: wri@bheltry.co.in	<ul style="list-style-type: none"> • SHE Practical Field Training for Welding Safety
26.	Dr Cris Research Centre for Occupational Health & Safety 306, Guru Arjuna Dev Bhawan Ranjit Nagar Complex, New Delhi-08 Ph: 9810040406 Fax: 011-25702929 Email: team@drcri.com www.drcri.com	<ul style="list-style-type: none"> • Ambulance • Communication Material • First Aid Training • HIV/AIDS Awareness • ID Card • Medical Facilities • SHE training




	JAIPUR METRO RAIL CORPORATION LTD.
General Instruction: JMRC/SHE/GI/011	

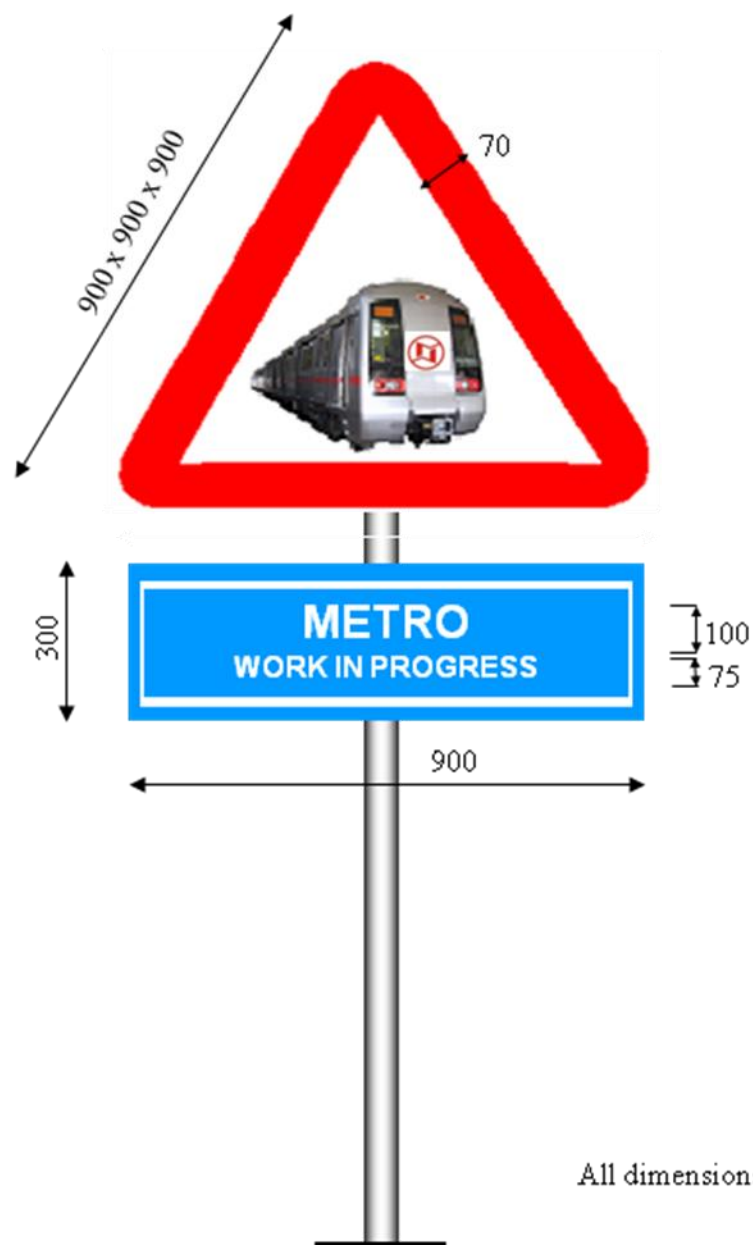
Minimum Lighting Requirements

S.N.	A. Facility or Function	Luminance – lx (lm/ft ²)
B. 1.	Administrative areas (offices, drafting and meeting rooms, etc.)	540 (50)
C. 2.	D. Construction areas <ul style="list-style-type: none"> - general indoor - general outdoor - tunnel and general underground work areas (minimum 110 lux required at tunnel and shaft heading during drilling, mucking and scaling) 	55 (5) 33 (3) 55 (5)
E. 3.	F. Access ways <ul style="list-style-type: none"> - exit ways, walkways, ladders, stairs 	110 (10)
4.	G. Maintenance / Operating areas / shops <ul style="list-style-type: none"> - vehicle maintenance shop - carpentry shop - outdoors field maintenance area - refueling area, outdoors - shops, fine details work - shops, medium detail work - welding shop 	325 (30) 110 (10) 55 (5) 55 (5) 540 (50) 325 (30) 325 (30)
5.	Mechanical/electrical equipment rooms	110 (10)
6.	Hoists, Elevators, freight and passenger	215 (20)
7.	H. Warehouses and storage rooms/area <ul style="list-style-type: none"> - indoor stockroom, active/bulk storage - indoor rack storage - outdoor storage 	110 (10) 270 (25) 33 (3)
8.	Health Centers and First aid stations and infirmaries	325 (30)
9.	Toilets, wash and dressing rooms	110 (10)
10.	Work areas – general (not listed above)	325 (30)
11.	Parking areas	33 (3)
12.	Visitor areas	215 (20)
13.	Laboratories	540 (50)



	JAIPUR METRO RAIL CORPORATION LTD.
General Instruction: JMRC/SHE/GI/012	

SIGNAGE





FORM No. : SF/001

FORMATION OF SITE SHE COMMITTEE

Contract No	
Contractor Name	
Contract Title	

CIRCULAR

Committee

The following SHE Committee is constituted with immediate effect:

Chairman:

Members:

- 1)
- 2)
- 3)
- 4)
- 5)

Secretary:

Periodicity

The committee will meet at least once in a month on the day (specify date)

Agenda

Secretary will circulate agenda of the meeting at least two days in advance of the schedule date of the meeting.

Circulation

Gist of the meeting will be minuted in the standard format and circulated to the following under the signature of the secretary

1. Chairman
2. Members
3. JMRC Representatives
5. Others concerned

Date:
CHAIRMAN

Signed By: -----



	JAIPUR METRO RAIL CORPORATION LTD.
FORM No. : SF/002	

MINUTES OF SHE COMMITTEE MEETING			
Contract No.			
Contractor Name			
Contract Title			
Meeting No.		Date of Meeting	
Location of Meeting			

MEMBERS PRESENT	INVITEES	MEMBERS ABSENT



Safety, Health and Environment (SHE) Manual

REPORT SENT TO					
No. of Copies	Name / Dept.	No. of Copies	Name / Dept.	No. of Copies	Name / Dept.
Prepared by: _____ Location: _____ Date: _____					

MINUTES OF SHE MEETING				
Item No.	Description of Discussion	Action By	Target	Remarks
1	Complaints received from Clients and corrective and preventive action			
2	Review of MOM of previous meeting			
3	NCR's / Observation from third party			
4	First - Aid cases / Reportable accident cases			
5	Future jobs and specific requirement			
6	Status of implementation of Safety plan			
7	Sub-contractor performance			



Safety, Health and Environment (SHE) Manual

8	Analysis of first-aid cases			
9	Need for any specific system / training / PPE's / resources			
10	Observation of SHE committee during last walk down			

Next SHE Meeting is scheduled on:

Date:	Chief SHE Manager (Signature & Name)
Date:	Project Manager (Signature & Name)



Procurement of Works

JAIPUR METRO RAIL CORPORATION LIMITED

BIDDING DOCUMENT

for

Procurement on Direct Contract Mode

of

DC No.- JP/JS15 (Phase-1B)

**BID DOCUMENTS FOR DESIGN, MANUFACTURE, SUPPLY,
INSTALLATION TESTING & COMMISSIONING OF PUBLIC
ADDRESS SYSTEM, PASSENGER INFORMATION DISPLAY
SYSTEM AND MASTER CLOCK SYSTEM FOR JMRC PHASE 1B**

PART-III CONDITIONS OF CONTRACT AND CONTRACT FORMS

Section 7 – General Conditions of Contractors (GCC)

Section 8 – Special Conditions of Contractors (SCC)

Section 9 – Contract Forms (COF)

JAIPUR METRO RAIL CORPORATION LTD.

Khanij Bhawan, Tilak Marg,

C- Scheme, Jaipur (Rajasthan) PIN-302005

Country: India



Procurement of Works

JAIPUR METRO RAIL CORPORATION LIMITED

BIDDING DOCUMENT

for

Procurement on Direct Contract Mode

of

DC No.- JP/JS15 (Phase-1B)

**BID DOCUMENTS FOR DESIGN, MANUFACTURE, SUPPLY,
INSTALLATION TESTING & COMMISSIONING OF PUBLIC
ADDRESS SYSTEM, PASSENGER INFORMATION DISPLAY
SYSTEM AND MASTER CLOCK SYSTEM FOR JMRC PHASE 1B**

PART-III CONDITIONS OF CONTRACT AND CONTRACT FORMS

Section 7 – General Conditions of Contractors (GCC)

JAIPUR METRO RAIL CORPORATION LTD.

Khanij Bhawan, Tilak Marg,

C- Scheme, Jaipur (Rajasthan) PIN-302005

Country: India

Section 7 - General Conditions of Contract

These General Conditions of Contract (GCC) are based on the Model Form of International Contract for Process Plant Construction published by the Engineering Advancement Association of Japan (ENAA). The Multilateral Development Banks (MDBs) participating in the procurement harmonization process gratefully acknowledge the contribution of ENAA to the advancement of good contracting practices by its borrowers. The GCC contain general clauses to be applied on all contracts. The GCC in this section, read in conjunction with the Special Conditions of Contract in Section 8 and other documents listed therein, should be a complete document expressing all the rights and obligations of the contracting parties. The General Conditions herein shall not be altered.

Table of Contents

A. Contract and Interpretation.....	7-3
1. Definitions	7-3
2. Contract Documents.....	7-5
3. Interpretation	7-5
4. Communications.....	7-7
5. Law and Language	7-7
6. Fraud and Corruption	7-7
B. Subject Matter of Contract	7-9
7. Scope of Facilities	7-9
8. Time for Commencement and Completion	7-10
9. Contractor's Responsibilities	7-10
10. Employer's Responsibilities.....	7-11
C. Payment	7-12
11. Contract Price	7-12
12. Terms of Payment	7-12
13. Securities.....	7-13
14. Taxes and Duties.....	7-14
D. Intellectual Property	7-14
15. License/Use of Technical Information	7-14
16. Confidential Information	7-15
E. Execution of the Facilities.....	7-16
17. Representatives.....	7-16
18. Work Program	7-17
19. Subcontracting.....	7-18
20. Design and Engineering	7-19
21. Procurement	7-21
22. Installation	7-22
23. Test and Inspection	7-28
24. Completion of the Facilities	7-30
25. Commissioning and Operational Acceptance	7-31

F. Guarantees and Liabilities	7-34
26. Completion Time Guarantee.....	7-34
27. Defect Liability.....	7-35
28. Functional Guarantees.....	7-36
29. Patent Indemnity	7-37
30. Limitation of Liability.....	7-38
G. Risk Distribution	7-38
31. Transfer of Ownership	7-38
32. Care of Facilities	7-39
33. Loss of or Damage to Property; Accident or Injury to Workers; Indemnification	7-40
34. Insurance	7-41
35. Unforeseen Conditions	7-43
36. Change in Laws and Regulations	7-44
37. Force Majeure	7-44
38. War Risks.....	7-46
H. Change in Contract Elements	7-47
39. Change in the Facilities.....	7-47
40. Extension of Time for Completion.....	7-50
41. Suspension	7-51
42. Termination	7-52
43. Assignment	7-57
I. Claims, Disputes and Arbitration	7-57
44. Contractor's Claims.....	7-57
45. Disputes and Arbitration	7-59

General Conditions of Contract

A. Contract and Interpretation

1. Definitions

1.1 The following words and expressions shall have the meanings hereby assigned them:

“Contract” means the Contract Agreement entered into between the Employer and the Contractor, together with the Contract Documents referred to therein; they shall constitute the Contract, and the term “the Contract” shall in all such documents be construed accordingly.

“Contract Documents” means the documents listed in Article 1.1 (Contract Documents) of the Contract Agreement (including any amendments thereto).

“GCC” means the General Conditions of Contract.

“SCC” means the Special Conditions of Contract.

“day” means calendar day.

“year” means 365 days.

“month” means calendar month.

“Party” means the Employer or the Contractor, as the context requires.

“Employer” means the person named as such in the SCC and includes the legal successors or permitted assigns of the Employer.

“Project Manager” means the person appointed by the Employer in the manner provided in GCC Subclause 17.1 (Project Manager) hereof and named as such in the SCC to perform the duties delegated by the Employer.

“Contractor” means the person(s) named as Contractor in the Contract Agreement, and includes the legal successors or permitted assigns of the Contractor.

“Contractor’s Representative” means any person nominated by the Contractor and approved by the Employer in the manner provided in GCC Subclause 17.2 (Contractor’s Representative and Construction Manager) hereof to perform the duties delegated by the Contractor.

“Construction Manager” means the person appointed by the Contractor’s Representative in the manner provided in GCC Subclause 17.2.4.

“Subcontractor,” including manufacturers, means any person to whom execution of any part of the Facilities, including preparation of any design or supply of any Plant, is sub-contracted directly or indirectly by the Contractor, and includes its legal successors or permitted assigns.

“Dispute Board” means the person or persons named as such in the SCC appointed by agreement between the Employer and the Contractor to make a decision on or to settle any dispute or difference between the Employer and the Contractor referred to him or her by the parties pursuant to GCC Subclause 45.1 (Dispute Board) hereof.

“The Bank” means the financing institution named in the SCC.

“Contract Price” means the sum specified in Article 2.1 (Contract Price) of the Contract Agreement, subject to such additions and adjustments thereto or deductions therefrom, as may be made pursuant to the Contract.

“Facilities” means the Plant to be supplied and installed, as well as all the Installation Services to be carried out by the Contractor under the Contract.

“Plant” means permanent plant, equipment, machinery, apparatus, articles and things of all kinds to be provided and incorporated in the Facilities by the Contractor under the Contract (including the spare parts to be supplied by the Contractor under GCC Subclause 7.3 hereof), but does not include Contractor’s Equipment.

“Installation Services” means all those services ancillary to the supply of the Plant for the Facilities, to be provided by the Contractor under the Contract, such as transportation and provision of marine or other similar insurance, inspection, expediting, site preparation works (including the provision and use of Contractor’s Equipment and the supply of all construction materials required), installation, testing, precommissioning, commissioning, operations, maintenance, the provision of operations and maintenance manuals, training, etc. as the case may require.

“Contractor’s Equipment” means all facilities, equipment, machinery, tools, apparatus, appliances, or things of every kind required in or for installation, completion and maintenance of Facilities that are to be provided by the Contractor, but does not include Plant, or other things intended to form or forming part of the Facilities.

“Country of Origin” means the countries and territories eligible under the rules of the Bank as further elaborated in the SCC.

“Site” means the land and other places upon which the Facilities are to be installed, and such other land or places as may be specified in the Contract as forming part of the Site.

“Effective Date” means the date of fulfillment of all conditions stated in Article 3 (Effective Date) of the Contract Agreement, upon which the period until the Time for Completion shall be counted from.

“Time for Completion” means the time within which Completion of the Facilities as a whole (or of a part of the Facilities where a separate Time for Completion of such part has been prescribed) is to be attained, as referred to in GCC Clause 8 and in accordance with the relevant provisions of the Contract.

“Completion” means that the Facilities (or a specific part thereof where specific parts are specified in the Contract) have been completed operationally and structurally and put in a tight and clean condition, that all work in respect of Precommissioning of the Facilities or such specific part thereof has been completed, and that the Facilities or specific part thereof are ready for Commissioning as provided in GCC Clause 24 (Completion) hereof.

“Precommissioning” means the testing, checking and other requirements specified in the Employer’s Requirements that are to be carried out by the Contractor in preparation for Commissioning as provided in GCC Clause 24 (Completion) hereof.

“Commissioning” means operation of the Facilities or any part thereof by the Contractor following Completion, which operation is to be carried out by the Contractor as provided in GCC Subclause 25.1 (Commissioning) hereof, for the purpose of carrying out Guarantee Test(s).

“Guarantee Test(s)” means the test(s) specified in the Employer’s Requirements to be carried out to ascertain whether the Facilities or a specified part thereof is able to attain the Functional Guarantees specified in the Appendix (Functional Guarantees) to the Contract Agreement in accordance with the provisions of GCC Subclause 25.2 (Guarantee Test) hereof.

“Operational Acceptance” means the acceptance by the Employer of the Facilities (or any part of the Facilities where the Contract provides for acceptance of the Facilities in parts), which certifies the Contractor’s fulfillment of the Contract in respect of Functional Guarantees of the Facilities (or the relevant part thereof) in accordance with the provisions of GCC Clause 28 (Functional Guarantees) hereof and shall include deemed acceptance in accordance with GCC Clause 25 (Commissioning and Operational Acceptance) hereof.

“Defect Liability Period” means the period of validity of the warranties given by the Contractor commencing at Completion of the Facilities or a part thereof, during which the Contractor is responsible for defects with respect to the Facilities (or the relevant part thereof) as provided in GCC Clause 27 (Defect Liability) hereof.

- | | |
|------------------------------|--|
| 2. Contract Documents | 2.1 Subject to Article 1.2 (Order of Precedence) of the Contract Agreement, all documents forming part of the Contract (and all parts thereof) are intended to be correlative, complementary and mutually explanatory. The Contract shall be read as a whole. |
| 3. Interpretation | 3.1 In the Contract, except where the context requires otherwise, <ul style="list-style-type: none"> (a) words indicating one gender include all genders; (b) words indicating the singular also include the plural and words indicating the plural also include the singular; (c) provisions including the word “agree,” “agreed,” or “agreement” require the agreement to be record in writing; |

- (d) the word “tender” is synonymous with “bid,” “tenderer” with “Bidder,” and “tender documents” with “Bidding Documents;” and
- (e) “written” or “in writing” means handwritten, typewritten, printed or electronically made, and resulting in a permanent record.

The marginal words and other headings shall not be taken into consideration in the interpretation of these Conditions.

3.2 Incoterms

Unless inconsistent with any provision of the Contract, the meaning of any trade term and the rights and obligations of parties thereunder shall be as prescribed by Incoterms.

“Incoterms” means international rules for interpreting trade terms published by the International Chamber of Commerce (latest edition), 38 Cours Albert 1^{er}, 75008 Paris, France.

3.3 Entire Agreement

Subject to GCC Subclause 16.4 hereof, the Contract constitutes the entire agreement between the Employer and Contractor with respect to the subject matter of Contract and supersedes all communications, negotiations, and agreements (whether written or oral) of parties with respect thereto made prior to the date of Contract.

3.4 Amendment

No amendment or other variation of the Contract shall be effective unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party hereto.

3.5 Independent Contractor

The Contractor shall be an independent contractor performing the Contract. The Contract does not create any agency, partnership, joint venture, or other joint relationship between the parties hereto. Subject to the provisions of the Contract, the Contractor shall be solely responsible for the manner in which the Contract is performed. All employees, representatives, or Subcontractors engaged by the Contractor in connection with the performance of the Contract shall be under the complete control of the Contractor and shall not be deemed to be employees of the Employer, and nothing contained in the Contract or in any subcontract awarded by the Contractor shall be construed to create any contractual relationship between any such employees, representatives, or Subcontractors and the Employer.

3.6 Non-Waiver

3.6.1 Subject to GCC Subclause 3.6.2 below, no relaxation, forbearance, delay, or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect, or restrict the rights of that party under the Contract, nor shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.

3.6.2 Any waiver of a party's rights, powers, or remedies under the

Contract must be in writing, must be dated, and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.

3.7 Severability

If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity, or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.

3.8 Country of Origin

"Origin" means the place where the plant and component parts thereof are mined, grown, produced, or manufactured, and from which the services are provided. Plant components are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that is substantially in its basic characteristics or in purpose or utility from its components.

4. Communications

4.1 Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices, requests, and discharges, these communications shall be

- (a) in writing and delivered against receipt; and
- (b) delivered, sent, or transmitted to the address for the recipient's communications as stated in the Contract Agreement.

When a certificate is issued to a Party, the certifier shall send a copy to the other Party. When a notice is issued to a Party, by the other Party or the Project Manager, a copy shall be sent to the Project Manager or the other Party, as the case may be.

5. Law and Language

5.1 The Contract shall be governed by and interpreted in accordance with laws of the country specified in the SCC.

5.2 The ruling language of the Contract shall be that stated in the SCC.

5.3 The language for communications shall be the ruling language unless otherwise stated in the SCC.

6. Fraud and Corruption

6.1 ADB's Anticorruption Policy requires Borrowers (including beneficiaries of ADB-financed activity), as well as Bidders, Suppliers, and Contractors under ADB-financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, ADB

- (a) defines, for the purposes of this provision, the terms set forth below as follows:
 - (i) "corrupt practice" means the offering, giving, receiving, or soliciting, directly or indirectly, anything of value to influence improperly the actions of another party;
 - (ii) "fraudulent practice" means any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party

- to obtain a financial or other benefit or to avoid an obligation;
- (iii) "coercive practice" means impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
 - (iv) "collusive practice" means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party;
 - (v) "obstructive practice" means (a) deliberately destroying, falsifying, altering, or concealing of evidence material to an ADB investigation; (b) making false statements to investigators in order to materially impede an ADB investigation; (c) failing to comply with requests to provide information, documents, or records in connection with an Office of Anticorruption and Integrity (OAI) investigation; (d) threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or (e) materially impeding ADB's contractual rights of audit or access to information; and
 - (vi) "integrity violation" is any act which violates ADB's Anticorruption Policy, including (i) to (v) above and the following: abuse, conflict of interest, violations of ADB sanctions, retaliation against whistleblowers or witnesses, and other violations of ADB's Anticorruption Policy, including failure to adhere to the highest ethical standard.
- (b) will reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations in competing for the Contract;
 - (c) will cancel the portion of the financing allocated to a contract if it determines at any time that representatives of the Borrower or of a beneficiary of ADB-financing engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations during the procurement or the execution of that contract, without the Borrower having taken timely and appropriate action satisfactory to ADB to remedy the situation;
 - (d) will impose remedial actions on a firm or an individual, at any time, in accordance with ADB's Anticorruption Policy and Integrity Principles and Guidelines (both as amended from time to time), including declaring ineligible, either indefinitely or for a

stated period of time, to participate¹ in ADB-financed, administered, or supported activities or to benefit from an ADB-financed, administered, or supported contract, financially or otherwise, if it at any time determines that the firm or individual has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations; and

- (e) will have the right to require suppliers and contractors to permit ADB or its representative to inspect their accounts and records and other documents relating to the bid submission and contract performance and to have them audited by auditors appointed by ADB.

B. Subject Matter of Contract

7. Scope of Facilities

- 7.1 Unless otherwise expressly limited in the Employer's Requirements, the Contractor's obligations cover the provision of all Plant and the performance of all Installation Services required for the design, the manufacture (including procurement, quality assurance, construction, installation, associated civil works, pre-commissioning and delivery) of the Plant and the installation, completion, and commissioning of the Facilities in accordance with the plans, procedures, specifications, drawings, codes, and any other documents as specified in the section Employer's Requirements. Such specifications include, but are not limited to, the provision of supervision and engineering services; the supply of labor, materials, equipment, spare parts (as specified in GCC Subclause 7.3 below) and accessories; Contractor's Equipment; construction utilities and supplies; temporary materials, structures, and facilities; transportation (including, without limitation, unloading and hauling to, from and at the Site); and storage, except for those supplies, works, and services that will be provided or performed by the Employer, as set forth in the Appendix (Scope of Works and Supply by the Employer) to the Contract Agreement.
- 7.2 The Contractor shall, unless specifically excluded in the Contract, perform all such work and/or supply all such items and materials not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining Completion of the Facilities as if such work and/or items and materials were expressly mentioned in the Contract.
- 7.3 In addition to the supply of Mandatory Spare Parts included in the Contract, the Contractor agrees to supply spare parts required for the operation and maintenance of the Facilities for the period specified in the SCC and the provisions, if any, specified in the SCC. However, the identity, specifications, and quantities of such spare parts and the terms and conditions relating to the supply thereof are to be agreed between the Employer and the Contractor, and the price of such spare parts shall be that given in Price Schedule No. 6, which shall be added

¹ Whether as a Contractor, Subcontractor, Consultant, Manufacturer or Supplier, or Service Provider; or in any other capacity (different names are used depending on the particular Bidding Document).

to the Contract Price. The price of such spare parts shall include the purchase price therefore and other costs and expenses (including the Contractor's fees) relating to the supply of spare parts.

8. Time for Commencement and Completion

- 8.1 The Contractor shall commence work on the Facilities within the period specified in the SCC and without prejudice to GCC Subclause 26.2 hereof, the Contractor shall thereafter proceed with the Facilities in accordance with the time schedule specified in the Appendix 4 (Time Schedule) to the Contract Agreement.
- 8.2 The Contractor shall attain Completion of the Facilities or of a part where a separate time for Completion of such part is specified in the Contract, within the time stated in the SCC or within such extended time to which the Contractor shall be entitled under GCC Clause 40 hereof.

9. Contractor's Responsibilities

- 9.1 The Contractor shall design, manufacture, including associated purchases and/or subcontracting, install, and complete the Facilities in accordance with the Contract. When completed, the Facilities should be fit for the purposes for which they are intended as defined in the Contract.
- 9.2 The Contractor confirms that it has entered into this Contract on the basis of a proper examination of the data relating to the Facilities, including any data as to boring tests provided by the Employer, and on the basis of information that the Contractor could have obtained from a visual inspection of the Site if access thereto was available and of other data readily available to it relating to the Facilities as of the date 28 days prior to bid submission. The Contractor acknowledges that any failure to acquaint itself with all such data and information shall not relieve its responsibility for properly estimating the difficulty or cost of successfully performing the Facilities.
- 9.3 The Contractor shall acquire and pay for all permits, approvals, and/or licenses from all local, state, or national government authorities or public service undertakings in the country where the Site is located, which such authorities or undertakings require the Contractor to obtain in its name and which are necessary for the performance of the Contract, including, without limitation, visas for the Contractor's and Subcontractor's personnel and entry permits for all imported Contractor's Equipment. The Contractor shall acquire all other permits, approvals, and/or licenses that are not the responsibility of the Employer under GCC Subclause 10.3 hereof and that are necessary for the performance of the Contract.
- 9.4 The Contractor shall comply with all laws in force in the country where the Facilities are to be implemented. The laws will include all local, state, national, or other laws that affect the performance of the Contract and bind upon the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any and all liabilities, damages, claims, fines, penalties, and expenses of whatever nature arising or resulting from the violation of such laws by the Contractor or its personnel, including the Subcontractors and their personnel, but without prejudice to GCC Subclause 10.1 hereof.
- 9.5 Any plant and services that will be incorporated in or be required for the Facilities and other supplies shall have their origin as specified under GCC Clause 1 (Country of Origin). Any Subcontractors retained

by the Contractor shall be from a country as specified in GCC Clause 1 (Country of Origin).

9.6 The Contractor shall permit ADB to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by ADB, if so required by ADB.

9.7 If the Contractor is a joint venture or consortium of two or more persons, all such persons shall be jointly and severally bound to the Employer for the fulfillment of the provisions of the Contract and shall designate one of such persons to act as a leader with authority to bind the joint venture or consortium. The composition or the constitution of the joint venture or consortium shall not be altered without the prior consent of the Employer.

9.8 Protection of the Environment

(a) The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise, and other results of his operations.

(b) The Contractor shall ensure that emissions, surface discharges, and effluent from the Contractor's activities shall not exceed the values stated in the Specification or prescribed by applicable Laws.

10. Employer's Responsibilities

10.1 All information and/or data to be supplied by the Employer as described in the Appendix (Scope of Works and Supply by the Employer) to the Contract Agreement shall be deemed to be accurate, except when the Employer expressly states otherwise.

10.2 The Employer shall be responsible for acquiring and providing legal and physical possession of the Site and access thereto, and for providing possession of and access to all other areas reasonably required for the proper execution of the Contract, including all requisite rights of way, as specified in the Appendix (Scope of Works and Supply by the Employer) to the Contract Agreement. The Employer shall give full possession of and accord all rights of access thereto on or before the date(s) specified in that Appendix.

10.3 The Employer shall acquire and pay for all permits, approvals, and/or licenses from all local, state, or national government authorities, or public service undertakings in the country where the Site is located which (a) such authorities or undertakings require the Employer to obtain in the Employer's name, (b) are necessary for the execution of the Contract, including those required for the performance by both the Contractor and the Employer of their respective obligations under the Contract, and (c) are specified in the Appendix (Scope of Works and Supply by the Employer) to the Contract Agreement.

10.4 If requested by the Contractor, the Employer shall use its best endeavors to assist the Contractor in obtaining in a timely and expeditious manner all permits, approvals, and/or licenses necessary

for the execution of the Contract from all local, state, or national government authorities, or public service undertakings that such authorities or undertakings require the Contractor or Subcontractors or the personnel of the Contractor or Subcontractors, as the case may be, to obtain.

- 10.5 Unless otherwise specified in the Contract or agreed upon by the Employer and the Contractor, the Employer shall provide sufficient, properly qualified operating and maintenance personnel; shall supply and make available all raw materials, utilities, lubricants, chemicals, catalysts, other materials and facilities; and shall perform all work and services of whatsoever nature, including those required by the Contractor to properly carry out Pre-commissioning, Commissioning, and Guarantee Tests, all in accordance with the provisions of the Appendix (Scope of Works and Supply by the Employer) to the Contract Agreement at or before the time specified in the program furnished by the Contractor under GCC Subclause 18.2 hereof and in the manner thereupon specified or as otherwise agreed upon by the Employer and the Contractor.
- 10.6 The Employer shall be responsible for the continued operation of the Facilities after Completion, in accordance with GCC Subclause 24.8, and shall be responsible for facilitating the Guarantee Test(s) for the Facilities, in accordance with GCC Subclause 25.2.
- 10.7 All costs and expenses involved in the performance of the obligations under this GCC Clause 10 shall be the responsibility of the Employer, except those incurred by the Contractor with respect to the performance of Guarantee Tests, in accordance with GCC Subclause 25.2.
- 10.8 In the event that the Employer shall be in breach of any of his obligations imposed by the Contract, then the additional cost reasonably incurred by the Contractor in consequence thereof shall be added to the Contract Price.

C. Payment

- 11. Contract Price**
- 11.1 The Contract Price shall be as specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement.
- 11.2 Unless an adjustment clause is provided for in the SCC, the Contract Price shall be a firm lump sum not subject to any alteration, except in the event of a Change in the Facilities or as otherwise provided in the Contract.
- 11.3 Subject to GCC Subclauses 9.2, 10.1, and 35 hereof, the Contractor shall be deemed to have satisfied itself as to the correctness and sufficiency of the Contract Price, which shall, except as otherwise provided for in the Contract, cover all its obligations under the Contract.
- 12. Terms of Payment**
- 12.1 The Contract Price shall be paid as specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement and in the Appendix (Terms and Procedures of Payment) to the Contract

Agreement, which also outlines the procedures to be followed in making application for and processing payments.

- 12.2 No payment made by the Employer herein shall be deemed to constitute acceptance by the Employer of the Facilities or any part(s) thereof.
- 12.3 In the event that the Employer fails to make any payment by its respective due date or within the period set forth in the Contract, the Employer shall pay to the Contractor interest on the amount of such delayed payment at the rate(s) shown in the Appendix (Terms and Procedures of Payment) to the Contract Agreement for the period of delay until payment has been made in full, whether before or after judgment or arbitration award.
- 12.4 The currency or currencies in which payments are made to the Contractor under this Contract shall be specified in the Appendix (Terms and Procedures of Payment) to the Contract Agreement, subject to the general principle that payments will be made in the currency or currencies in which the Contract Price has been stated in the Contractor's bid.

13. Securities

13.1 Issuance of Securities

The Contractor shall provide the securities specified below in favor of the Employer at the times, and in the amount, manner, and form specified below.

13.2 Advance Payment Security

13.2.1 The Contractor shall, within 28 days of the notification of contract award, provide a security in an amount equal to the advance payment calculated in accordance with the Appendix (Terms and Procedures of Payment) to the Contract Agreement, and in the same currency or currencies.

13.2.2 The security shall be in the form provided in the Bidding Documents or in another form acceptable to the Employer. The amount of the security shall be reduced in proportion to the value of the Facilities executed by and paid to the Contractor from time to time, and shall automatically become null and void when the full amount of the advance payment has been recovered by the Employer. The security shall be returned to the Contractor immediately after its expiration.

13.3 Performance Security

13.3.1 The Contractor shall, within 28 days of the notification of contract award, provide a security for the due performance of the Contract in the amount specified in the SCC.

13.3.2 The security shall be denominated in the currency or currencies of the Contract, or in a freely convertible currency acceptable to the Employer, and shall be in one of the forms of bank guarantees provided in the Bidding Documents, as stipulated by the Employer in the SCC, or in another form acceptable to the Employer.

13.3.3 Unless otherwise specified in the SCC, the security shall be reduced by half on the date of the Operational Acceptance. The Security shall become null and void, or shall be reduced

pro rata to the Contract Price of a part of the Facilities for which a separate Time for Completion is provided, 540 days after Completion of the Facilities or 365 days after Operational Acceptance of the Facilities, whichever occurs first; provided, however, that if the Defects Liability Period has been extended on any part of the Facilities pursuant to GCC Subclause 27.8 hereof, the Contractor shall issue an additional security in an amount proportionate to the Contract Price of that part. The security shall be returned to the Contractor immediately after its expiration, provided, however, that if the Contractor, pursuant to GCC Subclause 27.10, is liable for an extended defect liability obligation, the performance security shall be extended for the period and up to the amount specified in the SCC.

14. Taxes and Duties

- 14.1 Except as otherwise specifically provided in the Contract, the Contractor shall bear and pay all taxes, duties, levies, and charges assessed on the Contractor, its Subcontractors, or their employees by all municipal, state, or national government authorities in connection with the Facilities in and outside of the country where the Site is located.
- 14.2 Notwithstanding GCC Subclause 14.1 above, the Employer shall bear and promptly pay all customs and import duties as well as other local taxes like, e.g., a value-added tax (VAT), imposed by the law of the country where the Site is located on the Plant specified in Price Schedule No. 1 and that are to be incorporated into the Facilities.
- 14.3 If any tax exemptions, reductions, allowances, or privileges may be available to the Contractor in the country where the Site is located, the Employer shall use its best endeavors to enable the Contractor to benefit from any such tax savings to the maximum allowable extent.
- 14.4 For the purpose of the Contract, it is agreed that the Contract Price specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement is based on the taxes, duties, levies, and charges prevailing at the date 28 days prior to the date of bid submission in the country where the Site is located (hereinafter called "Tax" in this GCC Subclause 14.4). If any rates of Tax are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the performance of Contract, which was or will be assessed on the Contractor, Subcontractors, or their employees in connection with performance of the Contract, an equitable adjustment of the Contract Price shall be made to fully take into account any such change by addition to the Contract Price or deduction therefrom, as the case may be, in accordance with GCC Clause 36 hereof.

D. Intellectual Property

15. License/Use of Technical Information

- 15.1 For the operation and maintenance of the Plant, the Contractor hereby grants a non-exclusive and nontransferable license (without the right to sublicense) to the Employer under the patents, utility models, or other industrial property rights owned by the Contractor or by a third

party from whom the Contractor has received the right to grant licenses thereunder, and shall also grant to the Employer a nonexclusive and nontransferable right (without the right to sublicense) to use the know-how and other technical information disclosed to the Employer under the Contract. Nothing contained herein shall be construed as transferring ownership of any patent, utility model, trademark, design, copyright, know-how, or other intellectual property right from the Contractor or any third party to the Employer.

- 15.2 The copyright in all drawings, documents, and other materials containing data and information furnished to the Employer by the Contractor herein shall remain vested in the Contractor or, if they are furnished to the Employer directly or through the Contractor by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party.

16. Confidential Information

- 16.1 The Employer and the Contractor shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during, or following termination of the Contract. Notwithstanding the above, the Contractor may furnish to its Subcontractor(s) such documents, data, and other information it receives from the Employer to the extent required for the Subcontractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Subcontractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under this GCC Clause 16.
- 16.2 The Employer shall not use such documents, data, and other information received from the Contractor for any purpose other than the operation and maintenance of the Facilities. Similarly, the Contractor shall not use such documents, data, and other information received from the Employer for any purpose other than the design, procurement of Plant, construction, or such other work and services as are required for the performance of the Contract.
- 16.3 The obligation of a party under GCC Subclauses 16.1 and 16.2 above, however, shall not apply to that information, which
- (a) now or hereafter enters the public domain through no fault of that party;
 - (b) can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party hereto; and
 - (c) otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.
- 16.4 The above provisions of this GCC Clause 16 shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract in respect of the Facilities or any part thereof.

- 16.5 The provisions of this GCC Clause 16 shall survive termination, for whatever reason, of the Contract.

E. Execution of the Facilities

17. Representatives 17.1 Project Manager

If the Project Manager is not named in the Contract, then within 14 days of the Effective Date, the Employer shall appoint and notify the Contractor in writing of the name of the Project Manager. The Employer may from time to time appoint some other person as the Project Manager in place of the person previously so appointed, and shall give notice of the name of such other person to the Contractor without delay. No such appointment shall be made at such a time or in such a manner as to impede the progress of work on the Facilities. Such appointment shall only take effect upon receipt of such notice by the Contractor. The Project Manager shall represent and act for the Employer at all times during the performance of the Contract. All notices, instructions, orders, certificates, approvals, and all other communications under the Contract shall be given by the Project Manager, except as herein otherwise provided.

All notices, instructions, information, and other communications given by the Contractor to the Employer under the Contract shall be given to the Project Manager, except as herein otherwise provided.

17.2 Contractor's Representative and Construction Manager

17.2.1 If the Contractor's Representative is not named in the Contract, then within 14 days of the Effective Date, the Contractor shall appoint the Contractor's Representative and shall request the Employer in writing to approve the person so appointed. If the Employer makes no objection to the appointment within 14 days, the Contractor's Representative shall be deemed to have been approved. If the Employer objects to the appointment within 14 days giving the reason therefor, then the Contractor shall appoint a replacement within 14 days of such objection, and the foregoing provisions of this GCC Subclause 17.2.1 shall apply thereto.

17.2.2 The Contractor's Representative shall represent and act for the Contractor at all times during the performance of the Contract and shall give to the Project Manager all the Contractor's notices, instructions, information, and all other communications under the Contract.

All notices, instructions, information, and all other communications given by the Employer or the Project Manager to the Contractor under the Contract shall be given to the Contractor's Representative or, in its absence, its deputy, except as herein otherwise provided.

The Contractor shall not revoke the appointment of the Contractor's Representative without the Employer's prior written consent, which shall not be unreasonably withheld. If the Employer consents thereto, the Contractor shall appoint some other person as the Contractor's Representative, pursuant to the

procedure set out in GCC Subclause 17.2.1.

17.2.3 The Contractor's Representative may, subject to the approval of the Employer which shall not be unreasonably withheld, at any time delegate to any person any of the powers, functions and authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice signed by the Contractor's Representative, and shall specify the powers, functions, and authorities thereby delegated or revoked. No such delegation or revocation shall take effect unless and until a copy thereof has been delivered to the Employer and the Project Manager.

Any act or exercise by any person of powers, functions and authorities so delegated to him or her in accordance with this GCC Subclause 17.2.3 shall be deemed to be an act or exercise by the Contractor's Representative.

17.2.4 From the commencement of installation of the Facilities at the Site until Completion, the Contractor's Representative shall appoint a suitable person as the Construction Manager. The Construction Manager shall supervise all work done at the Site by the Contractor and shall be present at the Site throughout normal working hours except when on leave, sick, or absent for reasons connected with the proper performance of the Contract. Whenever the Construction Manager is absent from the Site, the Contractor's Representative or the Construction Manager shall appoint a suitable person to act as the Construction Manager's deputy.

17.2.5 The Employer may by notice to the Contractor object to any representative or person employed by the Contractor in the execution of the Contract who, in the reasonable opinion of the Employer, may behave inappropriately, may be incompetent or negligent, or may commit a serious breach of the Site regulations provided under GCC Subclause 22.4. The Employer shall provide evidence of the same, whereupon the Contractor shall remove such person from the Facilities.

17.2.6 If any representative or person employed by the Contractor is removed in accordance with GCC Subclause 17.2.5, the Contractor shall, where required, promptly appoint a replacement.

18. Work Program

18.1 Contractor's Organization

The Contractor shall supply to the Employer and the Project Manager a chart showing the proposed organization to be established by the Contractor for carrying out work on the Facilities within 21 days of the Effective Date. The chart shall include the identities of the key personnel, and the curricula vitae of such key personnel to be employed shall be supplied together with the chart. The Contractor shall promptly inform the Employer and the Project Manager in writing of any revision or alteration of such an organization chart.

18.2 Program of Performance

Within 28 days after the Effective Date, the Contractor shall submit to the Project Manager a detailed program of performance of the Contract, made in a form acceptable to the Project Manager and showing the sequence in which it proposes to design, manufacture,

transport, assemble, install, and pre-commission the Facilities, as well as the date by which the Contractor reasonably requires that the Employer shall have fulfilled its obligations under the Contract so as to enable the Contractor to execute the Contract in accordance with the program and to achieve Completion, Commissioning, and Acceptance of the Facilities in accordance with the Contract. The program so submitted by the Contractor shall accord with the Time Schedule included in the Appendix (Time Schedule) to the Contract Agreement and any other dates and periods specified in the Contract. The Contractor shall update and revise the program as and when appropriate or when required by the Project Manager, but without modification in the Times for Completion given in the SCC and any extension granted in accordance with GCC Clause 40, and shall submit all such revisions to the Project Manager.

18.3 Progress Report

The Contractor shall monitor progress of all the activities specified in the program referred to in GCC Subclause 18.2 above, and supply a progress report to the Project Manager every month.

The progress report shall be in a form acceptable to the Project Manager and shall indicate: (a) percentage completion achieved compared with the planned percentage completion for each activity; and (b) where any activity is behind the program, giving comments and likely consequences and stating the corrective action being taken.

18.4 Progress of Performance

If at any time the Contractor's actual progress falls behind the program referred to in GCC Subclause 18.2, or it becomes apparent that it will so fall behind, the Contractor shall, at the request of the Employer or the Project Manager, prepare and submit to the Project Manager a revised program, taking into account the prevailing circumstances, and shall notify the Project Manager of the steps being taken to expedite progress so as to attain Completion of the Facilities within the Time for Completion under GCC Subclause 8.2, any extension thereof entitled under GCC Subclause 40.1, or any extended period as may otherwise be agreed upon between the Employer and the Contractor.

18.5 Procedures

The Contract shall be executed in accordance with the Contract Documents including the procedures given in the Forms and Procedures of the Employer's Requirements.

The Contractor may execute the Contract in accordance with its own standard project execution plans and procedures to the extent that they do not conflict with the provisions contained in the Contract.

19.Subcontracting

- 19.1 The Appendix 5 (List of Major Items of Plant and Services and List of Approved Subcontractors) to the Contract Agreement specifies major items of plant and services and a list of approved Subcontractors against each item, including manufacturers. Insofar as no Subcontractors are listed against any such item, the Contractor shall prepare a list of Subcontractors for such item for inclusion in such list. The Contractor may from time to time propose any addition to or deletion from any such list. The Contractor shall submit any such list or any modification thereto to the Employer for its approval in sufficient

time so as not to impede the progress of work on the Facilities. Such approval by the Employer for any of the Subcontractors shall not relieve the Contractor from any of its obligations, duties, or responsibilities under the Contract.

- 19.2 The Contractor shall select and employ its Subcontractors for such major items from those listed in the lists referred to in GCC Subclause 19.1.
- 19.3 For items or parts of the Facilities not specified in the Appendix (List of Major Items of Plant and Services and List of Approved Subcontractors for Major Items) to the Contract Agreement, the Contractor may employ such Subcontractors as it may select, at its discretion.
- 19.4 Each subcontract shall include provisions which would entitle the Employer to require the sub-contract to be assigned to the Employer under GCC 19.5 (if and when applicable), or in event of termination by the Employer under GCC 42.2.
- 19.5 If a Sub-contractor's obligations extend beyond the expiry date of the relevant Defects Liability Period and the Project Manager, prior to that date, instructs the Contractor to assign the benefits of such obligations to the Employer, then the Contractor shall do so.

20. Design and Engineering

20.1 Specifications and Drawings

20.1.1 The Contractor shall execute the basic and detailed design and the engineering work in compliance with the provisions of the Contract, or where not so specified, in accordance with good engineering practice.

The Contractor shall be responsible for any discrepancies, errors, or omissions in the specifications, drawings, and other technical documents that it has prepared, whether such specifications, drawings, and other documents have been approved by the Project Manager or not, provided that such discrepancies, errors, or omissions are not because of inaccurate information furnished in writing to the Contractor by or on behalf of the Employer.

20.1.2 The Contractor shall be entitled to disclaim responsibility for any design, data, drawing, specification, or other document, or any modification thereof provided or designated by or on behalf of the Employer, by giving a notice of such disclaimer to the Project Manager.

20.2 Codes and Standards

Wherever references are made in the Contract to codes and standards in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards current at the date 28 days prior to date of bid submission shall apply unless otherwise specified. During Contract execution, any changes in such codes and standards shall be applied subject to approval by the Employer and shall be treated in accordance with GCC Clause 39.

20.3 Approval/Review of Technical Documents by Project Manager

20.3.1 The Contractor shall prepare or cause its Subcontractors to prepare, and furnish to the Project Manager the documents listed in the Appendix (List of Documents for Approval or Review) to the Contract Agreement for its approval or review as

specified and in accordance with the requirements of GCC Subclause 18.2 (Program of Performance).

Any part of the Facilities covered by or related to the documents to be approved by the Project Manager shall be executed only after the Project Manager's approval thereof.

GCC Subclauses 20.3.2 through 20.3.7 shall apply to those documents requiring the Project Manager's approval, but not to those furnished to the Project Manager for its review only.

20.3.2 Within 14 days after receipt by the Project Manager of any document requiring the Project Manager's approval in accordance with GCC Subclause 20.3.1, the Project Manager shall either return one copy thereof to the Contractor with its approval endorsed thereon or shall notify the Contractor in writing of its disapproval thereof and the reasons therefor and the modifications that the Project Manager proposes.

If the Project Manager fails to take such action within the said 14 days, then the said document shall be deemed to have been approved by the Project Manager.

20.3.3 The Project Manager shall not disapprove any document, except on the grounds that the document does not comply with the Contract or that it is contrary to good engineering practice. If the Project Manager disapproves a document, he shall specify the reasons for his decision.

20.3.4 If the Project Manager disapproves the document, the Contractor shall modify the document and resubmit it for the Project Manager's approval in accordance with GCC Subclause 20.3.2. If the Project Manager approves the document subject to modification(s), the Contractor shall make the required modification(s), whereupon the document shall be deemed to have been approved.

20.3.5 If any dispute or difference occurs between the Employer and the Contractor in connection with or arising out of the disapproval by the Project Manager of any document and/or any modification(s) thereto that cannot be settled between the parties within a reasonable period, then such dispute or difference may be referred to a Dispute Board for determination in accordance with GCC Subclause 45.3 hereof. If such dispute or difference is referred to a Dispute Board, the Project Manager shall give instructions as to whether and, if so, how, performance of the Contract is to proceed. The Contractor shall proceed with the Contract in accordance with the Project Manager's instructions, provided that if the Dispute Board upholds the Contractor's view on the dispute and if the Employer has not given notice under Subclause 45.3 hereof, then the Contractor shall be reimbursed by the Employer for any additional costs incurred by reason of such instructions and shall be relieved of such responsibility or liability in connection with the dispute and the execution of the instructions as the Dispute Board shall decide, and the Time for Completion shall

be extended accordingly.

20.3.6 The Project Manager's approval, with or without modification of the document furnished by the Contractor, shall not relieve the Contractor of any responsibility or liability imposed upon it by any provisions of the Contract except to the extent that any subsequent failure results from modifications required by the Project Manager.

20.3.7 The Contractor shall not depart from any approved document unless the Contractor has first submitted to the Project Manager an amended document and obtained the Project Manager's approval thereof, pursuant to the provisions of this GCC Subclause 20.3.

If the Project Manager requests any change in any already approved document and/or in any document based thereon, the provisions of GCC Clause 39 shall apply to such request.

21. Procurement

21.1 Materials

Subject to GCC Subclause 14.2, the Contractor shall procure and transport all materials in an expeditious and orderly manner to the Site.

21.2 Employer-Supplied Materials

If the Appendix (Scope of Works and Supply by the Employer) to the Contract Agreement provides that the Employer shall furnish any specific items to the Contractor, the following provisions shall apply:

21.2.1 The Employer shall, at its own risk and expense, transport each item to the place on or near the Site as agreed upon by the parties and make such item available to the Contractor at the time specified in the program furnished by the Contractor, pursuant to GCC Subclause 18.2, unless otherwise mutually agreed.

21.2.2 Upon receipt of such item, the Contractor shall inspect the same visually and notify the Project Manager of any detected shortage, defect, or default. The Employer shall immediately remedy any shortage, defect, or default, or the Contractor shall, if practicable and possible, at the request of the Employer, remedy such shortage, defect, or default at the Employer's cost and expense. After inspection, such item shall fall under the care, custody, and control of the Contractor. The provision of this GCC Subclause 21.2.2 shall apply to any item supplied to remedy any such shortage or default or to substitute for any defective item, or shall apply to defective items that have been repaired.

21.2.3 The foregoing responsibilities of the Contractor and its obligations of care, custody, and control shall not relieve the Employer of liability for any undetected shortage, defect, or default, nor place the Contractor under any liability for any such shortage, defect or default whether under GCC Clause 27 or under any other provision of Contract.

21.3 Transportation

21.3.1 The Contractor shall at its own risk and expense transport all the materials and the Contractor's Equipment to the Site by the mode of transport that the Contractor judges most suitable

under all the circumstances.

21.3.2 Unless otherwise provided in the Contract, the Contractor shall be entitled to select any safe mode of transport operated by any person to carry the materials and the Contractor's Equipment.

21.3.3 Upon dispatch of each shipment of materials and the Contractor's Equipment, the Contractor shall notify the Employer by telex, cable, facsimile, or electronic means, of the description of the materials and of the Contractor's Equipment, the point and means of dispatch, and the estimated time and point of arrival in the country where the Site is located, if applicable, and at the Site. The Contractor shall furnish the Employer with relevant shipping documents to be agreed upon between the parties.

21.3.4 The Contractor shall be responsible for obtaining, if necessary, approvals from the authorities for transportation of the materials and the Contractor's Equipment to the Site. The Employer shall use its best endeavors in a timely and expeditious manner to assist the Contractor in obtaining such approvals, if requested by the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any claim for damage to roads, bridges, or any other traffic facilities that may be caused by the transport of the materials and the Contractor's Equipment to the Site.

21.4 Customs Clearance

The Contractor shall, at its own expense, handle all imported materials and Contractor's Equipment at the point(s) of import and shall handle any formalities for customs clearance, subject to the Employer's obligations under GCC Subclause 14.2, provided that if applicable laws or regulations require any application or act to be made by or in the name of the Employer, the Employer shall take all necessary steps to comply with such laws or regulations. In the event of delays in customs clearance that are not the fault of the Contractor, the Contractor shall be entitled to an extension in the Time for Completion, pursuant to GCC Clause 40.

22. Installation

22.1 Setting Out/Supervision

22.1.1 Benchmark

- (a) The Contractor shall be responsible for the true and proper setting-out of the Facilities in relation to bench marks, reference marks, and lines provided to it in writing by or on behalf of the Employer.
- (b) If, at any time during the progress of installation of the Facilities, any error shall appear in the position, level, or alignment of the Facilities, the Contractor shall forthwith notify the Project Manager of such error and, at its own expense, immediately rectify such error to the reasonable satisfaction of the Project Manager. If such error is based on incorrect data provided in writing by or on behalf of the Employer, the expense of rectifying the same shall be

borne by the Employer.

22.1.2 Contractor's Supervision

The Contractor shall give or provide all necessary superintendence during the installation of the Facilities, and the Construction Manager or its deputy shall be constantly on the Site to provide full-time superintendence of the installation. The Contractor shall provide and employ only technical personnel who are skilled and experienced in their respective callings and supervisory staff who are competent to adequately supervise the work at hand.

22.2 Labor

22.2.1 Engagement of Staff and Labor

- (a) Except as otherwise stated in the Specification, the Contractor shall make arrangements for the engagement of all staff and labor, local or otherwise, and for their payment, housing, feeding, and transport.
- (b) The Contractor shall provide and employ on the Site in the installation of the Facilities such skilled, semi-skilled, and unskilled labor as is necessary for the proper and timely execution of the Contract. The Contractor is encouraged to use local labor that has the necessary skills.
- (c) The Contractor shall be responsible for obtaining all necessary permit(s) and/or visa(s) from the appropriate authorities for the entry of all labor and personnel to be employed on the Site into the country where the Site is located. The Employer will, if requested by the Contractor, use his best endeavors in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national, or government permission required for bringing in the Contractor's personnel.
- (d) The Contractor shall at its own expense provide the means of repatriation to all of its and its Subcontractor's personnel employed on the Contract at the Site to the place where they were recruited or to their domicile. It shall also provide suitable temporary maintenance of all such persons from the cessation of their employment on the Contract to the date programmed for their departure. In the event that the Contractor defaults in providing such means of transportation and temporary maintenance, the Employer may provide the same to such personnel and recover the cost of doing so from the Contractor.

22.2.2 Persons in the Service of Employer

The Contractor shall not recruit, or attempt to recruit, staff and labor from amongst the Employer's Personnel.

22.2.3 Labor Laws

- (a) The Contractor shall comply with all the relevant labor

Laws applicable to the Contractor's Personnel, including Laws relating to their employment, health, safety, welfare, immigration, and emigration, and shall allow them all their legal rights.

- (b) The Contractor shall at all times during the progress of the Contract use its best endeavors to prevent any unlawful, riotous, or disorderly conduct or behavior by or amongst its employees and the labor of its Subcontractors.
- (c) The Contractor shall, in all dealings with its labor and the labor of its Subcontractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious, or other customs and all local laws and regulations pertaining to the employment of labor.

22.2.4 Rates of Wages and Conditions of Labor

- (a) The Contractor shall pay rates of wages, and observe conditions of labor, which are not lower than those established for the trade or industry where the work is carried out. If no established rates or conditions are applicable, the Contractor shall pay rates of wages and observe conditions which are not lower than the general level of wages and conditions observed locally by employers whose trade or industry is similar to that of the Contractor.
- (b) The Contractor shall inform the Contractor's Personnel about their liability to pay personal income taxes in the Country in respect of such of their salaries, wages, and allowances as are chargeable under the Laws for the time being in force, and the Contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such Laws.

22.2.5 Working Hours

- (a) No work shall be carried out on the Site on locally recognized days of rest, or outside the normal working hours stated in the SCC, unless
 - (i) otherwise stated in the Contract;
 - (ii) the Project Manager gives consent; or
 - (iii) the work is unavoidable, or necessary for the protection of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Project Manager.
- (b) If and when the Contractor considers it necessary to carry out work at night or on public holidays so as to meet the Time for Completion and requests the Project Manager's consent thereto, the Project Manager shall not unreasonably withhold such consent.
- (c) This Subclause shall not apply to any work which is customarily carried out by rotary or double shifts.

22.2.6 Facilities for Staff and Labor

- (a) Except as otherwise stated in the Specification, the Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's Personnel. The Contractor shall also provide facilities for the Employer's Personnel as stated in the Specification.
- (b) The Contractor shall not permit any of the Contractor's Personnel to maintain any temporary or permanent living quarters within the structures forming part of the Permanent Works.

22.2.7 Health and Safety

- (a) The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's Personnel. In collaboration with local health authorities, the Contractor shall ensure that medical staff, first aid facilities, sick bay, and ambulance service are available at all times at the Site and at any accommodation for Contractor's and Employer's Personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics.
- (b) The Contractor shall appoint an accident prevention officer at the Site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the performance of the Contract, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority.
- (c) The Contractor shall send to the Project Manager, details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning health, safety, and welfare of persons, and damage to property, as the Project Manager may reasonably require.

22.2.8 Funeral Arrangements

In the event of the death of any of the Contractor's personnel or accompanying members of their families, the Contractor shall be responsible for making the appropriate arrangements for their return or burial, unless otherwise specified in the SCC.

22.2.9 Records of Contractor's Personnel

The Contractor shall keep accurate records of the Contractor's personnel, including the number of each class of Contractor's Personnel on the Site and the names, ages, gender, hours worked, and wages paid to all workers. These records shall be summarized on a monthly basis in a form approved by the Project Manager and shall be available for inspection by the Project Manager until the Contractor has completed all work.

22.2.10 Supply of Foodstuff

The Contractor shall arrange for the provision of a sufficient supply of suitable food as may be stated in the Specification at reasonable prices for the Contractor's Personnel for the purposes of or in connection with the Contract.

22.2.11 Supply of Water

The Contractor shall, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of the Contractor's Personnel.

22.2.12 Measures against Insect and Pest Nuisance

The Contractor shall at all times take the necessary precautions to protect the Contractor's Personnel employed on the Site from insect and pest nuisance, and to reduce their danger to health. The Contractor shall comply with all the regulations of the local health authorities, including use of appropriate insecticide.

22.2.13 Alcoholic Liquor or Drugs

The Contractor shall not, otherwise than in accordance with the Laws of the Country, import, sell, give barter, or otherwise dispose of any alcoholic liquor or drugs, or permit or allow importation, sale, gift barter, or disposal by Contractor's Personnel.

22.2.14 Arms and Ammunition

The Contractor shall not give, barter, or otherwise dispose of, to any person, any arms or ammunition of any kind, or allow Contractor's Personnel to do so.

22.2.15 Prohibition of All Forms of Forced or Compulsory Labor

The contractor shall not employ "forced or compulsory labor" in any form. "Forced or compulsory labor" consists of all work or service, not voluntarily performed, that is extracted from an individual under threat of force or penalty.

22.2.16 Prohibition of Harmful Child Labor

The Contractor shall not employ any child to perform any work that is economically exploitative, or is likely to be hazardous to, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development.

22.3 Contractor's Equipment

22.3.1 All Contractor's Equipment brought by the Contractor onto the Site shall be deemed to be intended to be used exclusively for the execution of the Contract. The Contractor shall not remove the same from the Site without the Project Manager's consent that such Contractor's Equipment is no longer required for the execution of the Contract.

22.3.2 Unless otherwise specified in the Contract, upon completion of the Facilities, the Contractor shall remove from the Site all Equipment brought by the Contractor onto the Site and any surplus materials remaining thereon.

- 22.3.3 The Employer will, if requested, use its best endeavors to assist the Contractor in obtaining any local, state or national government permission required by the Contractor for the export of the Contractor's Equipment imported by the Contractor for use in the execution of the Contract that is no longer required for the execution of the Contract.

22.4 Site Regulations and Safety

The Employer and the Contractor shall establish Site regulations setting out the rules to be observed in the execution of the Contract at the Site and shall comply therewith. The Contractor shall prepare and submit to the Employer, with a copy to the Project Manager, proposed Site regulations for the Employer's approval, which approval shall not be unreasonably withheld.

Such Site regulations shall include, but shall not be limited to, rules in respect of security, safety of the Facilities, gate control, sanitation, medical care, and fire prevention.

22.5 Opportunities for Other Contractors

- 22.5.1 The Contractor shall, upon written request from the Employer or the Project Manager, give all reasonable opportunities for carrying out the work to any other contractors employed by the Employer on or near the Site.

- 22.5.2 If the Contractor, upon written request from the Employer or the Project Manager, makes available to other contractors any roads or ways the maintenance for which the Contractor is responsible, permits the use by such other contractors of the Contractor's Equipment, or provides any other service of whatsoever nature for such other contractors, the Employer shall fully compensate the Contractor for any loss or damage caused or occasioned by such other contractors in respect of any such use or service, and shall pay to the Contractor reasonable remuneration for the use of such equipment or the provision of such services.

- 22.5.3 The Contractor shall also so arrange to perform its work as to minimize, to the extent possible, interference with the work of other contractors. The Project Manager shall determine the resolution of any difference or conflict that may arise between the Contractor and other contractors and the workers of the Employer in regard to their work.

- 22.5.4 The Contractor shall notify the Project Manager promptly of any defects in the other Contractors' work that come to its notice, and that could affect the Contractor's work. The Project Manager shall determine the corrective measures, if any, required to rectify the situation after inspection of the Facilities. Decisions made by the Project Manager shall be binding on the Contractor.

22.6 Emergency Work

If, by reason of an emergency arising in connection with and during the execution of the Contract, any protective or remedial work is necessary as a matter of urgency to prevent damage to the Facilities, the

Contractor shall immediately carry out such work.

If the Contractor is unable or unwilling to do such work immediately, the Employer may do or cause such work to be done as the Employer may determine is necessary in order to prevent damage to the Facilities. In such event the Employer shall, as soon as practicable after the occurrence of any such emergency, notify the Contractor in writing of such emergency, the work done and the reasons therefor. If the work done or caused to be done by the Employer is work that the Contractor was liable to do at its own expense under the Contract, the reasonable costs incurred by the Employer in connection therewith shall be paid by the Contractor to the Employer. Otherwise, the cost of such remedial work shall be borne by the Employer.

22.7 Site Clearance

22.7.1 Site Clearance in Course of Performance

In the course of carrying out the Contract, the Contractor shall keep the Site reasonably free from all unnecessary obstruction, store, or remove any surplus materials, clear away any wreckage, rubbish, or temporary works from the Site, and remove any Contractor's Equipment no longer required for execution of the Contract.

22.7.2 Clearance of Site after Completion

After Completion of all parts of the Facilities, the Contractor shall clear away and remove all wreckage, rubbish, and debris of any kind from the Site, and shall leave the Site and Facilities in a clean and safe condition.

22.8 Watching and Lighting

The Contractor shall provide and maintain at its own expense all lighting, fencing, and watching when and where necessary for the proper execution and the protection of the Facilities, or for the safety of the owners and occupiers of adjacent property and for the safety of the public.

23. Test and Inspection

- 23.1** The Contractor shall at its own expense carry out at the place of manufacture and/or on the Site all such tests and/or inspections of the Plant and any part of the Facilities as are specified in the Contract.
- 23.2** The Employer and the Project Manager or their designated representatives shall be entitled to attend the aforesaid test and/or inspection, provided that the Employer shall bear all costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.
- 23.3** Whenever the Contractor is ready to carry out any such test and/or inspection, the Contractor shall give a reasonable advance notice of such test and/or inspection and of the place and time thereof to the Project Manager. The Contractor shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Employer and the Project Manager or their designated representatives to attend the test and/or inspection.

- 23.4 The Contractor shall provide the Project Manager with a certified report of the results of any such test and/or inspection.

If the Employer or Project Manager or their designated representatives fails to attend the test and/or inspection, or if it is agreed between the parties that such persons shall not do so, then the Contractor may proceed with the test and/or inspection in the absence of such persons, and may provide the Project Manager with a certified report of the results thereof.

- 23.5 The Project Manager may require the Contractor to carry out any test and/or inspection not required by the Contract, provided that the Contractor's reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impedes the progress of work on the Facilities and/or the Contractor's performance of its other obligations under the Contract, due allowance will be made in respect of the Time for Completion and the other obligations so affected.

- 23.6 If any Plant or any part of the Facilities fails to pass any test and/or inspection, the Contractor shall either rectify or replace such Plant or part of the Facilities and shall repeat the test and/or inspection upon giving a notice under GCC Subclause 23.3.

- 23.7 If any dispute or difference of opinion shall arise between the parties in connection with or arising out of the test and/or inspection of the Plant or part of the Facilities that cannot be settled between the parties within a reasonable period of time, it may be referred to a Dispute Board for determination in accordance with GCC Subclause 45.3.

- 23.8 The Contractor shall afford the Employer and the Project Manager, at the Employer's expense, access at any reasonable time to any place where the Plant are being manufactured or the Facilities are being installed, in order to inspect the progress and the manner of manufacture or installation, provided that the Project Manager shall give the Contractor a reasonable prior notice.

- 23.9 The Contractor agrees that neither the execution of a test and/or inspection of Plant or any part of the Facilities, nor the attendance by the Employer or the Project Manager, nor the issue of any test certificate pursuant to GCC Subclause 23.4, shall release the Contractor from any other responsibilities under the Contract.

- 23.10 No part of the Facilities or foundations shall be covered up on the Site without the Contractor carrying out any test and/or inspection required under the Contract. The Contractor shall give a reasonable notice to the Project Manager whenever any such parts of the Facilities or foundations are ready or about to be ready for test and/or inspection; such test and/or inspection and notice thereof shall be subject to the requirements of the Contract.

- 23.11 The Contractor shall uncover any part of the Facilities or foundations, or shall make openings in or through the same as the Project Manager may from time to time require at the Site, and shall reinstate and make good such part or parts.

If any parts of the Facilities or foundations have been covered up at the Site after compliance with the requirement of GCC Subclause 23.10 and are found to be executed in accordance with the Contract, the expenses of uncovering, making openings in or through, reinstating, and making good the same shall be borne by the Employer, and the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been delayed or impeded in the performance of any of its obligations under the Contract.

24. Completion of the Facilities

24.1 As soon as the Facilities or any part thereof has, in the opinion of the Contractor, been completed operationally and structurally and put in a tight and clean condition as specified in the Employer's Requirements, excluding minor items not materially affecting the operation or safety of the Facilities, the Contractor shall so notify the Employer in writing.

24.2 Within 7 days after receipt of the notice from the Contractor under GCC Subclause 24.1, the Employer shall supply the operating and maintenance personnel specified in the Appendix (Scope of Works and Supply by the Employer) to the Contract Agreement for Pre-commissioning of the Facilities or any part thereof.

Pursuant to the Appendix (Scope of Works and Supply by the Employer) to the Contract Agreement, the Employer shall also provide, within the said 7-day period, the raw materials, utilities, lubricants, chemicals, catalysts, facilities, services, and other matters required for Pre-commissioning of the Facilities or any part thereof.

24.3 As soon as reasonably practicable after the operating and maintenance personnel have been supplied by the Employer and the raw materials, utilities, lubricants, chemicals, catalysts, facilities, services, and other matters have been provided by the Employer in accordance with GCC Subclause 24.2, the Contractor shall commence Pre-commissioning of the Facilities or the relevant part thereof in preparation for Commissioning, subject to GCC Subclause 25.5.

24.4 As soon as all works in respect of Pre-commissioning are completed and, in the opinion of the Contractor, the Facilities or any part thereof is ready for Commissioning, the Contractor shall so notify the Project Manager in writing.

24.5 The Project Manager shall, within 14 days after receipt of the Contractor's notice under GCC Subclause 24.4, either issue a Completion Certificate in the form specified in the Employer's Requirements (Forms and Procedures), stating that the Facilities or that part thereof have reached Completion as of the date of the Contractor's notice under GCC Subclause 24.4, or notify the Contractor in writing of any defects and/or deficiencies.

If the Project Manager notifies the Contractor of any defects and/or deficiencies, the Contractor shall then correct such defects and/or deficiencies, and shall repeat the procedure described in GCC Subclause 24.4.

If the Project Manager is satisfied that the Facilities or that part thereof have reached Completion, the Project Manager shall, within 7 days after receipt of the Contractor's repeated notice, issue a Completion Certificate stating that the Facilities or that part thereof have reached

Completion as of the date of the Contractor's repeated notice.

If the Project Manager is not so satisfied, then it shall notify the Contractor in writing of any defects and/or deficiencies within 7 days after receipt of the Contractor's repeated notice, and the above procedure shall be repeated.

24.6 If the Project Manager fails to issue the Completion Certificate and fails to inform the Contractor of any defects and/or deficiencies within 14 days after receipt of the Contractor's notice under GCC Subclause 24.4 or within 7 days after receipt of the Contractor's repeated notice under GCC Subclause 24.5, or if the Employer makes use of the Facilities or part thereof, then the Facilities or that part thereof shall be deemed to have reached Completion as of the date of the Contractor's notice or repeated notice, or as of the Employer's use of the Facilities, as the case may be.

24.7 As soon as possible after Completion, the Contractor shall complete all outstanding minor items so that the Facilities are fully in accordance with the requirements of the Contract, failing which the Employer will undertake such completion and deduct the costs thereof from any monies owing to the Contractor.

24.8 Upon Completion, the Employer shall be responsible for the care and custody of the Facilities or the relevant part thereof, together with the risk of loss or damage thereto, and shall thereafter take over the Facilities or the relevant part thereof.

**25. Commissioning
and Operational
Acceptance**

25.1 Commissioning

25.1.1 Commissioning of the Facilities or any part thereof shall be commenced by the Contractor immediately after issue of the Completion Certificate by the Project Manager, pursuant to GCC Subclause 24.5, or immediately after the date of the deemed Completion, under GCC Subclause 24.6.

25.1.2 The Employer shall supply the operating and maintenance personnel and all raw materials, utilities, lubricants, chemicals, catalysts, facilities, services, and other matters required for Commissioning.

25.1.3 In accordance with the requirements of the Contract, the Contractor's and Project Manager's advisory personnel shall attend the Commissioning, including the Guarantee Test, and shall advise and assist the Employer.

25.2 Guarantee Test

25.2.1 Subject to GCC Subclause 25.5, the Guarantee Test and repeats thereof shall be conducted by the Contractor during Commissioning of the Facilities or the relevant part thereof to ascertain whether the Facilities or the relevant part can attain the Functional Guarantees specified in the Appendix (Functional Guarantees) to the Contract Agreement. The Employer shall promptly provide the Contractor with such information as the Contractor may reasonably require in relation to the conduct and

results of the Guarantee Test and any repeats thereof.

25.2.2 If for reasons not attributable to the Contractor, the Guarantee Test of the Facilities or the relevant part thereof cannot be successfully completed within the period from the date of Completion specified in the SCC or any other period agreed upon by the Employer and the Contractor, the Contractor shall be deemed to have fulfilled its obligations with respect to the Functional Guarantees, and GCC Subclauses 28.2 and 28.3 shall not apply.

25.3 Operational Acceptance

25.3.1 Subject to GCC Subclause 25.4 below, Operational Acceptance shall occur in respect of the Facilities or any part thereof when

- (a) the Guarantee Test has been successfully completed and the Functional Guarantees are met; or
- (b) the Guarantee Test has not been successfully completed or has not been carried out for reasons not attributable to the Contractor within the period from the date of Completion specified in the SCC, or any other agreed upon period as specified in GCC Subclause 25.2.2 above; or
- (c) the Contractor has paid the liquidated damages specified in GCC Subclause 28.3 hereof; and
- (d) any minor items mentioned in GCC Subclause 24.7 hereof relevant to the Facilities or that part thereof have been completed.

25.3.2 At any time after any of the events set out in GCC Subclause 25.3.1 have occurred, the Contractor may give a notice to the Project Manager requesting the issue of an Operational Acceptance Certificate in the form provided in the Employer's Requirements (Forms and Procedures) in respect of the Facilities or the part thereof specified in such notice as of the date of such notice.

25.3.3 The Project Manager shall, after consultation with the Employer, and within 7 days after receipt of the Contractor's notice, issue an Operational Acceptance Certificate.

25.3.4 If within 7 days after receipt of the Contractor's notice, the Project Manager fails to issue the Operational Acceptance Certificate or fails to inform the Contractor in writing of the justifiable reasons why the Project Manager has not issued the Operational Acceptance Certificate, the Facilities or the relevant part thereof shall be deemed to have been accepted as of the date of the Contractor's said notice.

25.4 Partial Acceptance

25.4.1 If the Contract specifies that Completion and Commissioning shall be carried out in respect of parts of the Facilities, the provisions relating to Completion and Commissioning including the Guarantee Test shall apply to each such part of the Facilities individually, and the Operational Acceptance Certificate shall be

issued accordingly for each such part of the Facilities.

25.4.2 If a part of the Facilities comprises facilities such as buildings, for which no Commissioning or Guarantee Test is required, then the Project Manager shall issue the Operational Acceptance Certificate for such facility when it attains Completion, provided that the Contractor shall thereafter complete any outstanding minor items that are listed in the Operational Acceptance Certificate.

25.5 Delayed Pre-Commissioning and/or Guarantee Test

25.5.1 In the event that the Contractor is unable to proceed with the Pre-commissioning of the Facilities pursuant to Subclause 24.3, or with the Guarantee Test pursuant to Subclause 25.2, for reasons attributable to the Employer either on account of non availability of other facilities under the responsibilities of other contractor(s), or for reasons beyond the Employer's control, the provisions leading to "deemed" completion of activities such as Completion, pursuant to GCC Subclause 24.6, and Operational Acceptance, pursuant to GCC Subclause 25.3.4, and Contractor's obligations regarding Defect Liability Period, pursuant to GCC Subclause 27.2, Functional Guarantee, pursuant to GCC Clause 28, and Care of Facilities, pursuant to GCC Clause 32, and GCC Clause 41.1, Suspension, shall not apply. In this case, the following provisions shall apply.

25.5.2 When the Contractor is notified by the Project Manager that he will be unable to proceed with the activities and obligations pursuant to above Subclause 25.5.1, the Contractor shall be entitled to the following:

- (a) the Time of Completion shall be extended for the period of suspension without imposition of liquidated damages pursuant to GCC Subclause 26.2;
- (b) payments due to the Contractor in accordance with the provision specified in the Appendix (Terms and Procedures of Payment) to the Contract Agreement, which would not have been payable in normal circumstances due to noncompletion of the subject activities, shall be released to the Contractor against submission of a security in the form of a bank guarantee of equivalent amount acceptable to the Employer, and which shall become null and void when the Contractor will have complied with its obligations regarding those payments, subject to the provision of Subclause 25.5.3 below;
- (c) the expenses towards the above security and extension of other securities under the contract, of which validity needs to be extended, shall be reimbursed to the Contractor by the Employer;
- (d) the additional charges towards the care of the Facilities pursuant to GCC Subclause 32.1 shall be reimbursed to

the Contractor by the Employer for the period between the notification mentioned above and the notification mentioned in Subclause 25.5.4 below. The provision of GCC Subclause 33.2 shall apply to the Facilities during the same period.

25.5.3 In the event that the period of suspension under above Subclause 25.5.1 actually exceeds 180 days, the Employer and Contractor shall mutually agree to any additional compensation payable to the Contractor.

25.5.4 When the Contractor is notified by the Project Manager that the plant is ready for Pre-commissioning, the Contractor shall proceed without delay in performing all the specified activities and obligations under the contract.

F. Guarantees and Liabilities

26. Completion Time Guarantee

26.1 The Contractor guarantees that it shall attain Completion of the Facilities (or a part for which a separate time for completion is specified) within the Time for Completion specified in the SCC pursuant to GCC Subclause 8.2, or within such extended time to which the Contractor shall be entitled under GCC Clause 40 hereof.

26.2 If the Contractor fails to attain Completion of the Facilities or any part thereof within the Time for Completion or any extension thereof under GCC Clause 40, the Contractor shall pay to the Employer liquidated damages in the amount specified in the SCC as a percentage rate of the Contract Price or the relevant part thereof. The aggregate amount of such liquidated damages shall in no event exceed the amount specified as "Maximum" in the SCC as a percentage rate of the Contract Price. Once the "Maximum" is reached, the Employer may consider termination of the Contract, pursuant to GCC Subclause 42.2.2.

Such payment shall completely satisfy the Contractor's obligation to attain Completion of the Facilities or the relevant part thereof within the Time for Completion or any extension thereof under GCC Clause 40. The Contractor shall have no further liability whatsoever to the Employer in respect thereof.

However, the payment of liquidated damages shall not in any way relieve the Contractor from any of its obligations to complete the Facilities or from any other obligations and liabilities of the Contractor under the Contract.

Save for liquidated damages payable under this GCC Subclause 26.2, the failure by the Contractor to attain any milestone or other act, matter or thing by any date specified in the Appendix (Time Schedule) to the Contract Agreement and/or other program of work prepared pursuant to GCC Subclause 18.2 shall not render the Contractor liable for any loss or damage thereby suffered by the Employer.

- 26.3 If the Contractor attains Completion of the Facilities or any part thereof before the Time for Completion or any extension thereof under GCC Clause 40, the Employer shall pay to the Contractor a bonus in the amount specified in the SCC. The aggregate amount of such bonus shall in no event exceed the amount specified as "Maximum" in the SCC.

27. Defect Liability

- 27.1 The Contractor warrants that the Facilities or any part thereof shall be free from defects in the design, engineering, materials, and workmanship of the Plant supplied and of the work executed.

- 27.2 The Defect Liability Period shall be 540 days from the date of Completion of the Facilities (or any part thereof) or 1 year from the date of Operational Acceptance of the Facilities (or any part thereof), whichever first occurs, unless specified otherwise in the SCC pursuant to GCC Subclause 27.10.

If during the Defect Liability Period any defect should be found in the design, engineering, materials, and workmanship of the Plant supplied or of the work executed by the Contractor, the Contractor shall promptly, in consultation and agreement with the Employer regarding appropriate remedying of the defects, and at its cost, repair, replace, or otherwise make good as the Contractor shall determine at its discretion, such defect as well as any damage to the Facilities caused by such defect. The Contractor shall not be responsible for the repair, replacement, or making good of any defect or of any damage to the Facilities arising out of or resulting from any of the following causes:

- (a) improper operation or maintenance of the Facilities by the Employer,
- (b) operation of the Facilities outside specifications provided in the Contract, or
- (c) normal wear and tear.

- 27.3 The Contractor's obligations under this GCC Clause 27 shall not apply to:

- (a) any materials that are supplied by the Employer under GCC Subclause 21.2, are normally consumed in operation, or have a normal life shorter than the Defect Liability Period stated herein;
- (b) any designs, specifications or other data designed, supplied, or specified by or on behalf of the Employer or any matters for which the Contractor has disclaimed responsibility herein; or
- (c) any other materials supplied or any other work executed by or on behalf of the Employer, except for the work executed by the Employer under GCC Subclause 27.7.

- 27.4 The Employer shall give the Contractor a notice stating the nature of any such defect together with all available evidence thereof, promptly following the discovery thereof. The Employer shall afford all reasonable opportunity for the Contractor to inspect any such defect.

- 27.5 The Employer shall afford the Contractor all necessary access to the Facilities and the Site to enable the Contractor to perform its

obligations under this GCC Clause 27.

The Contractor may, with the consent of the Employer, remove from the Site any Plant or any part of the Facilities that are defective if the nature of the defect, and/or any damage to the Facilities caused by the defect, is such that repairs cannot be expeditiously carried out at the Site.

- 27.6 If the repair, replacement or making good is of such a character that it may affect the efficiency of the Facilities or any part thereof, the Employer may give to the Contractor a notice requiring that tests of the defective part of the Facilities shall be made by the Contractor immediately upon completion of such remedial work, whereupon the Contractor shall carry out such tests.

If such part fails the tests, the Contractor shall carry out further repair, replacement or making good, as the case may be, until that part of the Facilities passes such tests. The tests shall be agreed upon by the Employer and the Contractor.

- 27.7 If the Contractor fails to commence the work necessary to remedy such defect or any damage to the Facilities caused by such defect within a reasonable time (which shall in no event be considered to be less than 15 days), the Employer may, following notice to the Contractor, proceed to do such work, and the reasonable costs incurred by the Employer in connection therewith shall be paid to the Employer by the Contractor or may be deducted by the Employer from any monies due the Contractor or claimed under the Performance Security.

- 27.8 If the Facilities or any part thereof cannot be used by reason of such defect and/or making good of such defect, the Defect Liability Period of the Facilities or such part, as the case may be, shall be extended by a period equal to the period during which the Facilities or such part cannot be used by the Employer because of any of the aforesaid reasons.

- 27.9 Except as provided in GCC Clauses 27 and 33, the Contractor shall be under no liability whatsoever and howsoever arising, and whether under the Contract or at law, in respect of defects in the Facilities or any part thereof, the Plant, design, or engineering, or work executed that appear after Completion of the Facilities or any part thereof, except where such defects are the result of the gross negligence, fraud, criminal, or willful action of the Contractor.

- 27.10 In addition, any such component of the Facilities and during the period of time as may be specified in the SCC shall be subject to an extended Defect Liability Period. Such obligation of the Contractor shall be in addition to the Defect Liability Period specified under GCC Subclause 27.2.

28. Functional Guarantees

- 28.1 The Contractor guarantees that during the Guarantee Test, the Facilities and all parts thereof shall attain the Functional Guarantees specified in the Appendix (Functional Guarantees) to the Contract Agreement, subject to, and upon the conditions therein specified.

- 28.2 If, for reasons attributable to the Contractor, the minimum level of the Functional Guarantees specified in the Appendix (Functional

Guarantees) to the Contract Agreement are not met either in whole or in part, the Contractor shall at its cost and expense make such changes, modifications, and/or additions to the Plant or any part thereof as may be necessary to meet at least the minimum level of such Guarantees. The Contractor shall notify the Employer upon completion of the necessary changes, modifications, and/or additions, and shall request the Employer to repeat the Guarantee Test until the minimum level of the Guarantees has been met. If the Contractor eventually fails to meet the minimum level of Functional Guarantees, the Employer may consider termination of the Contract, pursuant to GCC Subclause 42.2.2.

- 28.3 If, for reasons attributable to the Contractor, the Functional Guarantees specified in the Appendix (Functional Guarantees) to the Contract Agreement are not attained either in whole or in part, but the minimum level of the Functional Guarantees specified in the said Appendix to the Contract Agreement is met, the Contractor shall, at the Contractor's option, either
- (a) make such changes, modifications, and/or additions to the Facilities or any part thereof that are necessary to attain the Functional Guarantees at its cost and expense, and shall request the Employer to repeat the Guarantee Test or
 - (b) pay liquidated damages to the Employer in respect of the failure to meet the Functional Guarantees in accordance with the provisions in the Appendix (Functional Guarantees) to the Contract Agreement.
- 28.4 The payment of liquidated damages under GCC Subclause 28.3, up to the limitation of liability specified in the Appendix (Functional Guarantees) to the Contract Agreement, shall completely satisfy the Contractor's guarantees under GCC Subclause 28.3, and the Contractor shall have no further liability whatsoever to the Employer in respect thereof. Upon the payment of such liquidated damages by the Contractor, the Project Manager shall issue the Operational Acceptance Certificate for the Facilities or any part thereof in respect of which the liquidated damages have been so paid.

29. Patent Indemnity

- 29.1 The Contractor shall, subject to the Employer's compliance with GCC Subclause 29.2, indemnify and hold harmless the Employer and its employees and officers from and against any and all suits, actions, or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, which the Employer may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract by reason of (a) the installation of the Facilities by the Contractor or the use of the Facilities in the country where the Site is located, and (b) the sale of the products produced by the Facilities in any country.

Such indemnity shall not cover any use of the Facilities or any part thereof other than for the purpose indicated by or to be reasonably inferred from the Contract, any infringement resulting from the use of the Facilities or any part thereof, or any products produced thereby in association or combination with any other equipment, plant, or materials not supplied by the Contractor, pursuant to the Contract

Agreement.

- 29.2 If any proceedings are brought or any claim is made against the Employer arising out of the matters referred to in GCC Subclause 29.1, the Employer shall promptly give the Contractor a notice thereof, and the Contractor may at its own expense and in the Employer's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

If the Contractor fails to notify the Employer within 28 days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Employer shall be free to conduct the same on its own behalf. Unless the Contractor has so failed to notify the Employer within the 28-day period, the Employer shall make no admission that may be prejudicial to the defense of any such proceedings or claim.

The Employer shall, at the Contractor's request, afford all available assistance to the Contractor in conducting such proceedings or claim, and shall be reimbursed by the Contractor for all reasonable expenses incurred in so doing.

- 29.3 The Employer shall indemnify and hold harmless the Contractor and its employees, officers, and Subcontractors from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, which the Contractor may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract arising out of or in connection with any design, data, drawing, specification, or other documents or materials provided or designed by or on behalf of the Employer.

30. Limitation of Liability

- 30.1 Except in cases of criminal negligence or willful misconduct,
- (a) the Contractor shall not be liable to the Employer, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Contractor to pay liquidated damages to the Employer, and
 - (b) the aggregate liability of the Contractor to the Employer, whether under the Contract, in tort or otherwise, shall not exceed a multiple of the Contract Price specified in the SCC or, if a multiple is not so specified, the total Contract Price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment, or to any obligation of the Contractor to indemnify the Employer with respect to patent infringement.

G. Risk Distribution

31. Transfer of Ownership

- 31.1 Ownership of the Plant (including spare parts) to be imported into the country where the Site is located shall be transferred to the Employer upon loading on to the mode of transport to be used to convey the

Plant from the country of origin to that country.

- 31.2 Ownership of the Plant (including spare parts) procured in the country where the Site is located shall be transferred to the Employer when the Plant are brought on to the Site.
- 31.3 Ownership of the Contractor's Equipment used by the Contractor and its Subcontractors in connection with the Contract shall remain with the Contractor or its Subcontractors.
- 31.4 Ownership of any Plant in excess of the requirements for the Facilities shall revert to the Contractor upon Completion of the Facilities or at such earlier time when the Employer and the Contractor agree that the Plant in question are no longer required for the Facilities.
- 31.5 Notwithstanding the transfer of ownership of the Plant, the responsibility for care and custody thereof together with the risk of loss or damage thereto shall remain with the Contractor pursuant to GCC Clause 32 (Care of Facilities) hereof until Completion of the Facilities or the part thereof in which such Plant are incorporated.

32. Care of Facilities

- 32.1 The Contractor shall be responsible for the care and custody of the Facilities or any part thereof until the date of Completion of the Facilities pursuant to GCC Clause 24 or, where the Contract provides for Completion of the Facilities in parts, until the date of Completion of the relevant part, and shall make good at its own cost any loss or damage that may occur to the Facilities or the relevant part thereof from any cause whatsoever during such period. The Contractor shall also be responsible for any loss or damage to the Facilities caused by the Contractor or its Subcontractors in the course of any work carried out, pursuant to GCC Clause 27. Notwithstanding the foregoing, the Contractor shall not be liable for any loss or damage to the Facilities or that part thereof caused by reason of any of the matters specified or referred to in paragraphs (a), (b) and (c) of GCC Subclauses 32.2 and 38.1.
- 32.2 If any loss or damage occurs to the Facilities or any part thereof or to the Contractor's temporary facilities by reason of
 - (a) insofar as they relate to the country where the Site is located, nuclear reaction, nuclear radiation, radioactive contamination, pressure wave caused by aircraft or other aerial objects, or any other occurrences that an experienced contractor could not reasonably foresee, or if reasonably foreseeable could not reasonably make provision for or insure against, insofar as such risks are not normally insurable on the insurance market and are mentioned in the general exclusions of the policy of insurance, including War Risks and Political Risks, taken out under GCC Clause 34 hereof; or
 - (b) any use or occupation by the Employer or any third party other than a Subcontractor, authorized by the Employer of any part of the Facilities; or
 - (c) any use of or reliance upon any design, data, or specification provided or designated by or on behalf of the Employer, or any such matter for which the Contractor has disclaimed

responsibility herein,

the Employer shall pay to the Contractor all sums payable in respect of the Facilities executed, notwithstanding that the same be lost, destroyed, or damaged, and will pay to the Contractor the replacement value of all temporary facilities and all parts thereof lost, destroyed, or damaged. If the Employer requests the Contractor in writing to make good any loss or damage to the Facilities thereby occasioned, the Contractor shall make good the same at the cost of the Employer in accordance with GCC Clause 39. If the Employer does not request the Contractor in writing to make good any loss or damage to the Facilities thereby occasioned, the Employer shall either request a change in accordance with GCC Clause 39, excluding the performance of that part of the Facilities thereby lost, destroyed or damaged, or, where the loss or damage affects a substantial part of the Facilities, the Employer shall terminate the Contract pursuant to GCC Subclause 42.1 hereof.

32.3 The Contractor shall be liable for any loss of or damage to any Contractor's Equipment, or any other property of the Contractor used or intended to be used for purposes of the Facilities, except (i) as mentioned in GCC Subclause 32.2 with respect to the Contractor's temporary facilities, and (ii) where such loss or damage arises by reason of any of the matters specified in GCC Subclauses 32.2 (b) and (c) and 38.1.

32.4 With respect to any loss or damage caused to the Facilities or any part thereof or to the Contractor's Equipment by reason of any of the matters specified in GCC Subclause 38.1, the provisions of GCC Subclause 38.3 shall apply.

**33. Loss of or
Damage to
Property;
Accident or Injury
to Workers;
Indemnification**

33.1 Subject to GCC Subclause 33.3, the Contractor shall indemnify and hold harmless the Employer and its employees and officers from and against any and all suits, actions, or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, in respect of the death or injury of any person or loss of or damage to any property other than the Facilities whether accepted or not, arising in connection with the supply and installation of the Facilities and by reason of the negligence of the Contractor or its Subcontractors, or their employees, officers, or agents, except any injury, death, or property damage caused by the negligence of the Employer, its contractors, employees, officers, or agents.

33.2 If any proceedings are brought or any claim is made against the Employer that might subject the Contractor to liability under GCC Subclause 33.1, the Employer shall promptly give the Contractor a notice thereof and the Contractor may at its own expense and in the Employer's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

If the Contractor fails to notify the Employer within 28 days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Employer shall be free to conduct the same on its own behalf. Unless the Contractor has so failed to notify the Employer within the 28-day period, the Employer shall make no admission that may be

prejudicial to the defense of any such proceedings or claim.

The Employer shall, at the Contractor's request, afford all available assistance to the Contractor in conducting such proceedings or claim, and shall be reimbursed by the Contractor for all reasonable expenses incurred in so doing.

33.3 The Employer shall indemnify and hold harmless the Contractor and its employees, officers, and Subcontractors from any liability for loss of or damage to property of the Employer, other than the Facilities not yet taken over, that is caused by fire, explosion, or any other perils, in excess of the amount recoverable from insurances procured under GCC Clause 34, provided that such fire, explosion, or other perils were not caused by any act or failure of the Contractor.

33.4 The party entitled to the benefit of an indemnity under this GCC Clause 33 shall take all reasonable measures to mitigate any loss or damage which has occurred. If the party fails to take such measures, the other party's liabilities shall be correspondingly reduced.

34. Insurance

34.1 To the extent specified in the Appendix (Insurance Requirements) to the Contract Agreement, the Contractor shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contract, the insurances set forth below in the sums and with the deductibles and other conditions specified in the said Appendix. The identity of the insurers and the form of the policies shall be subject to the approval of the Employer, who should not unreasonably withhold such approval.

(a) Cargo Insurance During Transport

Covering loss or damage occurring while in transit from the Contractor's or Subcontractor's works or stores until arrival at the Site, to the Plant (including spare parts therefor) and to the Contractor's Equipment.

(b) Installation All Risks Insurance

Covering physical loss or damage to the Facilities at the Site, occurring prior to Completion of the Facilities, with an extended maintenance coverage for the Contractor's liability in respect of any loss or damage occurring during the Defect Liability Period while the Contractor is on the Site for the purpose of performing its obligations during the Defect Liability Period.

(c) Third Party Liability Insurance

Covering bodily injury or death suffered by third parties including the Employer's personnel, and loss of or damage to property occurring in connection with the supply and installation of the Facilities.

(d) Automobile Liability Insurance

Covering use of all vehicles used by the Contractor or its Subcontractors, whether or not owned by them, in connection with the execution of the Contract.

(e) Workers' Compensation

In accordance with the statutory requirements applicable in any country where the Contract or any part thereof is executed.

(f) Employer's Liability

In accordance with the statutory requirements applicable in any country where the Contract or any part thereof is executed.

(g) Other Insurances

Such other insurances as may be specifically agreed upon by the parties hereto as listed in the Appendix (Insurance Requirements) to the Contract Agreement.

34.2 The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GCC Subclause 34.1, except for the Third Party Liability, Workers' Compensation, and Employer's Liability Insurances, and the Contractor's Subcontractors shall be named as co-insureds under all insurance policies taken out by the Contractor pursuant to GCC Subclause 34.1 except for the Cargo Insurance During Transport, Workers' Compensation, and Employer's Liability Insurances. All insurer's rights of subrogation against such co-insureds for losses or claims arising out of the performance of the Contract shall be waived under such policies.

34.3 The Contractor shall, in accordance with the provisions of the Appendix (Insurance Requirements) to the Contract Agreement, deliver to the Employer certificates of insurance or copies of the insurance policies as evidence that the required policies are in full force and effect. The certificates shall provide that no less than 21 days' notice shall be given to the Employer by insurers prior to cancellation or material modification of a policy.

34.4 The Contractor shall ensure that, where applicable, its Subcontractor(s) shall take out and maintain in effect adequate insurance policies for their personnel and vehicles and for work executed by them under the Contract, unless such Subcontractors are covered by the policies taken out by the Contractor.

34.5 The Employer shall at its expense take out and maintain in effect during the performance of the Contract those insurances specified in the Appendix (Insurance Requirements) to the Contract Agreement, in the sums and with the deductibles and other conditions specified in the said Appendix. The Contractor and the Contractor's Subcontractors shall be named as co-insureds under all such policies. All insurers' rights of subrogation against such co-insureds for losses or claims arising out of the performance of the Contract shall be waived under such policies. The Employer shall deliver to the Contractor satisfactory evidence that the required insurances are in full force and effect. The policies shall provide that not less than 21 days' notice shall be given to the Contractor by all insurers prior to any cancellation or material modification of the policies. If so requested by the Contractor, the Employer shall provide copies of the policies taken out by the Employer under this GCC Subclause 34.5.

- 34.6 If the Contractor fails to take out and/or maintain in effect the insurances referred to in GCC Subclause 34.1, the Employer may take out and maintain in effect any such insurances and may from time to time deduct from any amount due the Contractor under the Contract any premium that the Employer shall have paid to the insurer, or may otherwise recover such amount as a debt due from the Contractor. If the Employer fails to take out and/or maintain in effect the insurances referred to in GCC 34.5, the Contractor may take out and maintain in effect any such insurances and may from time to time deduct from any amount due the Employer under the Contract any premium that the Contractor shall have paid to the insurer, or may otherwise recover such amount as a debt due from the Employer. If the Contractor fails to or is unable to take out and maintain in effect any such insurances, the Contractor shall nevertheless have no liability or responsibility towards the Employer, and the Contractor shall have full recourse against the Employer for any and all liabilities of the Employer herein.
- 34.7 Unless otherwise provided in the Contract, the Contractor shall prepare and conduct all and any claims made under the policies effected by it pursuant to this GCC Clause 34, and all monies payable by any insurers shall be paid to the Contractor. The Employer shall give to the Contractor all such reasonable assistance as may be required by the Contractor. With respect to insurance claims in which the Employer's interest is involved, the Contractor shall not give any release or make any compromise with the insurer without the prior written consent of the Employer. With respect to insurance claims in which the Contractor's interest is involved, the Employer shall not give any release or make any compromise with the insurer without the prior written consent of the Contractor.

**35. Unforeseen
Conditions**

- 35.1 If, during the execution of the Contract, the Contractor shall encounter on the Site any physical conditions other than climatic conditions, or artificial obstructions that could not have been reasonably foreseen prior to the date of the Contract Agreement by an experienced contractor on the basis of reasonable examination of the data relating to the Facilities including any data as to boring tests, provided by the Employer, and on the basis of information that it could have obtained from a visual inspection of the Site if access thereto was available, or other data readily available to it relating to the Facilities, and if the Contractor determines that it will in consequence of such conditions or obstructions incur additional cost and expense or require additional time to perform its obligations under the Contract that would not have been required if such physical conditions or artificial obstructions had not been encountered, the Contractor shall promptly, and before performing additional work or using additional Plant or Contractor's Equipment, notify the Project Manager in writing of
- (a) the physical conditions or artificial obstructions on the Site that could not have been reasonably foreseen;
 - (b) the additional work and/or Plant and/or Contractor's Equipment required, including the steps which the Contractor will or proposes to take to overcome such conditions or obstructions;
 - (c) the extent of the anticipated delay; and

- (d) the additional cost and expense that the Contractor is likely to incur.

On receiving any notice from the Contractor under this GCC Subclause 35.1, the Project Manager shall promptly consult with the Employer and Contractor and decide upon the actions to be taken to overcome the physical conditions or artificial obstructions encountered. Following such consultations, the Project Manager shall instruct the Contractor, with a copy to the Employer, of the actions to be taken.

35.2 Any reasonable additional cost and expense incurred by the Contractor in following the instructions from the Project Manager to overcome such physical conditions or artificial obstructions referred to in GCC Subclause 35.1 shall be paid by the Employer to the Contractor as an addition to the Contract Price.

35.3 If the Contractor is delayed or impeded in the performance of the Contract because of any such physical conditions or artificial obstructions referred to in GCC Subclause 35.1, the Time for Completion shall be extended in accordance with GCC Clause 40.

36. Change in Laws and Regulations

36.1 If, after the date 28 days prior to the date of Bid submission, in the country where the Site is located, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated, or changed, which shall be deemed to include any change in interpretation or application by the competent authorities, that subsequently affects the costs and expenses of the Contractor and/or the Time for Completion, the Contract Price shall be correspondingly increased or decreased, and/or the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been affected in the performance of any of its obligations under the Contract. Notwithstanding the foregoing, such additional or reduced costs shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable, in accordance with the SCC, pursuant to GCC Subclause 11.2.

37. Force Majeure

37.1 "Force Majeure" shall mean any event beyond the reasonable control of the Employer or of the Contractor, as the case may be, and which is unavoidable notwithstanding the reasonable care of the party affected, and shall include, without limitation, the following:

- (a) war, hostilities, or warlike operations whether a state of war be declared or not, invasion, act of foreign enemy and civil war;
- (b) rebellion, revolution, insurrection, mutiny, usurpation of civil or military government, conspiracy, riot, civil commotion, and terrorist acts;
- (c) confiscation, nationalization, mobilization, commandeering or requisition by or under the order of any government or de jure or de facto authority or ruler or any other act or failure to act of any local state or national government authority;
- (d) strike, sabotage, lockout, embargo, import restriction, port congestion, lack of usual means of public transportation and communication, industrial dispute, shipwreck, shortage or

restriction of power supply, epidemics, quarantine, and plague;

- (e) earthquake, landslide, volcanic activity, fire, flood or inundation, tidal wave, typhoon or cyclone, hurricane, storm, lightning, or other inclement weather condition, nuclear, and pressure waves or other natural or physical disaster; and
- (f) shortage of labor, materials, or utilities where caused by circumstances that are themselves Force Majeure.

37.2 If either party is prevented, hindered, or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within 14 days after the occurrence of such event.

37.3 The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered, or delayed. The Time for Completion shall be extended in accordance with GCC Clause 40.

37.4 The party or parties affected by the event of Force Majeure shall use reasonable efforts to mitigate the effect thereof upon its or their performance of the Contract and to fulfill its or their obligations under the Contract, but without prejudice to either party's right to terminate the Contract under GCC Subclauses 37.6 and 38.5.

37.5 No delay or nonperformance by either party hereto caused by the occurrence of any event of Force Majeure shall

- (a) constitute a default or breach of the Contract; or
- (b) give rise to any claim for damages or additional cost or expense occasioned thereby, subject to GCC Subclauses 32.2, 38.3 and 38.4

if and to the extent that such delay or nonperformance is caused by the occurrence of an event of Force Majeure.

37.6 If the performance of the Contract is substantially prevented, hindered, or delayed for a single period of more than 60 days or an aggregate period of more than 120 days on account of one or more events of Force Majeure during the currency of the Contract, the parties will attempt to develop a mutually satisfactory solution, failing which either party may terminate the Contract by giving a notice to the other, but without prejudice to either party's right to terminate the Contract under GCC Subclause 38.5.

37.7 In the event of termination pursuant to GCC Subclause 37.6, the rights and obligations of the Employer and the Contractor shall be as specified in GCC Subclauses 42.1.2 and 42.1.3.

37.8 Notwithstanding GCC Subclause 37.5, Force Majeure shall not apply to any obligation of the Employer to make payments to the Contractor herein.

38. War Risks

38.1 "War Risks" shall mean any event specified in paragraphs (a) and (b) of GCC Subclause 37.1 and any explosion or impact of any mine, bomb, shell, grenade, or other projectile, missile, munitions or explosive of war, occurring or existing in or near the country (or countries) where the Site is located.

38.2 Notwithstanding anything contained in the Contract, the Contractor shall have no liability whatsoever for or with respect to

- (a) destruction of or damage to Facilities, Plant, or any part thereof;
- (b) destruction of or damage to property of the Employer or any third party; or
- (c) injury or loss of life

if such destruction, damage, injury or loss of life is caused by any war risks, and the Employer shall indemnify and hold the Contractor harmless from and against any and all claims, liabilities, actions, lawsuits, damages, costs, charges, or expenses arising in consequence of or in connection with the same.

38.3 If the Facilities or any Plant or Contractor's Equipment or any other property of the Contractor used or intended to be used for the purposes of the Facilities shall sustain destruction or damage by reason of any war risks, the Employer shall pay the Contractor for

- (a) any part of the Facilities or the Plant so destroyed or damaged to the extent not already paid for by the Employer and so far as may be required by the Employer, and as may be necessary for completion of the Facilities;
- (b) replacing or making good any Contractor's Equipment or other property of the Contractor so destroyed or damaged; and
- (c) replacing or making good any such destruction or damage to the Facilities or the Plant or any part thereof.

If the Employer does not require the Contractor to replace or make good any such destruction or damage to the Facilities, the Employer shall either request a change in accordance with GCC Clause 39, excluding the performance of that part of the Facilities thereby destroyed or damaged or, where the loss, destruction, or damage affects a substantial part of the Facilities, shall terminate the Contract, pursuant to GCC Subclause 42.1.

If the Employer requires the Contractor to replace or make good on any such destruction or damage to the Facilities, the Time for Completion shall be extended in accordance with GCC 40.

38.4 Notwithstanding anything contained in the Contract, the Employer shall pay the Contractor for any increased costs or incidentals to the execution of the Contract that are in any way attributable to, consequent on, resulting from, or in any way connected with any war risks, provided that the Contractor shall as soon as practicable notify the Employer in writing of any such increased cost.

38.5 If during the performance of the Contract any war risks shall occur that

financially or otherwise materially affect the execution of the Contract by the Contractor, the Contractor shall use its reasonable efforts to execute the Contract with due and proper consideration given to the safety of its and its Subcontractors' personnel engaged in the work on the Facilities, provided, however, that if the execution of the work on the Facilities becomes impossible or is substantially prevented for a single period of more than sixty (60) days or an aggregate period of more than one hundred and twenty (120) days on account of any war risks, the parties will attempt to develop a mutually satisfactory solution, failing which either party may terminate the Contract by giving a notice to the other.

- 38.6 In the event of termination pursuant to GCC Subclauses 38.3 or 38.5, the rights and obligations of the Employer and the Contractor shall be specified in GCC Subclauses 42.1.2 and 42.1.3.

H. Change in Contract Elements

39. Change in the Facilities

39.1 Introducing a Change

39.1.1 Subject to GCC Subclauses 39.2.5 and 39.2.7, the Employer shall have the right to propose, and subsequently require, that the Project Manager order the Contractor from time to time during the performance of the Contract to make any change, modification, addition, or deletion to, in or from the Facilities hereinafter called "Change," provided that such Change falls within the general scope of the Facilities and does not constitute unrelated work and that it is technically practicable, taking into account both the state of advancement of the Facilities and the technical compatibility of the Change envisaged with the nature of the Facilities as specified in the Contract.

39.1.2 The Contractor may from time to time during its performance of the Contract propose to the Employer with a copy to the Project Manager, any Change that the Contractor considers necessary or desirable to improve the quality, efficiency, or safety of the Facilities. The Employer may at its discretion approve or reject any Change proposed by the Contractor, provided that the Employer shall approve any Change proposed by the Contractor to ensure the safety of the Facilities.

39.1.3 Notwithstanding GCC Subclauses 39.1.1 and 39.1.2, no change made necessary because of any default of the Contractor in the performance of its obligations under the Contract shall be deemed to be a Change, and such change shall not result in any adjustment of the Contract Price or the Time for Completion.

39.1.4 The procedure on how to proceed with and execute Changes is specified in GCC Subclauses 39.2 and 39.3, and further details and forms are provided in the Employer's Requirements (Forms and Procedures).

39.2 Changes Originating from Employer

39.2.1 If the Employer proposes a Change pursuant to GCC Subclause 39.1.1, it shall send to the Contractor a "Request for Change

Proposal,” requiring the Contractor to prepare and furnish to the Project Manager as soon as reasonably practicable a “Change Proposal,” which shall include the following:

- (a) brief description of the Change,
- (b) effect on the Time for Completion,
- (c) estimated cost of the Change,
- (d) effect on Functional Guarantees (if any),
- (e) effect on the Facilities, and
- (f) effect on any other provisions of the Contract.

39.2.2 Prior to preparing and submitting the “Change Proposal,” the Contractor shall submit to the Project Manager an “Estimate for Change Proposal,” which shall be an estimate of the cost of preparing and submitting the Change Proposal.

Upon receipt of the Contractor’s Estimate for Change Proposal, the Employer shall do one of the following:

- (a) accept the Contractor’s estimate with instructions to the Contractor to proceed with the preparation of the Change Proposal,
- (b) advise the Contractor of any part of its Estimate for Change Proposal that is unacceptable and request the Contractor to review its estimate
- (c) advise the Contractor that the Employer does not intend to proceed with the Change.

39.2.3 Upon receipt of the Employer’s instruction to proceed under GCC Subclause 39.2.2 (a), the Contractor shall, with proper expedition, proceed with the preparation of the Change Proposal, in accordance with GCC Subclause 39.2.1.

39.2.4 The pricing of any Change shall, as far as practicable, be calculated in accordance with the rates and prices included in the Contract. If such rates and prices are inequitable, the parties thereto shall agree on specific rates for the valuation of the Change.

39.2.5 If before or during the preparation of the Change Proposal it becomes apparent that the aggregate effect of compliance therewith and with all other Change Orders that have already become binding upon the Contractor under this GCC Clause 39 would be to increase or decrease the Contract Price as originally set forth in Article 2 (Contract Price) of the Contract Agreement by more than 15%, the Contractor may give a written notice of objection thereto prior to furnishing the Change Proposal as aforesaid. If the Employer accepts the Contractor’s objection, the Employer shall withdraw the proposed Change and shall

notify the Contractor in writing thereof.

The Contractor's failure to so object shall neither affect its right to object to any subsequent requested Changes or Change Orders herein, nor affect its right to take into account, when making such subsequent objection, the percentage increase or decrease in the Contract Price that any Change not objected to by the Contractor represents.

- 39.2.6 Upon receipt of the Change Proposal, the Employer and the Contractor shall mutually agree upon all matters therein contained. Within 14 days after such agreement, the Employer shall, if it intends to proceed with the Change, issue the Contractor with a Change Order.

If the Employer is unable to reach a decision within 14 days, it shall notify the Contractor with details of when the Contractor can expect a decision.

If the Employer decides not to proceed with the Change for whatever reason, it shall, within the said period of 14 days, notify the Contractor accordingly. Under such circumstances, the Contractor shall be entitled to reimbursement of all costs reasonably incurred by it in the preparation of the Change Proposal, provided that these do not exceed the amount given by the Contractor in its Estimate for Change Proposal submitted in accordance with GCC Subclause 39.2.2.

- 39.2.7 If the Employer and the Contractor cannot reach agreement on the price for the Change, an equitable adjustment to the Time for Completion, or any other matters identified in the Change Proposal, the Employer may nevertheless instruct the Contractor to proceed with the Change by issue of a "Pending Agreement Change Order."

Upon receipt of a Pending Agreement Change Order, the Contractor shall immediately proceed with effecting the Changes covered by such Order. The parties shall thereafter attempt to reach agreement on the outstanding issues under the Change Proposal.

If the parties cannot reach agreement within 60 days from the date of issue of the Pending Agreement Change Order, then the matter may be referred to the Dispute Board in accordance with the provisions of GCC Subclause 45.3.

39.3 Changes Originating from Contractor

- 39.3.1 If the Contractor proposes a Change pursuant to GCC Subclause 39.1.2, the Contractor shall submit to the Project Manager a written "Application for Change Proposal," giving reasons for the proposed Change and including the information specified in GCC Subclause 39.2.1.

Upon receipt of the Application for Change Proposal, the parties

shall follow the procedures outlined in GCC Subclauses 39.2.6 and 39.2.7. However, should the Employer choose not to proceed, the Contractor shall not be entitled to recover the costs of preparing the Application for Change Proposal.

40. Extension of Time for Completion

40.1 The Time(s) for Completion specified in the SCC shall be extended if the Contractor is delayed or impeded in the performance of any of its obligations under the Contract by reason of any of the following:

- (a) any Change in the Facilities as provided in GCC Clause 39;
- (b) any occurrence of Force Majeure as provided in GCC Clause 37, unforeseen conditions as provided in GCC Clause 35, or other occurrence of any of the matters specified or referred to in paragraphs (a), (b) and (c) of GCC Subclause 32.2;
- (c) any suspension order given by the Employer under GCC Clause 41 hereof or reduction in the rate of progress pursuant to GCC Subclause 41.2; or
- (d) any changes in laws and regulations as provided in GCC Clause 36; or
- (e) any default or breach of the Contract by the Employer, or any activity, act or omission of the Employer, or the Project Manager, or any other contractors employed by the Employer; or
- (f) any other matter specifically mentioned in the Contract; or
- (g) any delay on the part of a sub-contractor, provided such delay is due to a cause for which the Contractor himself would have been entitled to an extension of time under this Subclause

by such period as shall be fair and reasonable in all the circumstances and as shall fairly reflect the delay or impediment sustained by the Contractor.

40.2 Except where otherwise specifically provided in the Contract, the Contractor shall submit to the Project Manager a notice of a claim for an extension of the Time for Completion, together with particulars of the event or circumstance justifying such extension as soon as reasonably practicable after the commencement of such event or circumstance. As soon as reasonably practicable after receipt of such notice and supporting particulars of the claim, the Employer and the Contractor shall agree upon the period of such extension. In the event that the Contractor does not accept the Employer's estimate of a fair and reasonable time extension, the Contractor shall be entitled to refer the matter to a Dispute Board, pursuant to GCC Subclause 45.3.

40.3 The Contractor shall at all times use its reasonable efforts to minimize any delay in the performance of its obligations under the Contract.

In all cases where the Contractor has given a notice of a claim for an extension of time under GCC 40.2, the Contractor shall consult with the Project Manager in order to determine the steps (if any) which can be taken to overcome or minimize the actual or anticipated delay. The Contractor shall there after comply with all reasonable instructions,

which the Project Manager shall give in order to minimize such delay. If compliance with such instructions shall cause the Contractor to incur extra costs and the Contractor is entitled to an extension of time under GCC 40.1, the amount of such extra costs shall be added to the Contract Price.

41. Suspension

- 41.1 The Employer may request the Project Manager, by notice to the Contractor, to order the Contractor to suspend performance of any or all of its obligations under the Contract. Such notice shall specify the obligation of which performance is to be suspended, the effective date of the suspension and the reasons therefor. The Contractor shall thereupon suspend performance of such obligation, except those obligations necessary for the care or preservation of the Facilities, until ordered in writing to resume such performance by the Project Manager.

If, by virtue of a suspension order given by the Project Manager, other than by reason of the Contractor's default or breach of the Contract, the Contractor's performance of any of its obligations is suspended for an aggregate period of more than 90 days, then at any time thereafter and provided that at that time such performance is still suspended, the Contractor may give a notice to the Project Manager requiring that the Employer shall, within 28 days of receipt of the notice, order the resumption of such performance or request and subsequently order a change in accordance with GCC Clause 39, excluding the performance of the suspended obligations from the Contract.

If the Employer fails to do so within such period, the Contractor may, by a further notice to the Project Manager, elect to treat the suspension, where it affects a part only of the Facilities, as a deletion of such part in accordance with GCC Clause 39 or, where it affects the whole of the Facilities, as termination of the Contract under GCC Subclause 42.1.

- 41.2 If
- (a) the Employer has failed to pay the Contractor any sum due under the Contract within the specified period, has failed to approve any invoice or supporting documents without just cause pursuant to the Appendix (Terms and Procedures of Payment) to the Contract Agreement, or commits a substantial breach of the Contract, the Contractor may give a notice to the Employer that requires payment of such sum, with interest thereon as stipulated in GCC Subclause 12.3, requires approval of such invoice or supporting documents, or specifies the breach and requires the Employer to remedy the same, as the case may be. If the Employer fails to pay such sum together with such interest, fails to approve such invoice or supporting documents or give its reasons for withholding such approval, or fails to remedy the breach or take steps to remedy the breach within 14 days after receipt of the Contractor's notice; or
 - (b) the Contractor is unable to carry out any of its obligations under the Contract for any reason attributable to the Employer, including but not limited to the Employer's failure to provide possession of or access to the Site or other areas in accordance with GCC Subclause 10.2, or failure to obtain any governmental permit

necessary for the execution and/or completion of the Facilities,
then the Contractor may by 14 days' notice to the Employer suspend performance of all or any of its obligations under the Contract, or reduce the rate of progress.

- 41.3 If the Contractor's performance of its obligations is suspended, or the rate of progress is reduced pursuant to this GCC Clause 41, then the Time for Completion shall be extended in accordance with GCC Subclause 40.1, and any and all additional costs or expenses incurred by the Contractor as a result of such suspension or reduction shall be paid by the Employer to the Contractor in addition to the Contract Price, except in the case of suspension order or reduction in the rate of progress by reason of the Contractor's default or breach of the Contract.
- 41.4 During the period of suspension, the Contractor shall not remove from the Site any Plant, any part of the Facilities or any Contractor's Equipment, without the prior written consent of the Employer.

42. Termination

42.1 Termination for Employer's Convenience

42.1.1 The Employer may at any time terminate the Contract for any reason by giving the Contractor a notice of termination that refers to this GCC Subclause 42.1.

42.1.2 Upon receipt of the notice of termination under GCC Subclause 42.1.1, the Contractor shall, either immediately or upon the date specified in the notice of termination,

- (a) cease all further work, except for such work as the Employer may specify in the notice of termination for the sole purpose of protecting that part of the Facilities already executed, or any work required to leave the Site in a clean and safe condition;
- (b) terminate all subcontracts, except those to be assigned to the Employer pursuant to paragraph (d) (ii) below;
- (c) remove all Contractor's Equipment from the Site, repatriate the Contractor's and its Subcontractors' personnel from the Site, remove from the Site any wreckage, rubbish and debris of any kind, and leave the whole of the Site in a clean and safe condition; and
- (d) subject to the payment specified in GCC Subclause 42.1.3,
 - (i) deliver to the Employer the parts of the Facilities executed by the Contractor up to the date of termination;
 - (ii) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Facilities and to the Plant as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors; and
 - (iii) deliver to the Employer all non-proprietary drawings, specifications and other documents prepared by the Contractor or its Subcontractors as at the date of

termination in connection with the Facilities.

42.1.3 In the event of termination of the Contract under GCC Subclause 42.1.1, the Employer shall pay to the Contractor the following amounts:

- (a) the Contract Price, properly attributable to the parts of the Facilities executed by the Contractor as of the date of termination;
- (b) the costs reasonably incurred by the Contractor in the removal of the Contractor's Equipment from the Site and in the repatriation of the Contractor's and its Subcontractors' personnel;
- (c) any amounts to be paid by the Contractor to its Subcontractors in connection with the termination of any subcontracts, including any cancellation charges;
- (d) costs incurred by the Contractor in protecting the Facilities and leaving the Site in a clean and safe condition pursuant to paragraph (a) of GCC Subclause 42.1.2; and
- (e) the cost of satisfying all other obligations, commitments and claims that the Contractor may in good faith have undertaken with third parties in connection with the Contract and that are not covered by paragraphs (a) through (d) above.

42.2 Termination for Contractor's Default

42.2.1 The Employer, without prejudice to any other rights or remedies it may possess, may terminate the Contract forthwith in the following circumstances by giving a notice of termination and its reasons therefor to the Contractor, referring to this GCC Subclause 42.2:

- (a) if the Contractor becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, if the Contractor is a corporation, a resolution is passed or order is made for its winding up, other than a voluntary liquidation for the purposes of amalgamation or reconstruction, a receiver is appointed over any part of its undertaking or assets, or if the Contractor takes or suffers any other analogous action in consequence of debt;
- (b) if the Contractor assigns or transfers the Contract or any right or interest therein in violation of the provision of GCC Clause 43; and
- (c) if the Contractor, in the judgment of the Employer has engaged in corrupt or fraudulent practices, as defined in GCC Clause 6, in competing for or in executing the Contract.

42.2.2 If the Contractor

- (a) has abandoned or repudiated the Contract;
- (b) has without valid reason failed to commence work on the Facilities promptly or has suspended, other than pursuant to GCC Subclause 41.2, the progress of Contract performance for more than 28 days after receiving a written instruction from the Employer to proceed;
- (c) persistently fails to execute the Contract in accordance with the Contract or persistently neglects to carry out its obligations under the Contract without just cause;
- (d) refuses or is unable to provide sufficient materials, services or labor to execute and complete the Facilities in the manner specified in the program furnished under GCC Subclause 18.2 at rates of progress that give reasonable assurance to the Employer that the Contractor can attain Completion of the Facilities by the Time for Completion as extended;

then the Employer may, without prejudice to any other rights it may possess under the Contract, give a notice to the Contractor, stating the nature of the default and requiring the Contractor to remedy the same. If the Contractor fails to remedy or to take steps to remedy the same within 14 days of its receipt of such notice, then the Employer may terminate the Contract forthwith by giving a notice of termination to the Contractor that refers to this GCC Subclause 42.2.

42.2.3 Upon receipt of the notice of termination under GCC Subclauses 42.2.1 or 42.2.2, the Contractor shall, either immediately or upon such date as is specified in the notice of termination,

- (a) cease all further work, except for such work as the Employer may specify in the notice of termination for the sole purpose of protecting that part of the Facilities already executed, or any work required to leave the Site in a clean and safe condition;
- (b) terminate all subcontracts, except those to be assigned to the Employer pursuant to paragraph (d) below;
- (c) deliver to the Employer the parts of the Facilities executed by the Contractor up to the date of termination;
- (d) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Facilities and to the Plant as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors; and
- (e) deliver to the Employer all drawings, specifications and other documents prepared by the Contractor or its Subcontractors as of the date of termination in connection

with the Facilities.

- 42.2.4 The Employer may enter upon the Site, expel the Contractor, and complete the Facilities itself or by employing any third party. The Employer may, to the exclusion of any right of the Contractor over the same, take over and use with the payment of a fair rental rate to the Contractor, with all the maintenance costs to the account of the Employer and with an indemnification by the Employer for all liability including damage or injury to persons arising out of the Employer's use of such equipment, any Contractor's Equipment owned by the Contractor and on the Site in connection with the Facilities for such reasonable period as the Employer considers expedient for the supply and installation of the Facilities.

Upon completion of the Facilities or at such earlier date as the Employer thinks appropriate, the Employer shall give notice to the Contractor that such Contractor's Equipment will be returned to the Contractor at or near the Site and shall return such Contractor's Equipment to the Contractor in accordance with such notice. The Contractor shall thereafter without delay and at its cost remove or arrange removal of the same from the Site.

- 42.2.5 Subject to GCC Subclause 42.2.6, the Contractor shall be entitled to be paid the Contract Price attributable to the Facilities executed as of the date of termination, the value of any unused or partially used Plant on the Site, and the costs, if any, incurred in protecting the Facilities and in leaving the Site in a clean and safe condition pursuant to paragraph (a) of GCC Subclause 42.2.3. Any sums due the Employer from the Contractor accruing prior to the date of termination shall be deducted from the amount to be paid to the Contractor under this Contract.

- 42.2.6 If the Employer completes the Facilities, the cost of completing the Facilities by the Employer shall be determined.

If the sum that the Contractor is entitled to be paid, pursuant to GCC Subclause 42.2.5, plus the reasonable costs incurred by the Employer in completing the Facilities, exceeds the Contract Price, the Contractor shall be liable for such excess.

If such excess is greater than the sums due the Contractor under GCC Subclause 42.2.5, the Contractor shall pay the balance to the Employer, and if such excess is less than the sums due the Contractor under GCC Subclause 42.2.5, the Employer shall pay the balance to the Contractor.

The Employer and the Contractor shall agree, in writing, on the computation described above and the manner in which any sums shall be paid.

42.3 Termination by Contractor

42.3.1 If

- (a) the Employer has failed to pay the Contractor any sum due under the Contract within the specified period, has failed to approve any invoice or supporting documents without just cause pursuant to the Appendix (Terms and Procedures of Payment) to the Contract Agreement, or commits a substantial breach of the Contract, the Contractor may give a notice to the Employer that requires payment of such sum, with interest thereon as stipulated in GCC Subclause 12.3, requires approval of such invoice or supporting documents, or specifies the breach and requires the Employer to remedy the same, as the case may be. If the Employer fails to pay such sum together with such interest, fails to approve such invoice or supporting documents or give its reasons for withholding such approval, fails to remedy the breach or take steps to remedy the breach within 14 days after receipt of the Contractor's notice; or
- (b) the Contractor is unable to carry out any of its obligations under the Contract for any reason attributable to the Employer, including but not limited to the Employer's failure to provide possession of or access to the Site or other areas or failure to obtain any governmental permit necessary for the execution and/or completion of the Facilities;

then the Contractor may give a notice to the Employer thereof, and if the Employer has failed to pay the outstanding sum, to approve the invoice or supporting documents, to give its reasons for withholding such approval, or to remedy the breach within 28 days of such notice, or if the Contractor is still unable to carry out any of its obligations under the Contract for any reason attributable to the Employer within 28 days of the said notice, the Contractor may by a further notice to the Employer referring to this GCC Subclause 42.3.1, forthwith terminate the Contract.

42.3.2 The Contractor may terminate the Contract forthwith by giving a notice to the Employer to that effect, referring to this GCC Subclause 42.3.2, if the Employer becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, being a corporation, if a resolution is passed or order is made for its winding up (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), a receiver is appointed over any part of its undertaking or assets, or if the Employer takes or suffers any other analogous action in consequence of debt.

42.3.3 If the Contract is terminated under GCC Subclauses 42.3.1 or 42.3.2, then the Contractor shall immediately

- (a) cease all further work, except for such work as may be necessary for the purpose of protecting that part of the Facilities already executed, or any work required to leave the Site in a clean and safe condition;
- (b) terminate all subcontracts, except those to be assigned to the Employer pursuant to paragraph (d) (ii);
- (c) remove all Contractor's Equipment from the Site and repatriate the Contractor's and its Subcontractors'

personnel from the Site; and

- (d) subject to the payment specified in GCC Subclause 42.3.4,
 - (i) deliver to the Employer the parts of the Facilities executed by the Contractor up to the date of termination;
 - (ii) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Facilities and to the Plant as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors; and
 - (iii) deliver to the Employer all drawings, specifications and other documents prepared by the Contractor or its Subcontractors as of the date of termination in connection with the Facilities.

42.3.4 If the Contract is terminated under GCC Subclauses 42.3.1 or 42.3.2, the Employer shall pay to the Contractor all payments specified in GCC Subclause 42.1.3, and reasonable compensation for all loss, except for loss of profit, or damage sustained by the Contractor arising out of, in connection with or in consequence of such termination.

42.3.5 Termination by the Contractor pursuant to this GCC Subclause 42.3 is without prejudice to any other rights or remedies of the Contractor that may be exercised in lieu of or in addition to rights conferred by GCC Subclause 42.3.

42.4 In this GCC Clause 42, the expression "Facilities executed" shall include all work executed, Installation Services provided, and all Plant acquired, or subject to a legally binding obligation to purchase, by the Contractor and used or intended to be used for the purpose of the Facilities, up to and including the date of termination.

42.5 In this GCC Clause 42, in calculating any monies due from the Employer to the Contractor, account shall be taken of any sum previously paid by the Employer to the Contractor under the Contract, including any advance payment paid pursuant to the Appendix (Terms and Procedures of Payment) to the Contract Agreement.

43. Assignment

43.1 Neither the Employer nor the Contractor shall, without the express prior written consent of the other party which consent shall not be unreasonably withheld, assign to any third party the Contract or any part thereof, or any right, benefit, obligation or interest therein or thereunder, except that the Contractor shall be entitled to assign either absolutely or by way of charge any monies due and payable to it or that may become due and payable to it under the Contract.

I. Claims, Disputes, and Arbitration

44. Contractor's

44.1 If the Contractor considers himself to be entitled to any extension of the Time for Completion and/or any additional payment, under any Clause

Claims

of these Conditions or otherwise in connection with the Contract, the Contractor shall submit a notice to the Project Manager, describing the event or circumstance giving rise to the claim. The notice shall be given as soon as practicable, and not later than 28 days after the Contractor became aware, or should have become aware, of the event or circumstance.

If the Contractor fails to give notice of a claim within such period of 28 days, the Time for Completion shall not be extended, the Contractor shall not be entitled to additional payment, and the Employer shall be discharged from all liability in connection with the claim. Otherwise, the following provisions of this Subclause shall apply.

The Contractor shall also submit any other notices, which are required by the Contract, and supporting particulars for the claim, all as relevant to such event or circumstance.

The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at another location acceptable to the Project Manager. Without admitting the Employer's liability, the Project Manager may, after receiving any notice under this Subclause, monitor the record keeping and/or instruct the Contractor to keep further contemporary records. The Contractor shall permit the Project Manager to inspect all these records, and shall (if instructed) submit copies to the Project Manager.

Within 42 days after the Contractor became aware (or should have become aware) of the event or circumstance giving rise to the claim, or within such other period as may be proposed by the Contractor and approved by the Project Manager, the Contractor shall send to the Project Manager a fully detailed claim, which includes full supporting particulars of the basis of the claim and of the extension of time and/or additional payment claimed. If the event or circumstance giving rise to the claim has a continuing effect,

- (a) this fully detailed claim shall be considered as interim;
- (b) the Contractor shall send further interim claims at monthly intervals, giving the accumulated delay and/or amount claimed, and such further particulars as the Project Manager may reasonably require; and
- (c) the Contractor shall send a final claim within 28 days after the end of the effects resulting from the event or circumstance, or within such other period as may be proposed by the Contractor and approved by the Project Manager.

Within 42 days after receiving a claim or any further particulars supporting a previous claim, or within such other period as may be proposed by the Project Manager and approved by the Contractor, the Project Manager shall respond with approval, or with disapproval and detailed comments. He may also request any necessary further particulars, but shall nevertheless give his response on the principles of the claim within such time.

Each payment certificate shall include such amounts for any claim as have been reasonably substantiated as due under the relevant provision of the Contract. Unless and until the particulars supplied are sufficient to substantiate the whole of the claim, the Contractor shall only be entitled to payment for such part of the claim as he has been able to substantiate.

The Project Manager shall agree with the Contractor or estimate: (i) the extension (if any) of the Time for Completion (before or after its expiry) in accordance with GCC Clause 40, and/or (ii) the additional payment (if any) to which the Contractor is entitled under the Contract.

The requirements of this Subclause are in addition to those of any other Subclause, which may apply to a claim. If the Contractor fails to comply with this or another Subclause in relation to any claim, any extension of time and/or additional payment shall take account of the extent (if any) to which the failure has prevented or prejudiced proper investigation of the claim, unless the claim is excluded under the second paragraph of this Subclause.

In the event that the Contractor and the Employer cannot agree on any matter relating to a claim, either party may refer the matter to the Dispute Board pursuant to GCC 45 hereof.

45. Disputes and Arbitration

45.1 Appointment of the Dispute Board

Disputes shall be referred to a Dispute Board for decision in accordance with GCC Subclause 45.3. The Parties shall appoint a Dispute Board by the date stated in the SCC.

The Dispute Board shall comprise, as stated in the SCC, either one or three suitably qualified persons ("the members"), each of whom shall be fluent in the language for communication defined in the Contract and shall be a professional experienced in the type of activities involved in the performance of the Contract and with the interpretation of contractual documents. If the number is not so stated and the Parties do not agree otherwise, the Dispute Board shall comprise three persons, one of whom shall serve as chairman.

If the Parties have not jointly appointed the Dispute Board 21 days before the date stated in the SCC and the Dispute Board is to comprise three persons, each Party shall nominate one member for the approval of the other Party. The first two members shall recommend and the Parties shall agree upon the third member, who shall act as chairman.

However, if a list of potential members is included in the SCC, the members shall be selected from those on the list, other than anyone who is unable or unwilling to accept appointment to the Dispute Board.

The agreement between the Parties and either the sole member or each of the three members shall incorporate by reference the General Conditions of Dispute Board Agreement contained in the Appendix to these General Conditions, with such amendments as are agreed

between them.

The terms of the remuneration of either the sole member or each of the three members, including the remuneration of any expert whom the Dispute Board consults, shall be mutually agreed upon by the Parties when agreeing the terms of appointment of the member or such expert (as the case may be). Each Party shall be responsible for paying one-half of this remuneration.

If a member declines to act or is unable to act as a result of death, disability, resignation or termination of appointment, a replacement shall be appointed in the same manner as the replaced person was required to have been nominated or agreed upon, as described in this Subclause.

The appointment of any member may be terminated by mutual agreement of both Parties, but not by the Employer or the Contractor acting alone. Unless otherwise agreed by both Parties, the appointment of the Dispute Board (including each member) shall expire when the Operational Acceptance Certificate has been issued in accordance with GCC Clause 25.3.

45.2 Failure to Agree Dispute Board

If any of the following conditions apply, namely:

- (a) the Parties fail to agree upon the appointment of the sole member of the Dispute Board by the date stated in the first paragraph of GCC Subclause 45.1;
- (b) either Party fails to nominate a member (for approval by the other Party) of a Dispute Board of three persons by such date;
- (c) the Parties fail to agree upon the appointment of the third member (to act as chairman) of the Dispute Board by such date; or
- (d) the Parties fail to agree upon the appointment of a replacement person within 42 days after the date on which the sole member or one of the three members declines to act or is unable to act as a result of death, disability, resignation, or termination of appointment;

then the appointing entity or official named in the SCC shall, upon the request of either or both of the Parties and after due consultation with both Parties, appoint this member of the Dispute Board. This appointment shall be final and conclusive. Each Party shall be responsible for paying one-half of the remuneration of the appointing entity or official.

45.3 Obtaining Dispute Board's Decision

If a dispute (of any kind whatsoever) arises between the Parties in connection with the performance of the Contract, including any dispute as to any certificate, determination, instruction, opinion or valuation of the Project Manager, either Party may refer the dispute in writing to the Dispute Board for its decision, with copies to the other Party and the

Project Manager. Such reference shall state that it is given under this Subclause.

For a Dispute Board of three persons, the Dispute Board shall be deemed to have received such reference on the date when it is received by the chairman of the Dispute Board.

Both Parties shall promptly make available to the Dispute Board all such additional information, further access to the Site, and appropriate facilities, as the Dispute Board may require for the purposes of making a decision on such dispute. The Dispute Board shall be deemed to be not acting as arbitrator(s).

Within 84 days after receiving such reference, or within such other period as may be proposed by the Dispute Board and approved by both Parties, the Dispute Board shall give its decision, which shall be reasoned and shall state that it is given under this Subclause. The decision shall be binding on both Parties, who shall promptly give effect to it unless and until it shall be revised in an amicable settlement or an arbitral award as described below. Unless the Contract has already been abandoned, repudiated or terminated, the Contractor shall continue to proceed with the performance of the Facilities in accordance with the Contract.

If either Party is dissatisfied with the Dispute Board's decision, then either Party may, within 28 days after receiving the decision, give notice to the other Party of its dissatisfaction and intention to commence arbitration. If the Dispute Board fails to give its decision within the period of 84 days (or as otherwise approved) after receiving such reference, then either Party may, within 28 days after this period has expired, give notice to the other Party of its dissatisfaction and intention to commence arbitration.

In either event, this notice of dissatisfaction shall state that it is given under this Subclause, and shall set out the matter in dispute and the reason(s) for dissatisfaction. Except as stated in GCC Subclauses 45.6 and 45.7, neither Party shall be entitled to commence arbitration of a dispute unless a notice of dissatisfaction has been given in accordance with this Subclause.

If the Dispute Board has given its decision as to a matter in dispute to both Parties, and no notice of dissatisfaction has been given by either Party within 28 days after it received the Dispute Board's decision, then the decision shall become final and binding upon both Parties.

45.4 Amicable Settlement

Where notice of dissatisfaction has been given under GCC Subclause 45.3 above, both Parties shall attempt to settle the dispute amicably before the commencement of arbitration. However, unless both Parties agree otherwise, arbitration may be commenced on or after the fifty-sixth day after the day on which notice of dissatisfaction and intention to commence arbitration was given, even if no attempt at amicable settlement has been made.

45.5 Arbitration

Unless settled amicably, any dispute in respect of which the Dispute Board's decision (if any) has not become final and binding shall be finally settled by international arbitration. Unless otherwise agreed by both Parties,

- (a) arbitration proceedings shall be conducted as stated in the Special Conditions;
- (b) if no arbitration proceedings is so stated, the dispute shall be finally settled by institutional arbitration under the Rules of Arbitration of the International Chamber of Commerce;
- (c) the dispute shall be settled by three arbitrators; and
- (d) the arbitration shall be conducted in the language for communications defined in GCC Subclause 5.3.

The arbitrator(s) shall have full power to open up, review and revise any certificate, determination, instruction, opinion or valuation of the Project Manager, and any decision of the Dispute Board, relevant to the dispute. Nothing shall disqualify the Project Manager from being called as a witness and giving evidence before the arbitrator(s) on any matter whatsoever relevant to the dispute.

Neither Party shall be limited in the proceedings before the arbitrator(s) to the evidence or arguments previously put before the Dispute Board to obtain its decision, or to the reasons for dissatisfaction given in its notice of dissatisfaction. Any decision of the Dispute Board shall be admissible in evidence in the arbitration.

Arbitration may be commenced prior to or after completion of the Works. The obligations of the Parties, the Project Manager and the Dispute Board shall not be altered by reason of any arbitration being conducted during the progress of the Works.

45.6 Failure to Comply with Dispute Board's Decision

In the event that a Party fails to comply with a Dispute Board decision which has become final and binding, then the other Party may, without prejudice to any other rights it may have, refer the failure itself to arbitration under GCC Subclause 45.5. GCC Subclauses 45.3 and 45.4 shall not apply to this reference.

45.7 Expiry of Dispute Board's Appointment

If a dispute arises between the Parties in connection with the performance of the Contract, and there is no Dispute Board in place, whether by reason of the expiry of the Dispute Board's appointment or otherwise,

- (a) GCC Subclauses 45.3 and 45.4 shall not apply, and
- (b) the dispute may be referred directly to arbitration under GCC Subclause 45.5.

APPENDIX A

General Conditions of Dispute Board Agreement

1 Definitions

Each "Dispute Board Agreement" is a tripartite agreement by and between

- (a) the "Employer";
- (b) the "Contractor"; and
- (c) the "Member" who is defined in the Dispute Board Agreement as being
 - (i) the sole member of the "Dispute Board" and, where this is the case, all references to the "Other Members" do not apply; or
 - (ii) one of the three persons who are jointly called the "Dispute Board" and, where this is the case, the other two persons are called the "Other Members".

The Employer and the Contractor have entered (or intend to enter) into a contract, which is called the "Contract" and is defined in the Dispute Board Agreement, which incorporates this Appendix. In the Dispute Board Agreement, words and expressions which are not otherwise defined shall have the meanings assigned to them in the Contract.

2 General Provisions

Unless otherwise stated in the Dispute Board Agreement, it shall take effect on the latest of the following dates:

- (a) the Commencement Date defined in the Contract;
- (b) when the Employer, the Contractor and the Member have each signed the Dispute Board Agreement; or
- (c) when the Employer, the Contractor and each of the Other Members (if any) have respectively each signed a dispute board agreement.

This employment of the Member is a personal appointment. At any time, the Member may give not less than 70 days' notice of resignation to the Employer and to the Contractor, and the Dispute Board Agreement shall terminate upon the expiry of this period.

3 Warranties

The Member warrants and agrees that he/she is and shall be impartial and independent of the Employer, the Contractor and the Project Manager. The Member shall promptly disclose, to each of them and to the Other Members (if any), any fact or circumstance which might appear inconsistent with his/her warranty and agreement of impartiality and independence.

When appointing the Member, the Employer and the Contractor relied upon the Member's representations that he/she is

- (a) experienced in the work, which the Contractor is to carry out under the Contract,
- (b) experienced in the interpretation of contract documentation, and
- (c) fluent in the language for communications defined in the Contract.

4 General Obligations of the Member

The Member shall

- (a) have no interest financial or otherwise in the Employer, the Contractor or the Project Manager, nor any financial interest in the Contract except for payment under the Dispute Board Agreement;
- (b) not previously have been employed as a consultant or otherwise by the Employer, the Contractor, or the Project Manager, except in such circumstances as were disclosed in writing to the Employer and the Contractor before they signed the Dispute Board Agreement;
- (c) have disclosed in writing to the Employer, the Contractor, and the Other Members (if any), before entering into the Dispute Board Agreement and to his/her best knowledge and recollection, any professional or personal relationships with any director, officer, or employee of the Employer, the Contractor, or the Project Manager, and any previous involvement in the overall project of which the Contract forms part;
- (d) not, for the duration of the Dispute Board Agreement, be employed as a consultant or otherwise by the Employer, the Contractor, or the Project Manager, except as may be agreed in writing by the Employer, the Contractor, and the Other Members (if any);
- (e) comply with the annexed procedural rules and with GCC Subclause 45.3;
- (f) not give advice to the Employer, the Contractor, the Employer's Personnel, or the Contractor's Personnel concerning the conduct of the Contract, other than in accordance with the annexed procedural rules;
- (g) not while a Member enter into discussions or make any agreement with the Employer, the Contractor, or the Project Manager regarding employment by any of them, whether as a consultant or otherwise, after ceasing to act under the Dispute Board Agreement;
- (h) ensure his/her availability for all site visits and hearings as are necessary;
- (i) become conversant with the Contract and with the progress of the Facilities (and of any other parts of the project of which the Contract forms part) by studying all documents received, which shall be maintained in a current working file;
- (j) treat the details of the Contract and all the Dispute Board's activities and hearings as private and confidential, and not publish or disclose them without the prior written consent of the Employer, the Contractor, and the Other Members (if any); and
- (k) be available to give advice and opinions on any matter relevant to the Contract when requested by both the Employer and the Contractor, subject to the agreement of the Other Members (if any).

5 General Obligations of the Employer and the Contractor

The Employer, the Contractor, the Employer's Personnel and the Contractor's Personnel shall not request advice from or consultation with the Member regarding the Contract, otherwise than in the normal course of the Dispute Board's activities under the Contract and the Dispute Board Agreement. The Employer and the Contractor shall be responsible for compliance with this provision, by the Employer's Personnel and the Contractor's Personnel respectively.

The Employer and the Contractor undertake to each other and to the Member that the Member shall not, except as otherwise agreed in writing by the Employer, the Contractor, the Member and the Other Members (if any)

- (a) be appointed as an arbitrator in any arbitration under the Contract;
- (b) be called as a witness to give evidence concerning any dispute before arbitrator(s) appointed for any arbitration under the Contract; or
- (c) be liable for any claims for anything done or omitted in the discharge or purported discharge of the Member's functions, unless the act or omission is shown to have been in bad faith.

The Employer and the Contractor hereby jointly and severally indemnify and hold the Member harmless against and from claims from which he is relieved from liability under the preceding paragraph.

Whenever the Employer or the Contractor refers a dispute to the Dispute Board under GCC Subclause 45.3, which will require the Member to make a site visit and attend a hearing, the Employer or the Contractor shall provide appropriate security for a sum equivalent to the reasonable expenses to be incurred by the Member. No account shall be taken of any other payments due or paid to the Member.

6 Payment

The Member shall be paid as follows, in the currency named in the Dispute Board Agreement:

- (a) a retainer fee per calendar month, which shall be considered as payment in full for
 - (i) being available on 28 days' notice for all site visits and hearings;
 - (ii) becoming and remaining conversant with all project developments and maintaining relevant files;
 - (iii) all office and overhead expenses including secretarial services, photocopying and office supplies incurred in connection with his duties; and
 - (iv) all services performed hereunder except those referred to in sub-paragraphs (b) and (c) of this Clause.

The retainer fee shall be paid with effect from the last day of the calendar month in which the Dispute Board Agreement becomes effective; until the last day of the calendar month in which the Taking-Over Certificate is issued for the whole of the Works.

With effect from the first day of the calendar month following the month in which Taking-Over Certificate is issued for the whole of the Works, the retainer fee shall be reduced by one-third. This reduced fee shall be paid until the first day of the calendar month in which the Member resigns or the Dispute Board Agreement is otherwise terminated.

- (b) a daily fee, which shall be considered as payment in full for
 - (i) each day or part of a day up to a maximum of 2 days' travel time in each direction for the journey between the Member's home and the site, or another location of a meeting with the Other Members (if any);
 - (ii) each working day on site visits, hearings, or preparing decisions; and
 - (iii) each day spent reading submissions in preparation for a hearing.
- (c) all reasonable expenses, including necessary travel expenses (air fare in less than first class, hotel and subsistence and other direct travel expenses) incurred in connection with the Member's duties, as well as the cost of telephone calls, courier charges, facsimiles, and telexes, and use of the internet: a receipt shall be required for each item in excess of 5% of the daily fee referred to in sub-paragraph (b) of this Clause;
- (d) any taxes properly levied in the Country on payments made to the Member (unless a national or permanent resident of the Country) under this Clause 6.

The retainer and daily fees shall be as specified in the Dispute Board Agreement. Unless it specifies otherwise, these fees shall remain fixed for the first 24 calendar months, and shall thereafter be adjusted by agreement between the Employer, the Contractor and the Member, at each anniversary of the date on which the Dispute Board Agreement became effective.

If the parties fail to agree on the retainer fee or the daily fee, the appointing entity or official named in the SCC shall determine the amount of the fees to be used.

The Member shall submit invoices for payment of the monthly retainer and air fares quarterly in advance. Invoices for other expenses and for daily fees shall be submitted following the conclusion of a site visit or hearing. All invoices shall be accompanied by a brief description of activities performed during the relevant period and shall be addressed to the Contractor.

The Contractor shall pay each of the Member's invoices in full within 56 calendar days after receiving each invoice and shall apply to the Employer (in the Statements under the Contract) for reimbursement of one-half of the amounts of these invoices. The Employer shall then pay the Contractor in accordance with the Contract.

If the Contractor fails to pay to the Member the amount to which he/she is entitled under the Dispute Board Agreement, the Employer shall pay the amount due to the Member and any other amount which may be required to maintain the operation of the Dispute Board; and without prejudice to the Employer's rights or remedies. In addition to all other rights arising from this default, the Employer shall be entitled to reimbursement of all sums paid in excess of one-half of these payments, plus all costs of recovering these sums and financing charges calculated at the rate specified in accordance with GCC Subclause 12.3.

If the Member does not receive payment of the amount due within 70 days after submitting a valid invoice, the Member may (i) suspend his/her services (without notice) until the

payment is received, and/or (ii) resign his/her appointment by giving notice under Clause 7.

7 Termination

At any time: (i) the Employer and the Contractor may jointly terminate the Dispute Board Agreement by giving 42 days' notice to the Member, or (ii) the Member may resign as provided for in Clause 2.

If the Member fails to comply with the Dispute Board Agreement, the Employer and the Contractor may, without prejudice to their other rights, terminate it by notice to the Member. The notice shall take effect when received by the Member.

If the Employer or the Contractor fails to comply with the Dispute Board Agreement, the Member may, without prejudice to his other rights, terminate it by notice to the Employer and the Contractor. The notice shall take effect when received by them both.

Any such notice, resignation and termination shall be final and binding on the Employer, the Contractor and the Member. However, a notice by the Employer or the Contractor, but not by both, shall be of no effect.

8 Default of the Member

If the Member fails to comply with any of his obligations under Clause 4 concerning his impartiality or independence in relation to the Employer or the Contractor, he/she shall not be entitled to any fees or expenses hereunder and shall, without prejudice to their other rights, reimburse each of the Employer and the Contractor for any fees and expenses received by the Member and the Other Members (if any), for proceedings or decisions (if any) of the Dispute Board which are rendered void or ineffective by the said failure to comply.

9 Disputes

Any dispute or claim arising out of or in connection with this Dispute Board Agreement, or the breach, termination or invalidity thereof, shall be finally settled by institutional arbitration. If no other arbitration institute is agreed, the arbitration shall be conducted under the Rules of Arbitration of the International Chamber of Commerce by one arbitrator appointed in accordance with these Rules of Arbitration.

Annex - DISPUTE BOARD GUIDELINES

1. Unless otherwise agreed by the Employer and the Contractor, the Dispute Board shall visit the site at intervals of not more than 140 days, including times of critical construction events, at the request of either the Employer or the Contractor. Unless otherwise agreed by the Employer, the Contractor, and the Dispute Board, the period between consecutive visits shall not be less than 70 days, except as required to convene a hearing as described below.
2. The timing of and agenda for each site visit shall be as agreed jointly by the Dispute Board, the Employer, and the Contractor, or in the absence of agreement, shall be decided by the Dispute Board. The purpose of site visits is to enable the Dispute Board to become and remain acquainted with the progress of the Works and of any actual or potential problems or claims, and, as far as reasonable, to prevent potential problems or claims from becoming disputes.
3. Site visits shall be attended by the Employer, the Contractor, and the Project Manager and shall be coordinated by the Employer in cooperation with the Contractor. The Employer shall ensure the provision of appropriate conference facilities and secretarial and copying services. At the conclusion of each site visit and before leaving the site, the Dispute Board shall prepare a report on its activities during the visit and shall send copies to the Employer and the Contractor.
4. The Employer and the Contractor shall furnish to the Dispute Board one copy of all documents which the Dispute Board may request, including Contract documents, progress reports, variation instructions, certificates, and other documents pertinent to the performance of the Contract. All communications between the Dispute Board and the Employer or the Contractor shall be copied to the other Party. If the Dispute Board comprises three persons, the Employer and the Contractor shall send copies of these requested documents and these communications to each of these persons.
5. If any dispute is referred to the Dispute Board in accordance with GCC Subclause 45.3, the Dispute Board shall proceed in accordance with GCC Subclause 45.3 and these Guidelines. Subject to the time allowed to give notice of a decision and other relevant factors, the Dispute Board shall
 - (a) act fairly and impartially as between the Employer and the Contractor, giving each of them a reasonable opportunity of putting his case and responding to the other's case; and
 - (b) adopt procedures suitable to the dispute, avoiding unnecessary delay or expense.
6. The Dispute Board may conduct a hearing on the dispute, in which event it will decide on the date and place for the hearing and may request that written documentation and arguments from the Employer and the Contractor be presented to it prior to or at the hearing.
7. Except as otherwise agreed in writing by the Employer and the Contractor, the Dispute Board shall have power to adopt an inquisitorial procedure, to refuse admission to hearings or audience at hearings to any persons other than representatives of the Employer, the Contractor, and the Project Manager, and to proceed in the absence of any party who the Dispute Board is satisfied received notice of the hearing; but shall have discretion to decide whether and to what extent this power may be exercised.
8. The Employer and the Contractor empower the Dispute Board, among other things, to

- (a) establish the procedure to be applied in deciding a dispute;
 - (b) decide upon the Dispute Board's own jurisdiction, and as to the scope of any dispute referred to it;
 - (c) conduct any hearing as it thinks fit, not being bound by any rules or procedures other than those contained in the Contract and these Guidelines;
 - (d) take the initiative in ascertaining the facts and matters required for a decision;
 - (e) make use of its own specialist knowledge, if any;
 - (f) decide upon the payment of financing charges in accordance with the Contract;
 - (g) decide upon any provisional relief such as interim or conservatory measures;
 - (h) open up, review and revise any certificate, decision, determination, instruction, opinion or valuation of the Project Manager, relevant to the dispute; and
 - (i) appoint, should the Dispute Board so consider necessary and the Parties agree, a suitable expert at the cost of the Parties to give advice on a specific matter relevant to the dispute.
9. The Dispute Board shall not express any opinions during any hearing concerning the merits of any arguments advanced by the Parties. Thereafter, the Dispute Board shall make and give its decision in accordance with GCC Subclause 45.3, or as otherwise agreed by the Employer and the Contractor in writing. If the Dispute Board comprises three persons
- (a) it shall convene in private after a hearing, in order to have discussions and prepare its decision;
 - (b) it shall endeavour to reach a unanimous decision: if this proves impossible the applicable decision shall be made by a majority of the Members, who may require the minority Member to prepare a written report for submission to the Employer and the Contractor; and
 - (c) if a Member fails to attend a meeting or hearing, or to fulfil any required function, the other two Members may nevertheless proceed to make a decision, unless
 - (i) either the Employer or the Contractor does not agree that they do so, or
 - (ii) the absent Member is the chairman and he/she instructs the other Members to not make a decision.



Procurement of Works

JAIPUR METRO RAIL CORPORATION LIMITED

BIDDING DOCUMENT

for

Procurement on Direct Contract Mode

of

DC No.- JP/JS15 (Phase-1B)

**BID DOCUMENTS FOR DESIGN, MANUFACTURE, SUPPLY,
INSTALLATION TESTING & COMMISSIONING OF PUBLIC
ADDRESS SYSTEM, PASSENGER INFORMATION DISPLAY
SYSTEM AND MASTER CLOCK SYSTEM FOR JMRC PHASE 1B**

PART-III CONDITIONS OF CONTRACT AND CONTRACT FORMS

Section 8 – Special Conditions of Contractors (SCC)

JAIPUR METRO RAIL CORPORATION LTD.

**Khanij Bhawan, Tilak Marg,
C- Scheme, Jaipur (Rajasthan) PIN-302005
Country: India**

Section 8 - Special Conditions of Contract

The following Special Conditions of Contract (SCC) shall supplement the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the GCC. The clause number of the SCC is the corresponding clause number of the GCC.

Table of Clauses

	GCC Sub Clause No.	Description	Page No.
1.	Sub Clause 1.1	Definitions	3
2.	Sub Clause 5.1, 5.2 & 5.3	Law & Language	3
3.	Sub Clause 7.3	Scope of Facilities	3
4.	Sub Clause 8.1	Time for Commencement	5
5.	Sub Clause 8.2	Time for Completion	5
6.	Sub Clause 9.8	Protection of the Environment	6
7.	Sub Clause 11.1 & Sub Clause 11.2	Contract Price	6 & 10
8.	Sub Clause 12.1	Terms of Payment	10
9.	Sub Clause 13.1	Issuance of Securities	14
10.	Sub Clause 13.2	Advance Payment Security	15
11.	Sub Clause 13.3.1 & 13.3.3	Performance Security & Forfeiture	18
12.	Sub Clause 15	Intellectual Property	20
13.	Sub Clause 17	Project Manager's Authority to Delegate	20
14.	Sub Clause 18.2	Work Programme	22
15.	Sub Clause 19	Subcontracting	23
16.	Sub Clause 20	Design and Engineering	25
17.	Sub Clause 21.1	Material	27
18.	Sub Clause 22.1.1	Bench Mark	27
19.	Sub Clause 22.2.3	Labour laws	27
20.	Sub Clause 22.2.5	Working Hours	27
21.	Sub Clause 22.2.7	Health and Safety	28
22.	Sub Clause 22.2.8	Funeral Arrangements	30
23.	Sub Clause 22.2.16	Prohibition of Harmful Child Labour	31
24.	Sub Clause 22.4	Site Regulations and Safety	31
25.	Sub Clause 24	Completion of the Facilities	32
26.	Sub Clause 25.1	Commissioning	33

27.	Sub Clause 25.3, 25.4 & 25.5	Operational & Partial Acceptance & Delayed Pre-Commissioning and/or Guarantee Test	34
28.	Sub Clause 26.2 & 26.3	Completion Time Guarantee	34 & 35
29.	Sub Clause 27.2	Defect Liability	35
30.	Sub Clause 30.1	Limitation of Liability	37
31.	Sub Clause 34.3 & 34.6	Insurance	37 & 38
32.	Sub Clause 36.1	Change in Laws and Regulations	39
33.	Sub Clause 39	Change in the Facilities	39
34.	Sub Clause 39.3	Changes Originating from Contractor	44
35.	Sub Clause 40	Extension of Time for completion	46
36.	Sub Clause 45, 45.2	Disputes and Arbitration	49 & 51
37.	Additional Clause	Eligibility	51
38.	Additional Clause	Claims, Disputes and Conciliation	51
39.	Additional Clause	Variation in the Bill of Quantities	55
40.	Additional Clause	Deployment of Personnel by the Employer	56
41.	Additional Clause	Indemnity Bond	56
42.	Additional Clause	Quality Plan	56
43.	Additional Clause	Work By persons other than the Contractor	57
44.	Additional Clause	Entry with full preparation as per SHE	57
45.	Additional Clause	Nuisance	58
46.	Additional Clause	Interface Requirement	58
47.	Additional Clause	Site Progress	58
48.	Additional Clause	Maintaining the site	58
49.	Additional Clause	BOCW (Building and Other Construction Works) Codes	58
50.	Additional Clause	Bank Guarantee for Supplementary Agreement	59
51.	Additional Clause	Service Tax for AMC Work	59
52.	Additional Clause	Professional Indemnity Insurance (PII)	59
53.	Additional Clause	As Built Record	61
54.	Additional Clause	Non-Payment by main Contractors to Sub-Contractors	61
55.	Additional Clause	Performance Certificate	62

1.	Sub Clause 1.1	<p>Definitions</p> <p>The Employer is: Jaipur Metro Rail Corporation (JMRC) and its legal successors or permitted assigns.</p> <p>The Project Manager is: Authorized Officer of DMRC</p> <p>The Bank is : Asian Development Bank</p> <p>Country of Origin: As per list of Eligible countries defined in section-5</p>
2.	Sub Clause 5.1	<p>Law and Language</p> <p>The Contract shall be interpreted in accordance with the laws of Republic of India</p>
	Sub Clause 5.2	The ruling language is English
	Sub Clause 5.3	The language for communications is English
3.	Sub Clause 7.3	<p>Scope of Facilities</p> <p>(a) The Contractor shall submit along with the tender a schedule of spare parts duly indicating, for each item of spares, its description, part number, lead time, shelf life and number of units required for the system during the first ten years, principal as well as secondary sources of supply. The Contractor/Tenderer shall submit the above list duly unit priced with escalation/de-escalation formula in the Package as part of Schedule no.6(a), Section 4- Bidding Forms. This price will not be used for bid evaluation.</p> <p>(b) The Employer may, during a period of ten years from the date of taking over of the whole works, purchase as many parts as required by him, at the rates indicated in this schedule.</p> <p>(c) If during the period of ten years, the Contractor intends to discontinue the manufacture of spare or replacement parts for the Telecommunication systems, the Contractor shall immediately give notice to the Employer of such intention. The Employer shall be given the opportunity of ordering at reasonable prices such quantities of</p>

		<p>such spare or replacement parts as the Employer requires in relation to the anticipated life of the equipment.</p> <p>In the event of Contractor failing to supply the spare parts in accordance with this Clause, he shall in respect of each item of spare, furnish free of cost to the Employer, the drawings, specifications, patterns and other information to enable the Employer to make or have made such spare parts. The Employer shall be entitled to retain the aforesaid drawings etc., for such time only as is necessary for the exercise by the Employer of his rights under this clause and the drawings, if the Contractor so requires, shall be returned by the Employer to the Contractor in good order and condition (fair wear and tear excepted).</p> <p>Under such circumstances, the Contractor shall also grant to the Employer, without payment of any royalty or charge, full right and liberty to make or have made spare or replacement parts as aforesaid and for such purposes only to use, make and have made copies of all drawings, patterns, specifications and other information supplied by the Contractor to the Employer pursuant to the Contract.</p> <p>(d) The Contractor will so far as it is reasonably able to bind his sub-contractors to conform with the requirements of this Clause and shall, prior to entry into any sub-contracts, provide the Employer with full details of any sub-contractor who will not so conform in which event the Employer may direct the Contractor to seek an alternative sub-contractor.</p> <p>If the Contractor fails to provide spare or replacement parts as described in this Sub-clause and these are available from the Contractor's sub-contractor, the Employer shall have the right to obtain such spare and replacement parts from the sub-contractor or any other supplier and any additional cost incurred by the Employer shall be recoverable from the Contractor.</p> <p>(e) The foregoing shall hold equally good for the Contractor, any or all of his sub-contractors and</p>
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		<p>venders.</p> <p>(f) The Employer may require the Contractor to enter into a Maintenance Contract with the Employer for the System / Machine provided under the Contract under terms and conditions to be mutually agreed.</p>
4.	Sub Clause 8.1	<p>Time for Commencement</p> <p>The Contractor shall commence work on the Facilities on the date specified in the Letter of Acceptance or if no date is specified in the Letter of Acceptance, on the date specified in an instruction in writing to that effect from the Project Manager (Notice to Proceed).</p> <p>Thereafter the Contractor shall proceed with due diligence, without delay, and in accordance with the programme or any revised or modified programme of the Works. Time will be the essence of Contract and time for Completion shall run from the date the Contractor is to commence the Works under this Clause.</p> <p>The Contractor shall not commence the construction, manufacture or installation of the Works or of any part of the Works unless and until the Project Manager has endorsed the relevant Working Drawings in accordance with the Employer's Requirements.</p>
5.	Sub Clause 8.2	<p>Time for Completion</p> <p>The Time for Completion of the whole of the Facilities shall be as per Key dates defined in Appendix 4 of Section 9- Contract Forms.</p> <p>The Access Dates shown in the Employer's Requirements are for planning purposes only.</p> <p>The Employer reserves the right to make each site available to the Contractor any time during the period from 60 days before to 90 days after the Access Dates. The Project Manager will notify the Contractor of the actual Access Dates at least 30 days in advance for each part of the works. This Notice will specify the area to which it refers is accessible and in a sufficient state of completion to permit the Contractor to begin installation and testing therein. It shall not imply that the Contractor will enjoy exclusive use of the area or that the work of other Contractor's therein is complete. The Contractor shall begin installation in each area by the actual</p>

		<p>Access Date, and shall complete all installation and testing in each area by the relevant Key Date.</p> <p>Notwithstanding the actual Access Date, whether before or after the stipulated Access Dates, the Employer shall not accept any increase in cost to the Employer.</p>
6.	Sub Clause 9.8	<p>Protection of the Environment</p> <p>The contractor shall refer SHE Manual (part of Employer's Requirements) for all such activities.</p>
7.	Sub Clause 11.1	<p>Contract Price</p> <p>The Contract Price shall be as specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement as given in Section 9.</p> <p>The rates and prices quoted in the Bill of Quantities shall be quoted separately in the following currencies:</p> <ol style="list-style-type: none"> For inputs to the Works, which are expected to be supplied from within India, in Indian Rupees. For those inputs to the Works, which are expected to be supplied from outside India, in foreign currencies. <p>The Contract Price shall not be adjusted on account of fluctuations in the rates of exchange between the foreign currencies of the Contract and Indian Rupees.</p> <p>The Bidder is required to note the following while quoting his prices:-</p> <p>As this project is funded by Asian Development Bank (ADB), the project is governed by the following exemptions.</p> <p>A. Custom Duty and Excise Duty</p> <ol style="list-style-type: none"> The project is eligible for exemption of custom duty as per notification no. 84/97-customs dated 11.11.1997, as amended by notification no. 85/99-cus. Dated 06.07.1999 and no. 119/99-cus. Dated 02.11.1999 and notification no. 75/2001 dated 01-07-01 and notification no. 107/2001-cus. Dated 12.10.2001

		<p>b) The project is eligible for exemption of Excise duty as per notification no. 108/95- CE, dated 28.08.1995, as amended vide central excise notification no. 7/98-CE, dated 02.06.1998; 33/98-CE, dated 13.10.1998; 4/99- CE dated 11.02.1999 and 40/99- CE, dated 02.11.1999.</p> <p>Note: 1. Amendments to above notifications, if any, up to the date 28 days prior to the deadline for submission of bids shall also be deemed to be taken into consideration in the Contract Price. The copy of above notification is attached as Annexure-I to the SCC.</p> <p>Note: 2. In order to seek exemptions of Custom Duty and/or Excise Duty the JMRC shall issue the required certificates for the project on the request of the contractor.</p> <p>B. VAT, Rajasthan Entry Tax and Service Tax :-</p> <p>Bidder to note that as per the following Notifications of Government of Rajasthan, Rajasthan Value Added Tax and Rajasthan Entry Tax on certain goods are exempted for this Contract and Bidder shall take into consideration these exemptions in their Contract Price:</p> <p>1. Rajasthan Tax on Entry of Goods into Local Areas Act, 1999:</p> <p>a. Notification No. F.12 (100)FD/Tax/10-81 dated 6th October 2010 issued by Finance Department (Tax Division) of Government of Rajasthan.</p> <p>(i)Amendment No. F 12(100)FD/Tax/10-76 dated 08th December 2011</p> <p>(ii) Amendment No. F 12 (100)FD/Tax/2010-10 dated 17th April 2013</p>
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		<p style="text-align: center;">2. Rajasthan Value Added Tax Act 2003</p> <p>a. Notification No. F.12 (100)FD/Tax/10-78 dated 6th October 2010 issued by Finance Department (Tax Division) of Government of Rajasthan.</p> <p style="padding-left: 40px;">(i) Amendment No. F 12(100)FD/Tax/10-73 dated 08th December 2011</p> <p style="padding-left: 40px;">(ii) Amendment No. F12 (100)FD/Tax/10-11 dated 24th April 2013</p> <p style="padding-left: 40px;">(iii) Amendment No. F 12 (79)FD/Tax/2014-Pt-I-151 dated 8th Feb 2016</p> <p>b. Notification No. F.12 (100)FD/Tax/10-79 dated 6th October 2010 issued by Finance Department (Tax Division) of Government of Rajasthan.</p> <p style="padding-left: 40px;">(i) Amendment No. F12 (100)FD/Tax/10-74 dated 8th Dec 2011</p> <p>c. Notification No. F.12 (63)FD/Tax/2005-81 dated 8th August 2006 issued by Finance Department (Tax Division) of Government of Rajasthan.</p> <p style="padding-left: 40px;">(i) Amendment No. F 12(100)FD/Tax/10-80 dated 06th October 2010</p> <p style="padding-left: 40px;">(ii) Amendment No. F12 (100)FD/Tax/10-75 dated 8th Dec 2011</p> <p style="text-align: center;">3. Service Tax</p> <p>Exemption on construction, erection, commissioning or installation of original works pertaining to monorail or metro as per</p>
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		<p>notification no. 25/2012 Service Tax dated 20.06.2012, in respect of contracts entered into on or after 1st March 2016 has been withdrawn vide notification no. 09.2016 dated 01.03.2016 w.e.f 01.03.2016 & now the service tax is applicable on all such contracts to be executed on or after 01.03.2016. However, the abatement as available on original works may also be available as per the provision of the Act and service tax may be leviable on 40% of total value @ 14% = 5.6% on gross value plus cess/surcharge etc as applicable</p> <p>Note:1 Amendments to above notifications, if any, up to the date 28 days prior to the deadline for submission of bids shall also be deemed to be taken into consideration in the Contract Price. The copies of above notification are attached as Annexure – I to the SCC.</p> <p>Note:2 In addition to above exemptions (Custom Duty, Excise Duty, VAT, Rajasthan Entry Tax and Service Tax), if any other exemptions which are available to the contractor by virtue of any notification of Govt./Local Bodies existing as on 28 days prior to the submission of the bids, may be availed by the contractor and JMRC will issue the necessary required certificates for availing such exemptions on the request of the contractor.</p> <p>C. Bid Evaluation:-</p> <ol style="list-style-type: none"> 1. The bidders shall quote fix lump sum price or as per BOQ price (as the case may be) inclusive of all taxes, levies, duties, cess, freight, insurance and all other incidental charges required to fulfill the contract requirements including statutory deduction viz., TDS towards Income Tax T/Works Contract Tax etc., except the exemptions stated in clause A, B above to the extent the same are applicable and available. 2. However, any new taxes/duties or any statutory variation in the existing taxes/duties applicable to the JMRC project during the contractual completion shall be to the employers account i.e.
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		<p>reduction is to be passed on to the employer and increase to be reimbursed by the employer, The contractor shall furnish the documentary evidence in support of their claims for reimbursement from JMRC. However, any increase in cost due to new taxes/duties or any statutory variation in the existing taxes/duties applicable to the JMRC project during extended contractual period due to contractors fault shall be to contractor account, whereas any decrease in the taxes/duties shall be employers account.</p> <p>D. Taxes and duties paid to the sub-vendors shall not be paid separately and therefore are to be included in the price.</p>
	Sub Clause 11.2	No price escalation shall be provided.
8.	Sub Clause 12.1	<p>Terms of Payment</p> <p>The fixed Lump Sum Price shall be apportioned by the Contractor amongst the various Cost Centers in accordance with Appendix-1 of Contract forms, wherever applicable. The amount thus apportioned under each Cost Centre will be further apportioned amongst various Milestones with the approval of the Employer. The Contractor shall be entitled to submit to the Project Manager requests for interim payments only upon the achievement of one or more of the Milestones described in the Cost Centre.</p> <p>At the beginning of each month, the Project Manager shall issue to the Contractor certificate in respect of each Milestone due to be achieved in the preceding month stating:</p> <ul style="list-style-type: none"> (a) the date on which the Milestone was achieved; or (b) the non-achievement of the Milestone. <p>The Contractor shall submit a statement in three copies to the Project Manager at the beginning of each month, in a form approved by the Project Manager, showing the amounts to which the Contractor is entitled, together with supporting documents, including</p>

		<p>Milestone Certificates. The statement shall include the following items, as applicable, which shall be expressed in the various currencies in which the Contract Price is payable, in the sequence listed:</p> <ul style="list-style-type: none"> a) the amount due in respect of Milestones certified achieved by the Project Manager under each Cost Centre; b) any amounts to be added and deducted for the advance payments and recovery thereof; c) any other additions or deductions is due and approved by the Project Manager in accordance with the Contract; and d) the deduction of the amounts certified in all previous Interim Payment Certificates. <p>The Contractor shall not submit more than one request for interim payment per month.</p> <p>If any Milestone is not achieved by the end of the month in which it is scheduled to be achieved, the Project Manager shall suspend the payment relating to the Cost Centre in which the Milestone is included.</p> <p>Payments suspended under this Clause shall be resumed by being included in the next application for interim payment made after the Milestone is achieved.</p>
		<p>A. Payment- Interim and Final</p> <ul style="list-style-type: none"> (a) After preliminary scrutiny and certification by the Engineer, payment of 80% of the certified interim amount shall be made by the Employer within 14 days. The amount certified shall account for all deductions, including statutory deductions, recoveries for advances and any amounts due from the Contractor. The balance 20% shall be paid within 28 days, from the date of the preliminary certification of the bill by the Engineer. (b) Next 80% interim payment shall be made only after 100% payment of preceding interim payment certified has been completed. (c) the Employer shall pay the amount certified in the Final Payment Certificate within 56 days from the date of issue of the Certificate.

		<p>Payments shall be made into a bank account, nominated by the Contractor in Indian rupees in a bank in India unless otherwise permitted in Special Conditions of Contract. If payments are to be made in more than one currency, separate bank accounts may be nominated by the Contractor for each currency, and payments shall be made by the Employer accordingly.</p> <p>If and to the extent that the Pricing Document expressly specifies in relation to a Cost Centre that the Contractor is entitled to payment in a currency other than Indian Rupees, or the Engineer makes a determination of Cost in a currency other than Indian Rupees, all such payments shall be made in the relevant foreign currency and no adjustment shall be made to any payment or to the Final Contract Sum on account of any fluctuation in the exchange rate between Indian Rupees and such other currency from the Base Date.</p> <p>All payments in a foreign currency shall be made against an irrevocable Letter of Credit or through Electronic funds transfer.</p> <p>Contractor may apply for part completion of any milestone, if the milestone activity has been at least 50% completed, along with supporting details justifying the percentage completion being requested. The Employer's Engineer shall have the full authority to accept, modify or reject any such request. The decision of the Engineer is final.</p>
		<p>B. Application for Final Payment Certificate</p> <p>Not later than 56 days after the issue of the Performance Certificate, the Contractor shall submit to the Engineer three copies of a draft final statement with supporting documents showing in detail, in a form approved by the Engineer:</p> <ul style="list-style-type: none"> (a) the value of all work done in accordance with the Contract, and (b) any further sums which the Contractor considers to be due to him under the Contract or otherwise. <p>If the Engineer disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as the Engineer may reasonably require and shall make changes in the</p>

		<p>draft as may be agreed between them. The Contractor shall then prepare and submit to the Engineer the Final Statement as agreed.</p> <p>If, following discussions between the Engineer and the Contractor and any changes to the draft final statement which may be agreed between them, it becomes evident that a dispute exists, the Employer shall pay those parts of the draft final statement as certified by the Engineer as not being in dispute. The remainder of the dispute may then be resolved under Clause 45, GCC in which case the Contractor shall then prepare and submit to the Engineer a Final Statement in accordance with the outcome of the dispute.</p> <p>Discharge</p> <p>When submitting the final statement, the Contractor shall submit a written discharge which confirms that the total of the Final Statement represents full and final settlement of all monies due to the Contractor under the Contract. Such discharge may state that it shall become effective only after payment due under the Final Payment Certificate has been made and the Performance security referred to in Sub-Clause 13.3, GCC has been returned to the Contractor.</p>
		<p>C. Issue of Final Payment Certificate</p> <p>The Engineer shall issue to the Employer, with a copy to the Contractor, the Final Payment Certificate within 28 days after receiving the Final Statement and written discharge in accordance with Clause 8(C), stating:</p> <ul style="list-style-type: none"> (a) the amount which is finally due, and (b) after giving credit to the Employer for all amounts previously paid by the Employer and for all sums to which the Employer is entitled, the balance, if any, due from the Employer to the Contractor or from the Contractor to the Employer, as the case may be. <p>If the Contractor has not applied for a Final Payment Certificate in accordance with Clause 8(B), the Engineer shall request the Contractor to do so. If the Contractor fails to make such an application within a period of 28 days, the Engineer shall issue the Final Payment Certificate for such amount as he considers</p>

		to be due.
		<p>D. Signature On Receipts For Payments</p> <p>Every receipt of payment to Contractor including refund of the Performance Security shall be signed by the person authorized to do so on his behalf. In the event of death of any of the Contractor's partners in case the Contractor is a partnership firm, during the currency of the Contract, it is hereby expressly agreed that every receipt by any one of surviving Contractor's partners, shall, if so signed as aforesaid, be a good and sufficient discharge as aforesaid, provided that nothing in this Clause shall be deemed to prejudice or affect any claim, which the Employer may hereafter have against the legal representatives of any Contractor's partner so dying, for or in respect of breach of any of the conditions of the Contract. Provided also that nothing contained in this clause shall be deemed to prejudice or affect the respective rights and obligations of the Contractor's partners, or of the legal heirs / representatives of any deceased Contractor / partner inters.</p>
		<p>E. Recovery of money due to the Employer</p> <p>All damages (including, without limitation, liquidated damages), costs, charges, expenses, debts, or sums for which the Contractor is liable to the Employer under any provision of the Contract may be deducted by the Employer from monies due to the Contractor under the Contract (including, without limitation, liquidated damages) and the Employer shall have the power to recover any balance not so deducted from monies due to the Contractor under any other contract between the Employer and the Contractor.</p> <p>When the Contractor has assigned to a third party the right to receive monies due, or, to become due, under the Contract to the Contractor or charged such monies in favour of a third party, the Employer's right to deduct damages (including without limitation liquidated damages), costs, charges, expenses, debts or sums for which the Contractor is liable to the Employer from monies due to the Contractor under the Contract shall be limited to the right expressed above.</p>
9.	Sub Clause 13.1	<p>Issuance of Securities</p> <p>The forms of Performance security and Advance Payment Guarantee shall be in the formats given in the</p>

		<p>contract forms , Section 9 of the contract. The forms of Parent Company Undertaking, Parent Company Guarantee and Contractor's warranty shall be in the formats given in the annexures VI, VII & VIII respectively to these Special Conditions of Contract. Even if not described or stated in the Employer's Requirements and the Contractor's Technical Proposals, the Contractor shall carry out and complete the design of the Works, including the selection of specifications for the kind and standard of Plant, Materials and workmanship to be used therein.</p> <p>The Contractor warrants to the Employer (Annexure VIII) that:</p> <ul style="list-style-type: none"> (a) the Works will, when completed, comply in all respects with the Employer's Requirements. (b) the Works have been or will be manufactured, constructed, executed, supplied, installed and tested to the highest standards available using proven up-to-date good practice; (c) the Works will, when completed, comply with enactments and regulations relevant to the Works; and (d) no Materials generally known to be deleterious or not in accordance with good engineering practice have been or will be selected or incorporated in the Works, by the Contractor. <p>The Contractor shall not, under any circumstance, have or make any claim for additional payment or an extension of time or be relieved from any liability or obligation under the Contract, where the cause of delay, suspension, impediment to or adverse effect upon the progress of the Works is due to failure by the Contractor.</p> <p>The Schedules attached to SCC may be modified as considered necessary at the time of finalisation of the Contract.</p>
10.	Sub Clause 13.2	<p>Advance Payment Security</p> <p>Mobilisation advance shall be paid interest free against acceptable Bank Guarantee from a scheduled commercial bank in India. The value of Bank Guarantee taken towards security of "Mobilisation advance" shall be 110% of the advance taken by the contractor.</p>

		<p>The Advance Payment shall be</p> <ul style="list-style-type: none"> a) Mobilisation advance of 10% of the Fixed Lump Sum Price when the Contract becomes effective. b) The advance payment shall be in the same proportion of currencies in which the Fixed Lump Sum Price has been quoted. c) The first installment shall be paid after mobilisation has started and next installment shall be paid after satisfactory utilization of earlier installment. d) Amount of advance payment guarantee will be reduced by an amount by which mobilization advance has been recovered from the contractor's interim payment requests. Such adjustment in the amount of advance payment guarantee will be carried out every six months. <p>Recovery of Advance</p> <ul style="list-style-type: none"> a) The recovery of advances shall commence when 20% of the original contract value of the work has been paid and it will be completed by the time 85% of the contract value has been paid or the original completion date whichever is earlier. As far as possible the recovery of advances shall be limited to 30% of an account bill. b) No advance shall be given after 40% of the original contract amount has been paid. c) The contractor shall always have the option to have the recoveries commenced and/ or completed earlier, and /or to have recoveries affected in installments of higher amount and also to repay part or whole of the advance by direct payment rather than through On-account Bills d) In case the contract is terminated due to default of the contractor or rescinded/foreclosed due to any other
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		<p>reason, the contractor shall return the unrecovered amount of all advances within 15 days of issue of notice of termination /rescission/fore closer of the contract and if the contractor fails to do so due to any reason whatsoever , then interest at an interest rate equal to State Bank of India prime lending rate plus 2% per annum or 10% per annum whichever is higher shall be charged on the unrecovered amount of such advances from 16th day onwards till the same is returned by the contractor .</p> <p>Interest in case of Delay in repayment of Advances</p> <p>Should there be delay in progress and completion of work, as a result of which is not possible to recover the advance and interest thereon, before the date of completion stipulated in the Contract, then the interest to be charged from the Contractor on the remaining portion of the advance beyond the original completion date specified in the Contract, shall be the State Bank of India prime lending Rate plus 2% per annum or 10% per annum whichever is higher.</p> <p>Advances to be used only for this work</p> <ol style="list-style-type: none"> The advances shall be used by the Contractor strictly for the purpose of the Contract, and for the purpose for which they are paid. Under no circumstances, shall the advances be diverted for other purposes. Any such diversion shall be construed as a breach of the contract and the contractor shall be asked to return the advance at once and pay interest at 15% per annum till the advance is recovered back from him .The Contractor shall return the advance and pay the interest in one go without demur. Employer retains the right for any other remedy prescribed for breach of Contract in this regard. The Contractor, if required by the Project Manager shall provide the details of utilization of Mobilization advance.
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11.	Sub Clause 13.3.1	<p>Performance Security</p> <p>Within 28 days of receipt of the Letter of Acceptance, the successful Tenderer shall furnish Performance Security in the form of a bank guarantee from a branch in India of a scheduled foreign bank or from a scheduled commercial bank in India acceptable to the Employer for an amount of 10% of the Contract value in types and proportions of currencies in which the Contract Price is payable.</p>
		<p>Whenever the contract value exceeds beyond 25% of the original contract value either due to Employer's variation or due to Contractor's variation, the contractor shall submit additional performance security equal to an amount of 10% of the variation reduced by an amount equal to 5% of the work already certified as completed by the Project Manager -in-Charge on the date of variation subject to a maximum limit of 10% of the variation amount.</p>
		<p>No additional performance security will be required to be submitted if the variation is within 25% of the original contract value.</p>
		<p>The performance security shall be in the form of the bank guarantee as per form included in Section 9 (Contract Forms).</p>
	Sub Clause 13.3.3	<p>Forfeiture</p> <ul style="list-style-type: none"> i. Failure of the successful Bidder to furnish the required Performance Security shall be a ground for the annulment of the award of Contract and forfeiture of the tender security. ii. The whole of the Performance Security amount shall be liable to be forfeited by the Employer at the discretion of the Employer, in the event of any breach of contract on the part of the Contractor. iii. On termination of contract due to contractor's default as per GCC Clause 42.2 the performance security shall be forfeited by encashing the bank guarantee and the balance work shall be got done independently without

		<p>risk and cost of the failed contractor. The failed contractor shall be debarred from participating in the tender for executing the balance work. If the failed contractor is a JV or a partnership firm, then every member/partner of such JV or partnership firm shall be debarred from participating in the bid for the balance work either in his/her individual capacity or as a partner of any other JV/partnership firm.</p> <p>The Project Manager shall not make a claim under the Performance Security except for amounts to which the JMRC is entitled under the contract (Not withstanding and/or without prejudice to any other provisions in the contract agreement) in the event of:</p> <ul style="list-style-type: none"> a) Failure by the contractor to extend the validity of the Performance Security, in which event the Project Manager may claim the full amount of the Performance Security. b) Failure by the contractor to pay JMRC any amount due, either as agreed by the contractor or determined under any or the Clauses/Conditions of the agreement, within 30 days of the service of notice to this effect by Project Manager. <p>The contractor being determined or rescinded under provision of the GCC, the Performance Security shall be forfeited in full and shall be absolutely at the disposal of the JMRC.</p>
		<p>Release</p> <ul style="list-style-type: none"> i. On completion of the entire work, one half of the Performance Security shall be refunded to the Contractor, on issue of Completion Certificate by the Project Manager. This shall not relieve the Contractor from his obligations and liabilities, to make good that may be detected during the Defects Liability Period. ii. The balance amount shall become due and shall be paid to the Contractor on signing of the Performance Certificate after the expiry of the final Defects Liability Period in

		accordance with GCC Clause 27 & SCC Clause 29 & 55.
12.	Sub Clause 15	<p>Intellectual Property</p> <p>In addition to GCC following shall also apply-</p> <p>As between the Parties, the Contractor shall retain the copyright and other intellectual property rights in the Contractor's Documents and other design Documents made by (or on behalf of) the Contractor.</p> <p>The Contractor shall be deemed (by signing the Contract) to give to the Employer an on-terminable transferable non-exclusive royalty-free license to Copy, use and communicate the Contractor's Documents, including making and using modifications of them .This license shall:</p> <p>a) Apply throughout the actual or intended working life(whichever is longer)of the relevant parts of the Works,</p> <p>Entitle any person in proper possession of the relevant part of the Works to copy, use and communicate the Contractor's Documents for the purposes of completing, operating, maintaining, altering, adjusting, repairing and demolishing the Works, and in the case of Contractor's Documents which are in the form of computer Programs and other software, permit their use on any computer on the Site and other places as envisaged by the Contract, including replacements of Any computers supplied by the Contractor.</p>
13.	Sub Clause 17	<p>Project Manager's Authority to Delegate</p> <p>i. The Project Manager, may from time to time assign and delegate authority to Project manager's representatives/assistants and may also revoke such assignments and delegations. The delegation or revocation shall be in writing and shall be applicable only after same has been notified in writing to the Contractor.</p> <p>ii. Each Assistant to whom duties have been assigned or authority has been delegated, shall be authorized to issue instructions to the Contractor to the extent defined by the delegation. Any</p>

		<p>determination, approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test or similar act by an assistance shall have the same effect as though the act had been an act of the Project manager. However:</p> <p>(a) Any failure to disapprove any Plant, Goods , Material, design and workmanship shall not prejudice the right of the Project manager to reject such Plant, Goods , Material, design and workmanship;</p> <p>(b) if the Contractor questions any determination or instruction of an assistant of the Project manager, the Contractor may refer the matter to the Project manager within three days of such decision having been given, who shall confirm, reverse or vary such determination or instruction</p> <p>Project Manager's Instructions</p> <p>The Contractor shall comply with instructions given by the Project manager in accordance with the Contract.</p> <p>The Contractor shall give reasonable notice to the Project manager of any instruction, which he considers necessary for the execution of the Works, to enable the Project manager to issue the instruction so that progress of the Works is not delayed. The Project manager shall not, however, be bound to issue any instruction which, in his opinion, is unnecessary.</p> <p>No act or omission by the Project manager or the assistants to the Project manager in the performance of any of the Project manager's duties or the exercise of any of the Project manager's powers under the Contract shall, in any way, operate to relieve the Contractor of any of the duties, responsibilities, obligations or liabilities imposed upon the Contractor by any of the provisions of the Contract.</p> <p>Project manager to Attempt Agreement</p> <p>When the Project manager is required to determine value, cost or extension of time, he shall consult with the Contractor and the Employer in an endeavour to reach agreement. If agreement is not achieved, the</p>
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		Project manager shall determine the matter fairly, reasonably and in accordance with the Contract, with the approval of Employer
14.	Sub Clause 18.2	<p>Work Programme</p> <p>The Contractor shall submit a detailed programme to the Project Manager after receipt of the Letter of Acceptance within the period stipulated in the Employer's Requirements. . The Contractor shall also submit a revised programme whenever the Project Manager finds that the previous programme is inconsistent with actual progress or with the Contractor's obligations.</p> <p>The Works Programme and any other document submitted along with the Tender shall not in any event be construed as a submission of the Programme under Employer's Requirements.</p> <p>Manufacture, Supply, Installation, Testing and Commissioning (Including Integrated Testing and Commissioning) Methods</p> <p>The Contractor shall submit complete documents and information pertaining to the methods of manufacture, supply, installation, testing and commissioning (including Integrated Testing and Commissioning) which the Contractor proposes to adopt or use on Corridors. The Engineer / Project Manager will then check to see whether, if such methods are adhered to, the Works can be executed in accordance with the Contract and without detriment to the Works (when completed) and to other works comprising the Project.</p> <p>The Engineer / Project Manager shall inform the Contractor in writing within 21 days after receipt of the above information</p> <ul style="list-style-type: none"> (a) that the Contractor's proposed methods of manufacture, testing and commissioning (including Integrated Testing and Commissioning) have the consent of the Project Manager; or (b) in what respects, in the opinion of the

		<p>Project Manager the Contractor's proposed methods of manufacture, etc:</p> <ul style="list-style-type: none"> (i) fail to comply with the Employer's Requirements and/or the Final Design; (ii) would be detrimental to the Works and/or to the other works comprising the Project; (iii) do not comply with the other requirements of the Contract; or (c) as to the further documents or information which are required to enable the Project Manager to properly assess the proposed methods of manufacture, etc. <p>In the event that the Project Manager does not give his consent, the Contractor shall take such steps or make such changes in the said methods or supply such further documents or information as may be necessary to meet the Project Manager 's requirements and to obtain his consent. The Contractor shall not change the methods of manufacture, supply, installation, testing and commissioning (including Integrated Testing and Commissioning) which have received the Project Manager 's consent without further review and consent in writing of the Project Manager.</p> <p>Notwithstanding the foregoing provisions of this Clause, or that certain of the Contractor's proposed methods of manufacture, etc. may be the subject of the consent of the Project Manager, the Contractor shall not be relieved of any liability or obligation under the Contract.</p>
15.	Sub Clause 19	<p>Sub-contracting</p> <p>19.1 The Employer shall screen in detail the sub-contractors and vendors listed in Appendix 5 during the Contract execution Phase. It will be obligatory for the Contractor to obtain Notice of No Objection from the Project Manager to the identity of the sub-contractors and vendors selected by the Contractor from the list included at the time of the Tender.</p>

		<p>For installation and other sub-contracts for items not included in Appendix 5, each costing over INR Five Lakh, it will be obligatory on the part of the Contractor to obtain consent of the Employer to the identity of the sub-contractor. The Employer will give his consent after assessing the technical suitability of the sub-system/system including proven performance, and feasibility of its maintenance in India, etc.</p> <p>The terms and conditions of the sub-contract/vending agreement are the sole prerogative of the Contractor and are deemed to be included in the Lump Sum Price.</p> <p>In case the Employer intends to withhold his consent, he shall inform the Contractor in time to enable him to make alternative arrangements to fulfill his programme.</p> <p>(a) The Contractor shall provide sufficient superintendence, whether on the Site or elsewhere, to ensure that the work to be carried out by a sub-contractor complies with the requirements of the contract.</p> <p>(b) The proposed sub-contract terms and conditions shall impose on the sub-contractor such of the terms of the Contract as are applicable and appropriate to the part of the Works to be sub-contracted, to enable the Contractor to comply with his obligations under the Contract.</p> <p>(c) In case of urgency and on receipt of application from the contractor the Project Manager may shorten the notice period from 28 days required for a sub-contractor's work to be commenced.</p> <p>(d) After the Notice of No Objection issued by the Project Manager to the identity of the sub-contractor/vendor, any change in the identity of sub-</p>
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		<p>contractor/vendor shall require prior approval of the Project Manager.</p> <p>Notwithstanding any consent to sub-contract given by the Project Manager, if in his opinion he considers it necessary, the Engineer shall have full power to order the removal of any sub-contractor from the Site or off-Site place of manufacture or storage, which power shall not be exercised unreasonably.</p> <p>For the subcontractor submitted at the time of bidding:-</p> <p>For the work proposed for sub contracting at the time of submission of bid (for evaluation of this contract) as per section 3 (EQC), no change in sub-contractor (submitted for the said work) shall be allowed from LOA to completion of works.</p> <p>The form of the Sub-Contractor's Warranty shall be in the format given in Annexure IV.</p>
16.	Sub Clause 20	<p>Design and Engineering</p> <p>Following shall be read in conjunction with GCC clause:</p> <p>General Obligations/Statutory Requirements</p> <p>The Design and Construction Standards shall be in conformity with the requirements of "Rules for Opening of a Railway or a Section of a Railway for Public Carriage of Passengers" and "Rules for Introduction of New Type of Rolling Stock" and to the satisfaction of the Commissioner of Railway Safety whose sanction is mandatory for commissioning of the System. The Contractor shall in this regard carry out all statutory tests and trials necessary for obtaining sanction of the competent authority for opening the system for public carriage of passengers and provide assistance and information as required by the appropriate statutory authorities in India.</p> <p>In the event that the Contractor employs a Designer, then the Contractor shall furnish a Designer's Warranty in the format given in Annexure V.</p> <p>Construction and/or Manufacture Documents</p>

		<p>The Contractor shall submit drawings and documents, as required by the Contract, to the Project Manager/ Engineer in accordance with any submittal schedule agreed with the Project Manager. This submittal shall be made sufficiently before the Works are to be carried out to give the Project Manager and the Employer reasonable time to examine the drawings or other documents, to prepare comments and for any changes to be accommodated by the Contractor.</p> <p>Where the consent of the Project Manager is required, the Project Manager shall notify the Contractor in writing of his decision either within such period as may expressly be stipulated in the Contract or otherwise within a reasonable time.</p> <p>If the Project Manager has reasonable cause for being dissatisfied with the proposals set out in the Contractor's drawings or documents, the Project Manager shall, within a period of 28 days from the date of submittal, require the Contractor in writing to make such amendments thereto as the Project Manager may consider necessary. The Contractor shall make and be bound by such amendments at no additional expense to the Employer and shall resubmit the amended drawings or documents for Project Manager's consent.</p> <p>Within 14 days of notification of the Engineer / Project Manager's consent the Contractor shall provide the Project Manager with the type and number of sets of the relevant drawings or documents as stipulated in the Employer's Requirement.</p> <p>Should it be found at any time after notification of consent that the relevant drawings or documents do not comply with the Contract or do not agree with drawings or documents in relation to which the Project Manager has previously notified his consent, the Contractor shall, at his own expense, make such alterations or additions as, in the opinion of the Project Manager, are necessary to remedy such non-compliance or non-agreement and shall submit all such varied or amended drawings or documents for the consent of the Project Manager.</p> <p>No examination by the Project Manager of the drawings or documents submitted by the Contractor, nor any consent of the Project Manager in relation to</p>
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		<p>the same, with or without amendment, shall absolve the Contractor from any of his obligations under the Contract or any liability for or arising from such drawings or documents.</p> <p>The Operation and Maintenance Manuals and drawings submitted by the Contractor shall, if required, be updated during the Defects Liability Period and re-submitted for approval by the Project Manager.</p>
17.	Sub Clause 21.1	<p>Material</p> <p>The Contractor shall adequately record the condition of roads, agricultural land and other infrastructure prior to the start of transporting materials, goods and equipment, and construction.</p>
18.	Sub Clause 22.1.1	<p>Bench Mark</p> <p>The Contractor shall comply with</p> <p>i) The measures and requirements relevant to the Contractor which are set forth in the Resettlement Plan ("RP") /Environmental Management Plan ("EMP") attached as Annexure – IX to the SCC, to the extent it concerns impacts on affected people during construction; and</p> <p>ii) Any corrective or preventive actions set out in safeguards monitoring reports that the Employer will prepare from time to time to monitor implementation of the resettlement plan</p>
19.	Sub Clause 22.2.3	<p>Labour laws</p> <p>The Contractor shall not make employment decisions based upon personal characteristics unrelated to job requirements. The Contractor shall base the employment relationship upon equal opportunity and fair treatment, and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment or retirement, and discipline.</p> <p>The Contractor shall provide equal wages and benefits to men and women for work of equal value or type.</p>
20.	Sub Clause 22.2.5	<p>Working Hours</p> <p>Normal working hours are: 8 Hours per day. The Contractor, if required, shall carry out work during night and in shifts. No extra payments shall be admissible for night work. The Contractor shall provide adequate lightning and safety arrangements.</p>

		<p>The Contractor shall take due approval from the employer before carrying out any works necessitated by the provisions of contract in or around the sites deemed part of the works of phase 1-A, JMRTS. All work permits shall be taken in accordance with the procedures laid down by employer and work shall be done in accordance with safety and quality provisions of this contract.</p>
21.	Sub Clause 22.2.7	<p>Health and Safety</p> <p>a. The Contractor shall throughout the contract (including the Defect Liability Period):</p> <ul style="list-style-type: none"> (i) conduct Information, Education and Consultation Communication (IEC) campaigns, at least every other month, addressed to all the Site staff and labor (including all the Contractor's employees, all Sub-Contractors and Employer's and Project Manager's' employees, and all truck drivers and crew making deliveries to Site for construction activities) and to the immediate local communities, concerning the risks, dangers and impact, and appropriate avoidance behavior with respect to of Sexually Transmitted Diseases (STD)—or Sexually Transmitted Infections (STI) in general and HIV/AIDS in particular; (ii) provide male or female condoms for all Site staff and labor as appropriate; and (iii) provide for STI and HIV/AIDS screening, diagnosis, counseling and referral to a dedicated national STI and HIV/AIDS program, (unless otherwise agreed) of all Site staff and labor. <p>The Contractor shall include in the program to be submitted for the execution of the Facilities under Sub-Clause 18.2 an alleviation program for Site staff and labor and their families in respect of Sexually Transmitted Infections (STI) and Sexually Transmitted Diseases (STD) including HIV/AIDS. The STI, STD and HIV/AIDS alleviation program</p>

		<p>shall indicate when, how and at what cost the Contractor plans to satisfy the requirements of this Sub-Clause and the related specification. For each component, the program shall detail the resources to be provided or utilized and any related sub-contracting proposed. The program shall also include provision of a detailed cost estimate with supporting documentation. Payment to the Contractor for preparation and implementation this program shall not exceed the Provisional Sum dedicated for this purpose.</p>
		<p>b. Safety Precautions</p> <p>After the date of Notice to Proceed, the Contractor shall submit a detailed and comprehensive contract-specific Site Safety Plan based on the Employer's Safety, Health and Environmental Manual (SHE Manual). The Contractor is required to make himself aware of all the requirements of the Employer's Safety, Health and Environmental Manual in this regard and comply with them. The Site Safety Plan shall include detailed policies, procedures and regulations which, when implemented, will ensure compliance with 22.2.7 of General Conditions of Contract. The Contractor shall, from time to time and as necessary or required by the Project Manager, produce supplements to the Site Safety Plan such that it is at all times a detailed, comprehensive and contemporaneous statement by the Contractor of his site safety and industrial health obligations, responsibilities, policies and procedures (under the laws of India) or as stated in the Contract or elsewhere relating to work on Site.</p> <p>If at any time the Site Safety Plan is, in the opinion of the Project Manager, insufficient or requires revision or modification to ensure the security of the Works and the safety of all workmen upon, and visitors to the Site, the Project Manager may instruct the Contractor to revise the Site Safety Plan. The Contractor shall, within 14 days, submit the revised plan to the Project Manager for review.</p> <p>Any omission, inconsistency or error in the Site Safety Plan or the Project Manager concurrence or rejection of the Site Safety Plan and/or supplements thereto shall be without prejudice to the Contractor's obligations with respect to site safety and industrial health and shall not excuse any failure by the</p>

		<p>Contractor to adopt proper and recognised safety practices throughout the execution of the Works.</p> <p>The Contractor shall adhere to the Site Safety Plan and shall ensure that all sub-contractors of all tiers have a copy of the Site Safety Plan and comply with its provisions.</p> <p>The Contractor shall provide all necessary access, assistance and facilities to enable the Project Manager and the Employer to carry out surveillance to verify that the Site Safety Plan is being properly and fully implemented.</p> <p>The Contractor shall notify the Project Manager immediately of any occurrence or incident that results in death or serious injury as defined in the Indian Penal Code. Such initial notification may be verbal and confirmed in writing thereafter and shall be followed by a comprehensive written report within 24 hours of the occurrence/incident. The Contractor shall duly complete standard forms as required by the Project Manager and Statutory Authorities.</p> <p>The Contractor shall provide and maintain all necessary temporary fire protection and fire fighting facilities on the Site during the construction of the Works in accordance with the statutory regulations and as required by the Project Manager. The Contractor shall ensure that all gases, fuels and other dangerous Materials and goods are stored and handled in a safe manner and in accordance with the statutory regulations and as required by the Project Manager.</p> <p>The obligations and requirements for safety and industrial health under this Contract are entirely without prejudice to, and do not derogate from, the Contractor's statutory obligations, with respect to safety and industrial health.</p> <p>A minimum penalty of Rs. 10000/- shall be imposed along with the cost of non provision of services as per Jaipur Metro SHE manual for each instance.</p>
22.	Sub Clause 22.2.8	<p>Funeral Arrangements</p> <p>Funeral arrangements: The bidder shall be responsible for making funeral arrangements if required.</p>

23.	Sub Clause 22.2.16	<p>Prohibition of Harmful Child Labour</p> <p>"Child" means a child below the statutory minimum age specified under applicable national, provincial or local law of India.</p>
24.	Sub Clause 22.4	<p>Site Regulations and Safety</p> <p>The following is added to existing GCC Clause.</p> <p>The Contractor shall take all measures necessary to ensure such security, including exercising control over all persons and vehicles which are employed or engaged on the Site or in connection with the Works or the other works comprising the Project and with the security arrangements applicable to any other site within the Project.</p> <p>The Contractor shall arrange the issue of passes for the admission of all persons and vehicles to the Site or to any part thereof and may refuse admission to or remove from the Site any person or vehicle failing to show an appropriate pass on demand to any duly authorised person. If required by the Engineer/ Project Manager, the Contractor shall submit a list identifying all persons to whom passes have been issued together with two photographs of each person and all entities to which a pass has been issued in respect of any vehicle and shall satisfy the Project Manager of the bonafides of any such person or entity.</p> <p>The Contractor shall not, without the written permission of the Engineer / Project Manager or otherwise in accordance with the Contract, allow access to the Site to any person unless the presence on Site of such person is necessary in connection with the execution of the Works or with the discharge of the duties of any relevant authority.</p> <p>All lights provided by the Contractor shall be so placed or screened as not to interfere with signs, signals or lights. The Contractor shall not in any way obscure or affect signs, signals or lights, in use by any relevant authority. In the event that the Contractor does so, the Contractor shall pay all costs associated with the re-setting, re-instating or provision of alternatives for any sign, signal or light, obscured or affected.</p> <p>For the purposes of this Clause only, "Site" shall</p>

		include off-Site places of manufacture or storage and the Contractor's Work Areas and shall include, areas provided to the Contractor by others.
25.	Sub Clause 24	<p>Completion of the Facilities</p> <p>The Works shall be taken over by the Employer when the same have been completed in accordance with the Contract, have passed the Tests on Completion, including Integrated Testing and Commissioning where ever applicable as per the contract, and a Completion Certificate/ Taking Over Certificate for the Works shall be issued. If the Works are divided into Sections, the Contractor shall be entitled to apply for a Completion Certificate for each Section.</p> <p>No Completion certificate/ Taking Over Certificate shall be issued before successful completion of Integrated Testing and Commissioning as per Employer's requirements and the contractor shall be responsible for care and custody of the works including risk of loss or damage thereto before works are taken over by employer with issuance of Taking Over Certificate.</p> <p>The Contractor may apply by notice to the Engineer / Project Manager for a Completion Certificate/ Taking Over Certificate not earlier than 14 days before the works or section (as the case may be) will, in the Contractor's opinion, be complete and ready for taking over. The Engineer / Project Manager shall, within 28 days after the receipt of the Contractor's application shall conduct a complete joint survey of the works including carrying out any tests prescribed in the contract and prepare a list of defects and outstanding works and :</p> <p>(a) issue the Completion Certificate/ Taking Over Certificate to the Contractor, stating the date on which the Works or Section were completed, including the Tests on Completion and Integrated Testing and Commissioning where ever applicable as per the contract in accordance with the Contract if defects and/or outstanding works are minor that does not affect the use and safety of the Works or Section for their intended purposes. The list of such works along with the target date of completion for each work shall be enclosed with the Completion certificate and completion</p>

		<p>of all these works /rectification of defects within the stipulated time shall be the responsibility of the contractor and any failure in it may be considered a reason by the Project Manager to cancel the taking over certificate issued earlier; or</p> <p>(b) reject the application, giving his reasons and specifying the work required to be done by the Contractor to enable the Completion Certificate/ Taking Over Certificate to be issued. The Contractor shall then complete such work before issuing a further notice under this Sub-Clause.</p> <p>The Engineer / Project Manager may, at the sole discretion of the Employer issue a Completion Certificate/ Taking Over Certificate for any part of the Permanent Works by following the procedure stipulated in this SCC clause if:.</p> <p>(a) the Employer uses that part of the Works for revenue service before the Completion Certificate/ Taking Over Certificate is issued for the entire work.</p> <p>(b) the balance part is not completed not due to the fault of the contractor and contractual date of completion for the completed part is over.</p> <p>Upon the completion of construction, the Contractor shall fully reinstate pathways, other local infrastructure, and agricultural land to at least their pre-project condition as recorded by the Contractor in consonance with its obligation in Clause 21.1</p> <p>Scope of Works and Supply by the Employer</p> <p>Except for the facilities as stated in Employer's Requirements, Section 6 of this Contract, no other facilities/works shall be provided by the Employer to the Contractor.</p>
26.	Sub Clause 25.1	<p>Commissioning</p> <p>The Contractor shall undertake commissioning of the system after successful completion of installation of the systems with Employer's consent and without issuance of any certificates to proceed or provision of any facilities by the employer except as stated in SCC Clause 25, so as to achieve the completion dates as specified in Time Schedule, Section 9.</p>

27.	Sub Clause 25.3 & 25.4	<p>Operational & Partial Acceptance</p> <p>The Integrated tests and System acceptance tests shall be successfully completed within the time stipulated in Key Dates specified in Time Schedule, Section 9, prior to which, no acceptance certificate of any kind whatsoever shall be issued.</p> <p>The only certificate for which contractor is entitled other than that of Performance Certificate shall be the Completion Certificate/Taking Over Certificate in accordance with SCC Clause 25 herein.</p>
	Sub Clause 25.5	<p>Delayed Pre-Commissioning and/or Guarantee Test</p> <p>For any delays in commissioning of system arising whether on part of contractor or not, the Contractor shall not be entitled for any additional charges towards care of facilities or any other additional compensation.</p> <p>The contractor shall only be entitled for Extension of Time for Completion in accordance with SCC Clause 35.</p> <p>Payment to contractor shall only be released after completion of milestones as per terms of payment specified herein and in Appendix-1, Section 9.</p>
28.	Sub Clause 26.2	<p>Completion Time Guarantee</p> <p>Time is the essence of the contract and therefore if the work is delayed on account of the contractor, liquidated damage shall be recovered as provided for in the contract. Annexure-III to SCC shall include in respect of the Works and in respect of any Stage, a percentage of the total contract value which will be recoverable from the Contractor as liquidated damages for delay in completion of the Works or in achievement of a stage by a particular Key Date. The total amount of liquidated damages in respect of the Works in all stages shall, however, not exceed the limit of liquidated damages stated in the Annexure-III to SCC. The aforesaid liquidated damages do not, however, include the sums payable by the Employer to Designated Contractors on account of delay caused by the Contractor to Designated Contractors which sums shall be recoverable from the Contractor in addition to any liquidated damages payable under this clause, the</p>

		<p>total ceiling limit of which is 10% of the contract value including liquidated damages levied under the provision of Annexure-III to the SCC.</p> <p>The liquidated damages are recovered by the Employer from the Contractor for delay and not as penalty.</p> <p>The Employer may, without prejudice to any other method of recovery, deduct the amount of such damages from any sum due, or to become due, to the Contractor. In the event of an extension of time being granted, the amount due under this Sub-Clause shall be recalculated accordingly, and any over-payment refunded. The payment or deduction of such damages shall not relieve the Contractor from his obligations to complete the Works, or from any other of his duties, obligations or responsibilities under the Contract.</p> <p>The Contractor shall use and continue to use his best endeavours to avoid or reduce further delay to the Works, or any relevant Stages.</p> <p>At any time after the Employer has become entitled to liquidated damages, the Engineer /Project Manager may give notice to the Contractor under clause 42 of GCC requiring the Contractor to complete the Works within a specified reasonable time. Such action shall not prejudice the Employer's entitlements to recovery of liquidated damages, under this Sub-Clause and to terminate under clause 42 of GCC.</p>
	Sub Clause 26.3	No bonus will be given for earlier Completion of the Facilities or part thereof.
29.	Sub Clause 27.2	<p>Defect Liability</p> <p>During the Defects Liability Period the Contractor shall provide, free of cost, competent and skilled personnel and maintain adequate stock of spares so as to promptly fulfil his obligations during the Defects Liability Period as laid down in GCC and Employer's Requirements.</p> <p>The Defect Liability Period of a section shall start from the date of opening of the section for revenue services</p>

		<p>and shall continue until 24 months.</p> <p>For the equipment and software supplied for OCC, the Defect Liability Period shall start from the date of opening of the first section for revenue services and shall continue until 24 months.</p> <p>The Employer may require the Contractor to enter into a Maintenance Contract with the Employer for the Signalling & Telecommunication Systems provided under the Contract under terms and conditions as specified in Employer's requirements at the rates as quoted by the contractor in Schedule 6(b).</p>
		<p>Failure to Remedy Defects :</p> <p>If the Contractor fails to remedy any defect or damage within such time as the Employer / Engineer may deem to be reasonable, the Employer or the Engineer may fix a date on or by which to remedy the defect or damage, and give the Contractor reasonable notice of such date. If the Contractor fails to remedy the defect or damage by such date and the necessity for such work is due to a cause stated below :-</p> <ul style="list-style-type: none"> • the design of the Works; • Plant, Systems, Materials or workmanship not being in accordance with the Contract; or • failure by the Contractor to comply with any of his other obligations <p>If in the opinion of the Engineer, such necessity is due to any other cause, he shall determine an adjustment to the Contract Price, with the approval of the Employer, and shall notify the Contractor accordingly.</p> <p>The Employer may (at his sole discretion):</p> <ol style="list-style-type: none"> 1. carry out the work himself or by others, in a reasonable manner and at the Contractor's risk and cost, but the Contractor shall have no responsibility for such work: the costs incurred by the Employer in remedying the defect or damage shall be recoverable from the Contractor by the Employer; 2. require the Engineer to determine and certify a reasonable reduction in the Contract Price; or

		<p>3. if the defect or damage is such that the Employer has been deprived of substantially the whole of the benefit of the Works or parts of the Works, terminate the Contract in respect of such parts of the Works as cannot be put to the intended use, the Employer shall then be entitled to recover all sums paid for such parts of the Works together with the cost of dismantling the same, clearing the Site and returning Plant, Rolling Stock and Materials to the Contractor</p>
		<p>Supervision of Maintenance</p> <p>The Contractor shall provide experts for Supervision of Maintenance. The deployment of these Experts may not be continuous and they may be required to supervise the maintenance in short periods at a time. The number of man-months of Experts shall be Four.</p> <p>These Experts shall work under the administrative control of the Employer. These Experts shall ensure that the Client's maintenance staff acquire necessary skills and follow correct procedures and practices in the maintenance, overhaul and repairs of equipment and components for Telecom Systems as well as for the maintenance of the related software.</p> <p>The qualification and experience of the Experts to be deployed by the Contractor shall be reviewed by employer.</p> <p>Prior approval of the Employer shall be necessary before the Experts are deployed for supervision of maintenance. The Contractor shall replace promptly, Contractor's experts who are not considered suitable by the Project Manager.</p>
30.	Sub Clause 30.1	<p>Limitation of Liability</p> <p>(b) The multiplier of the Contract Price is: One</p>
31.	Sub Clause 34.3	<p>Insurance</p> <p>The Contractor shall, within the respective periods stated in the Annexure-III to SCC (calculated from the Commencement Date), submit to the Employer:</p>

		<p>(a) evidence that the insurances described in this Clause have been effected, with an Indian Insurance Company ,and</p> <p>(b) copies of the policies for the insurances described in Sub-Clause 34.1.</p> <p>When each premium has been paid, the contractor shall submit copy of receipts to the employer. The contractor shall also, when providing such evidence, policies and receipts to the employer, notify the Project Manager of so doing.</p> <p>The contractor shall effect all insurances for which he is responsible with insurers and in terms approved by the employer. Each policy insuring against loss or damage shall provide for payments to be made in the currencies required to rectify such loss or damage. Payments received from insurers shall be used for the rectification of such loss or damage.</p> <p>The contractor (and, if appropriate, the employer) shall comply with the conditions stipulated in each of the insurance policies. The contractor shall make no material alteration to the terms of any insurance without the prior approval of the employer. If an insurer makes (or purports to make) any such alteration, the contractor shall notify the employer immediately.</p>
	Sub Clause 34.6	<p>If the contractor fails to effect and keep in force any of the insurances required under the contract, or fails to provide satisfactory evidence, policies and receipts in accordance with this sub-clause, the employer may, without prejudice to any other right or remedy, effect insurance for the coverage relevant to such default, and pay the premiums due. In such cases the premium paid by the employer plus overheads (equal to 50% of the premium paid) shall be recoverable from the contractor by the employer, and may be deducted by the employer from any monies due, or to become due, to the contractor or recover the same as debt due from the contractor. The contractor shall not dispute the amount of premium paid by the employer or the overhead charges thereon.</p> <p>Nothing in this clause limits the obligations, liabilities or responsibilities of the contractor or the employer,</p>

		<p>under the other terms of the contract or otherwise. Any amount not insured or not recovered from the insurers shall be borne by the contractor.</p> <p>The Contractor shall submit to the Project Manager, the details of all claims made with the insurer and claims accepted by the insurer or any other details as required by the Project Manager on monthly basis.</p>
32.	Sub Clause 36.1	<p>Change in Laws and Regulations</p> <p>Legislation in respect of taxes, duties, levies, cess etc. means any new tax, duty, levy, cess etc. which is imposed or deleted after the due date of submission of tender resulting into increase/ decrease in cost. The fixed lump sum contract price shall be adjusted to take account of this increase or decrease in cost.</p> <p>Such increase or decrease in cost shall be certified by the Project Manager after examining records provided by the contractor.</p> <p>The fixed lump sum contract price shall not be adjusted in respect of the variation in the rates of taxes, duties, levies, cess etc. till completion of the contract including extended period of completion, if any.</p>
33.	Sub Clause 39.	<p>Change in the Facilities</p> <p>Following is added to the clause 39 of GCC</p> <p>Employer's Variations</p> <p>"Employer's Variation" means a change in the Employer's Requirements which makes necessary alteration or modification of the Design, quality or scope of Works as described by or referred to in the Employer's Requirements. Changes to any sequence, method or timing of manufacture, supply, installation, testing and Commissioning including Integrated Testing and Commissioning and changes to any part of the Site or access thereto will not constitute Employer's Variation.</p> <p>If the Project Manager requests a proposal, prior to instructing a Variation which may be for additional work or alteration in the work on deletion / reduction in the scope of work, the Contractor shall submit at his own cost within 14 days or such period as the</p>

		<p>Project Manager may allow of the receipt of such request of the Project Manager</p> <ul style="list-style-type: none"> a a description of the proposed design and/or work to be performed and a programme for its execution, b the Contractor's proposal for any necessary modifications to the programme according to Sub-Clause 18.2, and c the Contractor's proposal for adjustment to the Contract Price, Time for Completion and/or modifications to the Contract. <p>Variation Procedure</p> <p>The Project Manager shall, as soon as practicable after receipt of proposals under this Sub-Clause and Sub-Clause 39.3, respond with approval, rejection or comments.</p> <p>After receipt of proposal, it will be the prerogative of the Employer, whether to Instruct and proceed ahead with the variation or drop the proposal in part or full. In that case, no cost of preparing And submitting the proposal will be payable to Contractor. In case, the design part of variation has been completed on submission of same to the Project Manager, the Employer decides to abandon the variation, only cost for design to the extent of work done will be paid to the Contractor.</p> <p>If the Project Manager instructs or approves a Variation, he shall proceed to agree or determine adjustments to the Contract Price, Time for Completion and Schedule of Payments in consultation with the Contractor and the Employer in an endeavour to reach agreement. If agreement is not achieved, the Project Manager shall determine the matter fairly, reasonably and in accordance with the Contract, with the approval of Employer</p> <p>An Employer's Variation shall be requested and implemented in accordance with and subject to the following provisions:</p> <ul style="list-style-type: none"> (a) within 14 days (or such other period as the Project Manager may allow) of the
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		<p>Project Manager informing the Contractor in writing of the intention to request an Employer's Variation, the Contractor shall notify the Project Manager in writing whether in his opinion the Employer's Variation would, if ordered:</p> <p>(i) give rise to any entitlement to an extension of time; or</p> <p>(ii) affect the achievement of any Milestone; or</p> <p>(iii) give rise to any entitlement to additional payment; or</p> <p>(iv) affect the warranties of the Contractor set out in Clause 6 of Special Conditions of Contract,</p> <p>and shall submit his proposals as to the terms upon which he would agree to implement the Employer's Variation.</p> <p>(b) The Project Manager shall determine the amount well in advance that should be added to or deducted from the relevant Cost Centre Total and/or the revisions (if any) which should be made to the Milestone Payment Schedules as a result of the Variation and get it prior approved by the Employer.</p> <p>In the event of the Project Manager and the Contractor failing to reach agreement on the revisions to be made to the Cost Centre Totals, the Project Manager shall, with the approval of the Employer, determine such revisions as shall be reasonable.</p> <p>In assessing work covered by any sub-contract, the Project Manager will have, where he deems necessary, access to the original sub-contract conditions, rates, prices and details of the variation claimed, to assist in evaluating any Variations.</p>
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		<p>c) if the Project Manager withdraws the request for an Employer's Variation, the Contractor shall have no claim of any kind whatsoever arising out of or in connection with any of the proposals made or any failure to reach agreement. In case the Employer's Variation involves omission of part of the Works, the agreement shall address the issue of reduction in the Contract Price.</p> <p>i) The quantities of items shown in the Bill of Quantities are approximate, and liable to vary during the actual execution of the work. Some items/group of items may have to be altered, added or omitted. The Contractor shall be bound to carry out and complete the stipulated work as instructed by the Project Manager, irrespective of the magnitude of variations including additions, alterations or omissions in the Bill of Quantities, individual items or group of items, specified in the Bill of Quantities.</p> <p>ii) Such variations shall be paid as follows:</p> <p>a) At the accepted rates of the Contract for Positive variation in quantities to the extent of 25%, , except in the case of foundation works. Unless otherwise specifically provided for in the Bill of Quantities or elsewhere in the Contract, the variation of 25% shall be applicable to a group of items mentioned therein and not to individual items. In case of variation in quantities on minus side, contract rates will be payable for executed quantities.</p> <p>b) For items against which the quantity given in the Bills of Quantities is "if or as required", there shall be no increase/decrease of rates whatever be the quantity finally executed.</p> <p>c) Variation in the quantity of items individually costing upto 1% of the total contract value, shall be payable at the rates stated in the Contract.</p>
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		<p>notwithstanding the magnitude of variation upto 2% of the original Contract Value for each item.</p> <p>d) In case the variation in individual items or the group of items as stipulated above, is more than 25% (positive or negative) , the rate for the varied quantity beyond 25% shall be negotiated between the Project Manager and the Contractor and mutually agreed rates arrived at before actual execution of the extra quantity.</p> <p>e) In case Project Manager introduces an item for which the Contract does not contain any rates or prices applicable to the varied Works, the rate of such items shall be derived, wherever possible, from rate for similar items available in the Bill of Quantities of the accepted Bid. In case this is not possible, the rate may be decided on the following basis:</p> <p>i) Cost of Materials at current market price, as actually utilised in the final finished Permanent Works, including a reasonable percentage for wastage and transportation.</p> <p>ii) Cost of enabling works if any(unless provided for separately) worked out on the above basis but with less stringent quality. Specifications minus salvage value of serviceable material released after completion of work and cost of material released as scrap.</p> <p>iii) Cost of labour actually used at the site of work at rates under Payment of Minimum Wages Act for the area of work for each category of worker, further enhanced by a percentage of 10% of the aforesaid rates to account for labour not directly utilised at Site and other ancillary and incidental expenses on labour.</p> <p>iv) Hire charges for Plant & Machinery, scaffolding, shuttering, forms, etc., required to be used at the site of the work. The tools used by the various</p>
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		<p>trades shall not be counted as Plant & Machinery for this purpose.</p> <p>v) An amount of 20% of items (i), (ii), (iii) and (iv) above to allow for Contractor's overheads, profits and corporate taxes. This percentage shall also apply to estimated cost of Materials supplied free to the Contractor.</p> <p>vi) In all cases where extra items of work are involved, for which there are no rates in the accepted Bill of Quantities the Contractor shall give a notice to the Project Manager, of at least 7 days before the need for their execution arises.</p> <p>f) In the event of disagreement in respect of items (d) and (e) above, the Project Manager shall fix such rates of price as are, in his opinion appropriate and shall notify the Contractor accordingly, with a copy to the Employer. Until such time as rates or prices are agreed or fixed, the Project Manager shall determine provisional rates or prices to enable on account payments to the Contractor. Alternatively, in the event of disagreement, the Contractor shall have no claim to execute extra quantities/new items and the Project Manager shall be free to get such additional quantities beyond 25% new items executed through any other agency. However, if the Project Manager or the Employer so directs the Contractor shall be bound to carry out any such additional quantities beyond the limits stated above original quantities and or new items and the disagreement or the difference regarding rates to be paid for the same shall be settled in the manner laid down under the conditions for the settlement of dispute.</p>
34.	Sub Clause 39.3	<p>Changes Originating from Contractor</p> <p>The Contractor may submit to the Employer, in writing at its own cost, any engineering proposal as contractor's variation for modifying the Employer's</p>

		<p>Requirements, provision of additional land, access or feasibility over and above that is provided in the Contract for the purpose of saving in time, construction or manufacture costs. Such variation proposal shall not impair the essential character, functions or characteristics or the Work, including service life, economy of operation, ease of maintenance, desired appearance, or design and safety standards.</p> <p>The Contractor shall provide his variation proposal in a time limit prescribed by the Engineer / Project Manager. The Engineer / Project Manager's decision in this regard shall be communicated to the Contractor within a reasonable period of time. If by any reason the time limit specified by the Project Manager is exceeded, the proposal may not be considered. The decision of the Project Manager in this regard shall be final and binding.</p> <p>If the Employer requires or accepts it, and if the Contractor wants to proceed with the proposal, the Contractor must provide (at no cost to the Employer) a detailed report prepared by a consultant acceptable to the Employer and which shall include:</p> <ul style="list-style-type: none"> a. a general description of the original Contract requirements for the Works and the proposed changes b. a detail of all the proposed modifications to the drawings and specifications c. a detail of all Work and goods affected by the value engineering proposal d. detailed estimate of the construction cost based on the original Contract requirements and based on the proposed changes. e. any resultant time extensions or reductions for the Contract. f. statement to the extent of minimum saving expected. The Contractor's cost of preparing the variation proposal shall be excluded in determining the estimated net savings in construction costs. <p>The Employer may in his sole discretion, accept or reject the contractor's variation or any part thereof and determine the estimated net saving in the construction cost. The Employer shall not be liable</p>
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		<p>for delays or damages to the Contractor due to any failure of the Employer to accept or act upon any such variation proposal submitted pursuant to this Clause.</p> <p>Once, the Employer or the Project Manager rejects the contractor's variation during proposition due to any reason, it shall not be pursued by Contractor in any other form.</p> <p>If the variation proposal is acceptable to the Employer/ Project Manager in whole or in parts, it will accept by execution of an amendment. Such amendment shall identify all the changes in the specifications, Contract Period etc. and shall specify net savings on construction costs which shall be adjusted in the contract value by the Employer.</p> <p>The Contractor shall either accept or reject any proposed amendment executed by the Project Manager pursuant to this section within 5 working days of its receipt date from the Employer. If the Contractor does not reject the same in the period stipulated above, the amendments shall be deemed to be accepted by the Contractor and shall become a variation to the Contract. The Contractor's acceptance shall be unconditional and the contract value / price shall be adjusted by the amount of saving due to the variation.</p>
35.	Sub Clause 40	<p>Extension of Time for Completion</p> <p>Time is the essence of Contract and will remain so at all times during the pendency of the Contract including the extended period of Contract. The Contractor shall ensure defect free completion and have passed the tests on the completion, including integrated testing where ever in the scope of work and commissioning of the whole of the Works and/or parts thereof before the same is taken over by the Employer.</p> <p>In case of delay on the part of the Contractor, the Contractor shall be liable to pay liquidated damages and any other compensation for the damages suffered by the Employer as per relevant clause. This is without prejudice to the right of the Employer to rescind the Contract.</p>

		<p>Failure or delay by the Employer or the Project Manager, to hand over to the Contractor the Site necessary for execution of Works, or any part of the Works, or to give necessary notice to commence the Works, or to provide necessary Drawings or instructions or clarifications or to supply any material, plant or machinery, which under the Contract, is the responsibility of the Employer, shall in no way affect or vitiate the Contract or alter the character thereof; or entitle the Contractor to damages or compensation thereof but in any such case, the Project Manager shall extend the time period for the completion of the Contract, as in his opinion is / are reasonable. The Contractor may apply for an extension of the Time for Completion if the Work is or will be delayed either before or after the Time for Completion by any of the following causes:</p> <ul style="list-style-type: none"> a. "Force Majeure" referred to in Clause 16 b. The Contractor's work held up for not being given possession of or access to the Site in accordance with the Contract c. Instruction of the Project Manager to suspend the Works and the Contractor not being in default as to reasons of suspension. d. Acts or omissions of other Designated Contractors in executing work not forming part of this Contract and on whose performance, the performance of the Contractor necessarily depends. e. Any act of prevention or Breach of Contract by the Employer and not mentioned in this Clause f. Any order of Court restraining the performance of the Contract in full or in any part thereof g. Any other event or occurrence which, according to the Employer is not due to the Contractor's failure or fault, and is beyond his control without Employer being responsible for the same.
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		<p>h. An Employer's Variation</p> <p>However, the Contractor shall not be entitled to any extension of time where the instructions or acts of the Employer or the Project Manager are necessitated by or intended to cure any default of or breach of Contract by the Contractor or where any delay is due to</p> <ul style="list-style-type: none"> a. the failure of sub-contractor, to commence or to carry out work in due time, b. non-availability, or shortage of Contractor's equipment, labour, utility services, Plant and Materials, c. inclement weather conditions, and d. the Contractor not fulfilling his obligations under contract. <p>If the Contractor considers himself to be entitled to an extension of time for Completion, he shall give notice to the Project Manager of such intention as soon as possible and in any event within 28 days of the start of the event giving rise to the delay and full and final supporting details of his application within 21 days of the last day of delay, together with any notice required by the Contract and relevant to such Clause.</p> <p>The Project Manager shall proceed in consultation with the Contractor and the Employer in an endeavour to reach agreement or determine either prospectively or retrospectively such extension of the Time for Completion as may be due.. If agreement is not achieved, the Project Manager shall determine the matter fairly, reasonably and in accordance with the Contract, with the approval of Employer. The Project Manager shall notify the Contractor accordingly.</p> <p>The extension of time including that of key date shall not entitle the contractor to retain the advance which shall be governed by SCC Sub-Clause13.2.</p> <p>The Contractor shall not be entitled to an extension of time by reason of any delay to any activity in the carrying out of the Works unless in the opinion of the Project Manager such delay results in or may be expected to result in a delay to completion of the Works, or achievement of any Stage by the relevant Key Date. Whether or not the Contractor fails to</p>
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		<p>achieve any Milestone by reason of any delay shall not by itself be material to the Contractor's entitlement to an extension of time.</p> <p>Any extension to a Key Date shall not by itself entitle the Contractor to an extension to any other Key Date.</p>
36.	Sub Clause 45	<p>Disputes and Arbitration</p> <p>The DB shall be appointed within 30 days after the Effective Date.</p> <p>If the efforts to resolve all or any of the disputes through conciliation fails, then such disputes or differences, whatsoever arising between the parties, arising out of touching or relating to construction/ manufacture, measuring operation or effect of the Contract or the breach thereof shall be referred to Arbitration in accordance with the following provisions:</p> <p>(a) Matters to be arbitrated upon shall be referred to a sole Arbitrator if the total value of the claim is upto Rs.5 million and to a panel of three Arbitrators if total value of claims is more than Rs.5 million. The Employer shall provide a panel of three arbitrators for the claims upto Rs.5 million and a panel of five Arbitrators for claims of more than Rs.5 million. The Contractor shall have to choose the sole Arbitrator from the panel of three and/or one Arbitrator from the panel of five in case three Arbitrators are to be appointed. The Employer shall also choose one Arbitrator from this panel of five and the two so chosen will choose the third arbitrator from the panel only. . The Arbitrator(s) shall be appointed within a period of 30 days from the date of receipt of written notice/ demand of appointment of Arbitrator from either party. Neither party shall be limited in the proceedings before such arbitrator(s) to the evidence or arguments put before the Project Manager for the purpose of obtaining his decision. No decision given by the Project Manager in accordance with the foregoing provisions shall disqualify him from being called as a witness and giving evidence before the</p>

		<p>arbitrator(s) on any matter, whatsoever, relevant to dispute or difference referred to arbitrator/s. The arbitration proceedings shall be held in Jaipur only. The language of proceedings, that of documents and communication shall be English.</p> <p>(b) The Employer at the time of offering the panel of Arbitrator(s) to be appointed as Arbitrator shall also supply the information with regard to the qualifications of the said Arbitrator nominated in the panel along with their professional experience, phone nos. and addresses to the contractor.</p> <p>(c) The award of the sole Arbitrator or the award by majority of three Arbitrators as the case may be shall be binding on all parties.</p> <p>Interest on Arbitration Award</p> <p>Where the arbitral award is for the payment of money, no interest shall be payable on whole or any part of the money for any period, till the date on which the award is made.</p> <p>Cost of Arbitration</p> <p>The cost of arbitration shall be borne by the respective parties. The cost shall, inter alia, include the fees of the arbitrator (s) as agreed by both the parties or provided under the International Arbitration Rules.</p> <p>Jurisdiction of Courts</p> <p>Where recourse to a Court is to be made in respect of any matter, the court at Jaipur shall have the exclusive jurisdiction to try all disputes between the parties.</p> <p>Suspension of Work on Account of Arbitration</p> <p>The reference to Conciliation / Arbitration shall proceed notwithstanding that the Works shall not then be or be alleged to be complete, provided always that the obligations of the Employer, Project Manager and the Contractor shall not be altered by reasons of arbitration being conducted during the progress of the Works. Neither party shall be entitled to suspend the work or part of the work to which the dispute relates on account of arbitration and payments to the Contractor shall continue to be</p>
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		made in terms of the Contract.
	Sub Clause 45.2	Appointment (if not agreed) to be made by: Employer
		Rules of procedure for arbitration proceedings: As per law of the Republic of India
37.	Additional Clause	<p>Eligibility</p> <ol style="list-style-type: none"> 1. The Contractor shall have the nationality of an ADB member country. The Contractor shall be deemed to have the nationality of a country if the Contractor is a citizen or is constituted, or incorporated, and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed subcontractors or suppliers for any part of the Contract including related services. 2. The materials, equipment and services to be supplied under the Contract shall have their origin in eligible source countries and all expenditures under the Contract will be limited to such materials, equipment, and services. At the Employer's request, the Contractor may be required to provide evidence of the origin of materials, equipment and services. 3. For purposes of SCC Clause 37(2), —"origin" means the place where the materials and equipment are mined, grown, produced or manufactured, and from which the services are provided. Materials and equipment are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that differs substantially in its basic characteristics or in purpose or utility from its components.
38.	Additional Clause	<p>Claims, Disputes and Conciliation</p> <p>Procedure for Claims</p> <p>If the Contractor intends to claim any additional payment under any clause of these Conditions or otherwise, the Contractor shall give notice to the Project Manager as soon as possible and in any event within 28 days of the start of the event giving</p>

		<p>rise to the claim.</p> <p>The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at any other location acceptable to the Project Manager. Without admitting the Employer's liability, the Project Manager shall, on receipt of such notice, inspect such records and may instruct the Contractor to keep further contemporary records. The Contractor shall permit the Project Manager to inspect all such records, and shall (if instructed) submit copies to the Project Manager.</p> <p>Within 28 days of such notice, or such other time as may be agreed by the Project Manager, the Contractor shall send to the Project Manager an account, giving detailed particulars of the amount and basis of the claim. Where the event giving rise to the claim has a continuing effect, such amount shall be considered as interim. The Contractor shall then, at such intervals as the Project Manager may reasonably require, send further interim accounts giving the accumulated amount of the claim and any further particulars. Where interim accounts are sent to the Project Manager, the Contractor shall send a final account within 28 days of the end of the effects resulting from the event.</p> <p>If the Contractor fails to comply with this Sub-Clause, he shall not be entitled to claim any additional payment.</p> <p>Payment for Claims</p> <p>The Contractor shall be entitled to have included in any Interim Payment Certificate such amount for any claim as the Project Manager considers due, after taking approval from the Employer. If the particulars supplied are insufficient to substantiate the whole of the claim, the Contractor shall be entitled to payment for such part of the claim as has been substantiated.</p> <p>(iii) No legal action Till Dispute Settlement Procedure is Exhausted</p> <p>Any and all Disputes shall be settled in accordance with the provisions of this clause. No action at law concerning or arising out of any Dispute shall be commenced unless and until all applicable Dispute resolution procedures set out in this clause shall have been finally exhausted in relation to that Dispute or any Dispute out of which that Dispute</p>
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		<p>shall have arisen with which it may be or may have been connected.</p> <p>(iv) Notice of Dispute</p> <p>For the purpose of clause (v), a Dispute shall be deemed to arise when one party serves on the other party a notice in writing (hereinafter called a "Notice of Dispute") stating the nature of the Dispute provided that no such notice shall be served later than 28 days after the date of issue of Performance Certificate by the Project Manager.</p> <p>(v) Two Stages for Dispute Resolution</p> <p>Disputes shall be settled through two stages:</p> <p>Conciliation procedures as established by "The Arbitration and Conciliation Act-1996" (as amended from time to time) and in accordance with this Clause. In the event this procedure fails to resolve the Dispute then;</p> <p>Arbitration procedures undertaken as provided by "The Arbitration and Conciliation Act - 1996" (as amended from time to time) and in accordance with this Clause.</p> <p>(vi) Conciliation</p> <p>Within 60 days of receipt of Notice of Dispute, either party shall refer the matter in dispute to conciliation.</p> <p>Conciliation proceedings shall be initiated within 30 days of one party inviting the other in writing to Conciliation. Conciliation shall commence when the other party accepts in writing this invitation. If the invitation is not accepted then Conciliation shall not take place. If the party initiating conciliation does not receive a reply within 30 days from the date on which he sends the invitation he may elect to treat this as a rejection of the invitation to conciliate and inform the other party accordingly.</p> <p>The Conciliator shall assist the parties to reach an amicable settlement in an independent and impartial manner.</p> <p>(vii) Conciliation Procedure</p> <p>For the purpose of conciliation in this contract, the conciliation shall be undertaken by one conciliator selected from panel of conciliators maintained by the employer, who shall be from serving or retired engineers of Government Departments, or of Public</p>
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		<p>Sector Undertakings. Out of this panel, a list of three Conciliators shall be sent to the Contractor who shall choose one of them to act as Conciliator and conduct conciliation proceedings in accordance with “The Arbitration and Conciliation Act, 1996”, of India.</p> <p>The Employer and the Contractor shall in good faith co-operate with the Conciliator and, in particular, shall endeavour to comply with requests by the Conciliator to submit written materials, provide evidence and attend meetings. Each party may, on his own initiative or at the invitation of the Conciliator, submit to the Conciliator suggestions for the settlement of the dispute.</p> <p>When it appears to the Conciliator that there exist elements of a settlement which may be acceptable to the parties, he shall formulate the terms of a possible settlement and submit them to the parties for their observations. After receiving the observations of the parties, the Conciliator may reformulate the terms of a possible settlement in the light of such observations.</p> <p>If the parties reach agreement on a settlement of the dispute, they may draw up and sign a written settlement agreement. If requested by the parties, the Conciliator may draw up, or assist the parties in drawing up, the settlement agreement.</p> <p>When the parties sign the settlement agreement, it shall be final and binding on the parties and persons claiming under them respectively.</p> <p>The Conciliator shall authenticate the settlement agreement and furnish a copy thereof to each of the parties.</p> <p>As far as possible, the conciliation proceedings should be completed within 60 days of the receipt of notice by the Conciliator.</p> <p>The parties shall not initiate, during the conciliation proceedings, any arbitral or judicial proceedings in respect of a dispute that is the subject matter of the conciliation proceedings.</p> <p>(viii) Termination of Conciliation Proceedings</p> <p>The conciliation proceedings shall be terminated:</p> <p>by the signing of the settlement agreement by the parties on the date of agreement; or</p>
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		<p>by written declaration of the conciliator, after consultation with the parties, to the effect further efforts at conciliation are no longer justified, on the date of declaration; or</p> <p>by a written declaration of the parties to the conciliator to the effect that the conciliation proceedings are terminated, on the date of declaration; or</p> <p>by a written declaration of a party to the other party and the conciliator, if appointed, to the effect that the conciliation proceedings are terminated, on the date of declaration.</p> <p>Upon termination of the conciliation proceedings, the conciliator shall fix the costs of the conciliation and give written notice thereof to the parties. The costs shall be borne equally by the parties unless settlement agreement provides for a different apportionment. All other expenses incurred by a party shall be borne by that party.</p>
39.	Additional Clause	<p>Variation in the Bill of Quantities</p> <p>The Tenderer shall provide a Bill of Quantity (BoQ) in the format given in Schedule 1,2,3,4 of Section 4- Bidding Forms, to meet the entire scope of whole of works as stipulated in the Employer's Requirements using Table-I as a reference. The Tenderer shall note that the Contract is a lump sum contract and any change in quantities, other than those due to a change in scope of work, shall have no impact on the Contract price.</p> <p>Change of any item in Schedule 1, 2,3,4 up to $\pm 25\%$ in quantity due to change in scope of work during execution, shall be applied at the unit rate quoted by the Tenderer in Schedule 1,2,3,4 of Section 4- Bidding Forms and no additional amount whatsoever shall be payable to the Contractor,</p> <p>The Employer shall advise the Contractor about any reduction in quantities due to change in Scope of work within twelve months of Commencement date. However, the Employer may exercise any increase in quantity on any date before three months of scheduled opening (as per Key Date Table) of the last section.</p>

40.	Additional Clause	<p>Deployment of Personnel by the Employer</p> <p>The Contractor shall deploy personnel sponsored by the Employer during the Contract Period in areas stipulated in the Employer's Requirements.</p> <p>The travel expenses, salary and allowances, boarding and lodging expenses of these sponsored personnel shall be borne by the Employer but the Contractor shall provide other facilities required for the purpose of performing their duties. The sponsored personnel shall be under the technical and administrative control of the Contractor.</p>
41.	Additional Clause	<p>Indemnity Bond</p> <p>The contractor shall submit an Indemnity Bond in the format given in Annexure-II against payments made for Plant and Equipment delivered to Jaipur.</p>
42.	Additional Clause	<p>Quality Plan</p> <p>The detailed Quality Plan shall be developed from the Outline Quality Plan to meet the stipulations of the Employer's Requirements.</p> <p>Upon the Project Manager notifying his consent to the Site Quality Plan, or any supplement thereto, the Contractor shall, adhere to the principles and procedures contained in such document, except where the Project Manager gives his consent to any amended or varied version thereof. The Contractor shall cause any sub-contractors to adhere to this Plan.</p> <p>The Contractor shall appoint a suitably qualified and experienced person, not otherwise engaged in the performance of the Contract, to act as manager of the quality assurance system and shall provide such other personnel and resources as required to ensure effective operation of the quality assurance system. The said manager shall carry out audits of the application of the quality assurance system, and ensure effective quality control and delivery of quality assurance.</p> <p>The Contractor shall provide all necessary access, assistance and facilities to enable the Project Manager to carry out surveillance visits both on and off the Site to verify that the quality assurance system is being properly and fully implemented. No extra payment shall be made in this regard and the</p>

		cost of the Work under this element shall be deemed to be included in the Contract Price.
43.	Additional Clause	<p>Work by persons other than the Contractor</p> <p>If the Contractor shall fail to carry out any work required under the Contract or refuse to comply with any instruction or order given by the Employer or Project Manager in accordance with the Contract within a reasonable time, the Project Manager may give the Contractor 14 days' notice in writing to carry out such work or comply with such instruction. If the Contractor fails to comply with such notice, the Employer shall be entitled to carry out such work or instruction by his own workmen or by other contractors. Without prejudice to any other right or remedy, all additional expenditure properly incurred by the Employer in having such work or instruction carried out shall be recoverable by the Employer from the Contractor.</p> <p>If by reason of any accident or failure or other event occurring to, in, or in connection with the Works any remedial or other work shall, in the opinion of the Project Manager, be urgently necessary and the Contractor is unable or unwilling at once to do such remedial or other work, the Project Manager may authorise the carrying out of such remedial or other work by a person other than the Contractor. If the remedial or other work so authorised by the Project Manager is work, which, in the Project Manager's opinion, the Contractor was liable to do under the defect liability period Contract, all expenses properly incurred in carrying out the same shall be recoverable by the Employer from the Contractor, provided that the Project Manager shall, as soon after the occurrence of any such emergency as may be reasonably practicable, notify the Contractor thereof in writing.</p>
44.	Additional Clause	<p>Entry with full preparation as per SHE</p> <p>The contractor need to mobilize at site with full preparation with proper provision of display boards (mentioning various details like Contract Name, Contract Value, Scope, Organization, Contract Details, Labour Laws obligations as per agreement with the Project Manager), lighting, Water Supply, Ventilation Facility, Toilet Facility, Tea & Coffee facility, Cleaning arrangement etc (this list is</p>

		indicative not exhaustive). The Project Manager shall approve after inspection and shall issue no objection certificate for erection of the equipment.
45.	Additional Clause	<p>Nuisance</p> <p>Contractor will be responsible for any unhygienic conditions in the area under their possession and liable to be penalized if condition does not improve despite warnings/notices</p>
46.	Additional Clause	<p>Interface Requirement</p> <p>The contractor shall be responsible to interface with the other contractors as per the interface table provided in the contract. JMRC will supervise/facilitate the coordination between the contractor and other designated contractors. However, the contractor will allow for liaison with, and modifications to his design to cater for the work of such other contractors. The list of interface items is indicative only and the ultimate responsibility of commissioning lies with the contractor.</p>
47.	Additional Clause	<p>Site Progress</p> <p>The contractor shall prepare Performa in consultation with the Project Manager and submit to Project Manager the monthly progress report and will be required to deliver the Power Point presentation as and when instructed by the Project Manager.</p>
48.	Additional Clause	<p>Maintaining the Site</p> <p>In general the cleanliness, lighting, safety, security, drinking water, first aid etc will be the responsibility of the civil contractor as specified in the interface document.</p> <p>The contractor shall be responsible for maintaining the site. The daily sweeping and cleaning of the area under his possession/work shall be his responsibility.</p> <p>In case of repeated aberrations noticed by the Project Manager a minimum penalty of Rs. 5000/- shall be imposed for each instance.</p>
49.	Additional Clause	<p>BOCW (Building and Other Construction Works) Cess</p> <p>Bidders need to judge the applicability of BOCW for the work. Any liabilities on account of BOCW at any stage shall be on part of bidder and the quoted price</p>

		<p>shall be inclusive of BOCW charges.</p> <p>If same is not applicable, the bidder needs to submit required undertaking/certificates. The JMRC shall make the deduction accordingly and deposit the amount to the concerned authorities.</p>
50.	Additional Clause	<p>Bank Guarantee for Supplementary Agreement</p> <p>The contractor shall submit the Bank Guarantee for 10 % value for works to be executed through supplementary agreement at the time of signing of the supplementary agreement. The bank Guarantee shall be valid till the 28 days beyond the completion of the works to be executed through supplementary agreement.</p>
51.	Additional Clause	<p>Service Tax for AMC Work</p> <p>The contractor shall submit his offer for AMC works(if applicable) beyond DLP inclusive of service tax.</p>
52.	Additional Clause	<p>Professional Indemnity Insurance (PII)</p> <p>The Contractor shall effect and maintain professional indemnity insurance, preferably in the name of JMRC, for the amount in Indian Rupees stipulated in Annexure-III, SCC in respect of any design of the Works to be carried out by, or on behalf of the Contractor. This insurance, which shall ensure the Contractor's liability by reason of professional negligence and errors in the design of the works, shall be valid from the date of commencement of Works, until 5 years after the date of issue of Performance Certificate. Alternatively the Contractor shall redeem the insurance before the expiry of the Yearly Insurance in such a way that the entire validity period is covered.</p> <p>The Project Manager will not issue Final Payment Certificate until the Contractor has produced evidence that coverage of the professional indemnity insurance has been provided for the aforesaid period.</p> <p>The Contractor shall, within the respective periods stated in the Bid documents (calculated from the Commencement Date), submit to the Employer:</p> <p>(a) evidence that the insurances described in this Clause have been effected, with an Insurance Company operating in India, and</p>

		<p>(b) copies of the policies for the insurances.</p> <p>When each premium has been paid, the contractor shall submit copy of receipts to the employer. The contractor shall also, when providing such evidence, policies and receipts to the employer, notify the Project Manager of so doing.</p> <p>The contractor shall effect all insurances for which he is responsible with insurers and in terms approved by the employer. Each policy insuring against loss or damage shall provide for payments to be made in the currencies required to rectify such loss or damage. Payments received from insurers shall be used for the rectification of such loss or damage.</p> <p>The contractor (and, if appropriate, the employer) shall comply with the conditions stipulated in each of the insurance policies. The contractor shall make no material alteration to the terms of any insurance without the prior approval of the employer. If an insurer makes (or purports to make) any such alteration, the-contractor shall notify the employer immediately.</p> <p>If the contractor fails to effect and keep in force any of the insurances required under the contract, or fails to provide satisfactory evidence, policies and receipts in accordance with this sub-clause, the employer may, without prejudice to any other right or remedy, effect insurance for the coverage relevant to such default, and pay the premiums due. In such cases the premium paid by the employer plus overheads (equal to 50% of the premium paid) shall be recoverable from the contractor by the employer, and may be deducted by the employer from any monies due, or to become due, to the contractor or recover the same as debt due from the contractor. The contractor shall not dispute the amount of premium paid by the employer or the overhead charges thereon.</p> <p>Nothing in this clause limits the obligations, liabilities or responsibilities of the contractor or the employer, under the other terms of the contract or otherwise. Any amount not insured or not recovered from the insurers</p>
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		<p>shall be borne by the contractor.</p> <p>The Contractor shall submit to the Project Manager, the details of all claims made with the insurer and claims accepted by the insurer or any other details as required by the Project Manager on monthly basis.</p>
53.	Additional Clause	<p>As Built Record</p> <p>The Contractor shall prepare, and keep up-to-date, a complete set of “as-built records of the execution of the works, showing the exact “as-built” locations, sizes and details of the works as executed, with cross reference to relevant specifications and data sheets. These records shall be kept on the Site and shall be used exclusively for the purpose of this sub-clause. Four copies shall be submitted to the Project Manager prior to the CMRS inspection of the section.</p> <p>The Contractor shall prepare and submit to the Project Manager “as Built drawings” of the works, showing all works as executed. The drawing shall be prepared as the works proceed and shall be submitted to the Project Manager for his inspection. The Contractor shall obtain the consent of the Project Manager as to their size, the referencing system and other pertinent details.</p> <p>Prior to the issue of any Completion Certificate, the Contractor shall submit to the Project Manager/ Employer one electronic copy, one full-size original copy and two printed copies of the relevant “as-built drawing”, two copies of O&M manuals(if applicable) and any further construction and/or Manufacture Documents specified in the Employers Requirements. The works shall not be considered to be completed for the purpose of Taking Over under Sub- Clause 24.5 until such documents have been submitted to the Project Manager.</p>
54.	Additional Clause	<p>Non-Payment by main Contractors to Sub-Contractors</p> <p>Timely payment to the sub-contractors is the sole responsibility of the main contractor for smooth execution of the work. Though JMRC or Project Manager shall not interface in the day to day management of the contract between the main</p>

		contractor and the sub-contractor, but if frequent complaints are received from any sub-contractor regarding non-payment or delay in payment by the main contractor to him then JMRC will notify to the main contractor to resolve the issue within the reasonable period (to be specified in the notice) and provide the details to JMRC. In case, the issue is not resolved and the details provided by the main contractor are not considered satisfactory, JMRC at its sole discretion may make direct payment to sub-contractor as per his claim and recover the same from any payment due to the main contractor.
55.	Additional Clause	Performance Certificate The Contract shall not be considered to be completed until the Performance Certificate has been signed by the Project Manager and delivered to the Contractor at the end of Defect Liability Period, stating the date on which the Contractor completed his obligations related to completion of works and rectification of defects during Defect Liability Period to the Project manager's satisfaction. Only the Performance Certificate shall be deemed to constitute approval of the Works.

ANNEXURE-I

9/3/13

Notification No. 84/97-Customs

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Seeks to Exempt Imports by United Nations or International organisation for execution of projects in India.

11-11-1997

Notification No. 84/97-Customs

In exercise of the powers conferred by sub-section (1) of section 25 of the Customs Act, 1962 (52 of 1962), read with sub-section (4) of section 68 of the Finance (No. 2) Act, 1996 (33 of 1996), the Central Government, being satisfied that it is necessary in the public interest so to do, hereby exempts all the goods imported into India for execution of projects financed by the United Nations or an International Organisation and approved by the Government of India, from the whole of the duty of customs leviable thereon under First Schedule to the Customs Tariff Act, 1975 (51 of 1975), the whole of the additional duty of customs leviable thereon under section 3 of the said Customs Tariff Act and the whole of the special duty of customs leviable under section 68 of the Finance (No. 2) Act 1996 (33 of 1996):

Provided that the importer, at the time of clearance of the goods, produces before the Assistant Commissioner of Customs or Deputy Commissioner of Customs, as the case may be, having jurisdiction, -

(i) in case the said goods are -

(a) Imported by an international organisation listed in the Annexure appended to this notification and intended to be used in a project that has been approved by the Government of India and financed (whether by a loan or a grant) by such an organisation, a certificate from such organisation that the said goods are required for the execution of the said project and that the said project has duly been approved by the Government of India; or

(b) imported for use in a project that has been approved by the Government of India and financed (whether by a loan or a grant) by an international organisation listed in the said Annexure, a certificate from an officer not below the rank of Deputy Secretary to the Government of India, in the Ministry of Finance (Department of Economic Affairs) that the said goods are required for the execution of the said project and that the said project has duly been approved by the Government of India;

(ii) in case the said goods are intended to be used in a project financed (whether by a loan or a grant) by the World Bank, the Asian Development Bank or any other international organisation other than those listed in the Annexure, and the said project has been approved by the Government of India, a certificate from the executive head of the Project Implementing Authority and countersigned by an officer not below the rank of a Joint Secretary the Government of India, in the concerned Line Ministry in the Government of India, that the said goods are required for the execution of the said project and that the said project has duly been approved by the Government of India, and

(iii) in case the said goods are intended to be used in a project financed (whether by a loan or a grant) by the World Bank, the Asian Development Bank or any other international organisation, other than those listed in the Annexure and the said project has been approved by the Government of India for implementation by the Government of a State or a Union Territory, a certificate from the executive head of the Project Implementing Authority and countersigned by the Principal Secretary or the Secretary (Finance), as the case may be, in the concerned State Government or the Union Territory, that the said goods are required for the execution of the said project, and that the said project has duly been approved by the Government of India for implementation by the concerned State Government.

Explanation. - For the purposes of this notification, -

(a) "international organisation" means an international organisation to which the Central Government has declared, in pursuance of section 3 of the United Nations (Privileges and Immunities) Act, 1947 (46 of 1947), that the provisions of the Schedule to the said Act shall apply;

(b) "Line Ministry" means a Ministry in the Government of India, which has been so nominated with respect to a project, by the Government of India, in the Ministry of Finance (Department of Economic Affairs).

www.cbec.gov.in/customs/cs-act/notifications/notins-before2k/c84-97c.htm

1/2

9/5/13

Notification No. 84/97-Customs

133-5-

ANNEXURE

1. United Nations Development Programme,
2. United Nations International Childrens' Fund,
3. Food and Agricultural Organisation,
4. International Labour Organisation,
5. World Health Organisation,
6. United Nations Population Fund,
7. United Nations World Food Programme,
8. United Nations Industrial Development Organisation.

Notification No. 84/97-Cus., dated 11-11-1997 as amended by Notification No. 85/99-Cus., dated 6-7-1999 and No. 119/99-Cus., dated 2-11-1999, and Notification No. 75/2001 dt. 0-07-01 and Notification No. 107/2001-Cus., dated 12.10.2001.

-4-132

Cus Ntf No.85/1999 Date 6/7/1999

Imports for Projects financed by UN - Duty Exemption conditions changed

In exercise of the powers conferred by sub-section (1) of section 25 of the Customs Act, 1962 (52 of 1962), the Central Government, being satisfied that it is necessary in the public interest so to do, hereby makes the following amendment in the notification of the Government of India in the Ministry of Finance (Department of Revenue), No.84/97 Customs, dated the 11th November, 1997, namely:

In the said notification,-

- i. for the words "all the goods imported into India by the United Nations or an international organisation for execution of projects financed by them", the following words shall be substituted, namely:-

"all the goods imported into India for execution of projects financed by the United Nations or an international organisation"

- ii. for the proviso, the following shall be substituted, namely: -

"Provided that the importer, at the time of clearance of the goods, produces before the Assistant Commissioner of Customs or Deputy Commissioner of Customs, as the case may be, having jurisdiction:-

- i. in case the said goods are intended to be used in a project financed (whether by a loan or a grant) by the United Nations and the said project has been approved by the Government of India, a certificate from an officer not below the rank of a Deputy Secretary to the Government of India, in the Ministry of Finance (Department of Economic Affairs), that the said goods are required for the execution of the said project financed by the United Nations and that the said project has duly been approved by the Government of India, or
- ii. in case the said goods are intended to be used in a project financed (whether by a loan or a grant) by the World Bank, the Asian Development Bank or any other international organisation, and the project has been approved by the Government of India, a certificate from the executive head of the Project Implementing Authority and countersigned by an officer not below the rank of a Joint Secretary to the Government of India, in the concerned Line Ministry in the Government of India, that the said goods are required for the execution of the said project and that the said project has duly been approved by the Government of India, and
- iii. in case the said goods are intended to be used in a project financed (whether by a loan or a grant) by the World Bank, the Asian Development Bank or any other international organisation, and the said project has been approved by the Government of India for implementation by the Government of a State or a Union Territory a certificate from the executive head of the Project Implementing Authority and countersigned by the Principal Secretary or the Secretary (Finance), as the case may be, in the concerned State

-3- 131

Government or the Union Territory, that the said goods are required for the execution of the said project, and that the said project has duly been approved by the Government of India for implementation by the concerned State Government";

iii. for the Explanation, the following Explanation shall be substituted, namely:-

"Explanation For the purposes of this notification,-

- a. "international organisation" means an international organisation to which the central Government has declared, in pursuance of section 3 of the United Nations (Privileges and Immunities) Act, 1947 (46 of 1947), that the provisions of the Schedule to the said Act shall apply;
- b. "Line Ministry" means a Ministry in the Government of India, which has been so nominated with respect to a project, by the Government of India, in the Ministry of Finance (Department of Economic Affairs)".

Sd/-
(Prashant Kumar Sinha)
Under Secretary to the Government of India

Issued by:
Ministry of Finance Department of Revenue
New Delhi.

-3- 132

Notification No. 108/95-CE, Dt. 28-8-95**Goods supplied to UN/Intnl. Organisations or Proj.****As amended vide Central Excise Notification No. 7/98-CE, dt. 2-6-1998; 33/98-CE, dt. 13-10-1998; 4/99-CE, dt. 11-2-99 and 40/99-CE, dt. 2-11-99.**

In exercise of the powers conferred by sub-section (1) of section 5A of the Central Excises and Salt Act, 1944 (1 of 1944) read with sub-section (3) of section 3 of the Additional Duties of Excise (Goods of Special Importance) Act, 1957 (58 of 1957), the Central Government, being satisfied that it is necessary in the public interest so to do, hereby exempts all goods falling under the Schedule to the Central Excise Tariff Act, 1985 (5 of 1986) (hereinafter referred to as the said goods) when supplied to the United Nations or an international organisation for their official use or supplied to the projects financed by the said United Nations or an international organisation and approved by the Government of India, from the whole of-

(i) the duty of excise leviable thereon under section 3 of the Central Excises Act, 1944 (1 of 1944); and

(ii) the additional duty of excise leviable thereon under sub-section (1) of section 3 of the Additional Duties of Excise (Goods of Special Importance) Act, 1957 (58 of 1957):

Provided that before clearance if the said goods, the manufacturer produces before the Assistant Commissioner of Central Excise having jurisdiction over his factory :-

(a) in case the said goods are intended for the official use by the United Nations or an international organisation, a certificate from the United Nations or that international organisation that the said goods are intended for such use;

(b) in case of the said goods are-

(i) Supplied to an international organisation listed in the Annexure appended to this notification for use in a project that has been approved by the Government of India and financed (whether by a loan or a grant) by such an organisation, a certificate from such an organisation that the said goods are required for the execution of the said project and that the said project has duly been approved by the Government of India; or

(ii) Supplied to a project that has been approved by the Government of India and financed (whether by a loan or a grant) by an international organisation listed in the said annexure, a certificate from an officer not below the rank of Deputy Secretary to the Government of India, in the Ministry of finance (Department of Economic Affairs) that the said goods are required for the execution of the said project and that the said project has duly been approved by the government of India;

(Above b) i & ii have been substituted vide Cen Exc NTF 40/99 dt. 2-11-99)

(c) in case the said goods are intended to be supplied to a project financed (whether by a loan or a grant) by the World Bank, the Asian Development Bank or any international organisation, other than those listed in the

- 9 - 136

- 8 -

Annexure, and

(Above c) has been amended vide Cen Exc NTF 40/99 dt. 2-11-99)

(i) if the said project has been approved by the Government of India, a certificate from the executive head of the Project Implementing Authority and countersigned by an officer not below the rank of a Joint Secretary to the Government of India, in the concerned Line Ministry in the Government of India, that the said goods are required for the execution of the said project and that the said project has duly been approved by the Government of India, and

(ii) if the said project has been approved by the Government of India for implementation by the Government of a State or a Union Territory, a certificate from the executive head of the Project Implementing Authority and countersigned by the Principal Secretary or the Secretary (Finance), as the case may be, in the concerned State Government or the Union Territory, that the said goods are required for the execution of the said project, and that the said project has duly been approved by the Government of India for implementation by the concerned State Government.

(Above proviso has been amended vide Central Excise Notification No. 4/99 dt. 11-2-99)

Explanation.-For the purpose of this notification,-

(a) "international organisation" means an international organisation to which the Central Government has declared, in pursuance of section 3 of the United Nations (Privileges and Immunities) Act, 1947 (46 of 1947), that the provisions of the Schedule to the said Act shall apply;

(b) "Line Ministry" means a Ministry in the Government of India, which has been so nominated with respect to a project, by the Government of India, in the Ministry of Finance (Department of Economic Affairs).'

(Above explanation has been amended vide Central Excise Notification No. 4/99 dt. 11-2-99)

ANNEXURE

1. United Nations Development Programme,
2. United Nations International Childrens' Fund,
3. Food and Agricultural Organisation,
4. International Labour Organisation,
5. World health Organisation,
6. United Nations Population Fund.
7. United Nations World Food Programme

135
-7-

8. United Nations Industrial Development Organisation.

(Above Sl. No. (8.) has been inserted vide Ntf. No. 50/2001-CE, dt. 12-10-2001)

(Above Sl. No. (7.) has been inserted vide Ntf. No. 36/2001-CE, dt. 6-7-2001)

(Above ANNEXURE has been added vide Cen NTF 40/99 dt. 2-11-99)

(Note:-see Ntf. No. 31/2001-CE(NT), dt. 21/06/2001)

**GOVERNMENT OF RAJASTHAN
FINANCE DEPARTMENT
(TAX DIVISION)**

NOTIFICATION

Jaipur, Dated: 06.10.2010

In exercise of the powers conferred by section 9 of the Rajasthan Tax on Entry of Goods into Local Areas Act, 1999 (Act No. 13 of 1999), the State Government being of the opinion that it is expedient in the public interest so to do, hereby exempts from payment of tax payable under the said Act by any registered dealer on goods and equipments mentioned in Annexure-A of this notification, which are brought into the local area for exclusive use in execution of works contracts related to Metro Rail project in Jaipur City awarded by the Delhi Metro Rail Corporation Limited for Jaipur Metro Rail Project on the condition that such dealer shall submit a declaration to the assessing authority, in the form as specified in Annexure-'B' of this notification duly certified by the authorized officer of the Delhi Metro Rail Corporation Limited.

ANNEXURE-'A'

List of goods required for execution of Metro Rail Project in Jaipur City

S.No.	Name of Goods	S.No.	Name of Goods
1.	Cement	10.	Marble/granite/tiles/ kota stone
2.	Steel (a) TOR, TMT (b) HTS (c) Binding wire (d) Plate, structural Steel (i) Angle (ii) Channel (iii) SMB etc. (iv) Pipe	11.	Sanitary fitting/wares
3.	Aggregate	12.	Sheet AC/GI/others
4.	Sand	13.	Paver block/ CC blocks
5.	Ply	14.	Bitumen
6.	Batten- wooden	15.	Stainless steel pipe/hollow section
7.	Hardware -Nail etc	16.	Paint/snow-cem/putty etc
8.	Bearing i. Neoprene ii. Pot /PTFE	17.	Diesel/petrol
9.	Bentonite	18.	Tyre

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19.	Ready mix concrete	26.	Spare part of 4 wheeler dumper, Tractor, Crane, Gantry
20.	Jacks	27.	Electrical cable/ fitting
21.	GI/CI/PVC/SW Pipes	28.	Signal& telecom cable & fittings equipments
22.	JCB, excavator, loader, truck, Car, Jeep, dumper, tractor, trailer, cranes, battery plant, concrete pump, placer, transit mixer, gantry, launchings girder, piling rig	29.	Rail
23.	Bricks/stone	30.	PSC sleeper, CI inserts
24.	Aluminum	31.	Track fittings: - Points and crossing, pandrol clip, rubber pad, liner
25.	Wooden/ply doors	32.	Ballast

List of electrical equipment:

- 25 Km. (S.P.) AC. Traction:** All equipment used for erecting of overhead (25 KV - A.C. traction System including. Contact wire, centenary wire, Droppers, Insulators, Masts, Portals, Drop Arm, Steel structures, Automatic Tensioning Device, Traction Return Rail Bonding, Earthing System etc.
- Power & Distribution transformers:** 220/132 KV, 132/33 KV, 33 KV /25 KV - Power 33/0.415 Aux.transformers, Booster transformers etc.
- Sub Stations:** All the equipments installed in substation including single Bus Bar with Bus sectioning or Double Bus Bar with Bus coupler, circuit breakers, interrupters (220 KV, 132 KV, 25 KV single phase) for traction load and 33 KV side for Auxiliary loads, lightening protection equipment, Instrument transformers (current & Voltage), Protection Relays etc.
- H.T. & L.T. Cables :** All cables used for connecting the Equipments in the above stated system for operation & control.
- Stand By arrangement:** A) D.G. Set. 200 KVA at elevated Stations, D.G. Set. 2x1000/750 KVA at U.G. Station (chandpole)
(B) Battery Chargers with Batteries for control supply.
- Equipments used in supervisory control & Data Acquisition (SCADA) system with Optical Fibre Glass Cables.
- All the Equipment used in Ventilation & Air Conditioning System.
- Equipments used for Illumination.
- Equipments used for provision of Fans.
- Equipments used for provision of exhaust fans.
- Equipments used for provision of Escalators/Lifts.
- Equipments used for provision of Pump Sets.
- Equipments required for cool drinking water.
- Equipments for provision of Sign age on P.F & Sin Bldg's

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ANNEXURE-'B'**DECLARATION FOR GOODS BROUGHT INTO LOCAL AREA**

No.

Dated:

To,

.....

.....

(Name of the assessing authority of the registered dealer)

It is hereby certified that the goods brought by M/s
into the local area vide invoice No.....
 dated.....for ₹..... (in words) have been
 exclusively utilized in completion of Metro Rail Project in Jaipur City.

Seal

Signature of Authorized officer of DMRC
 Name
 Designation

[No. F.12(100) FD/Tax/10-81]
 By Order of the Governor,

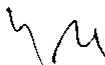
(Bhawani Singh Detha)
 Deputy Secretary to Government

Copy forwarded to the following for information and necessary action:

1. Superintendent, Government Central Press, Jaipur for publication of this notification in part 4(c) of extra ordinary gazette along with a soft copy in CD. It is requested 10 copies of this notification may sent to this department and 20 copies along with bill may be sent Commissioner, Commercial Taxes Department Rajasthan, Jaipur, Please ensure that soft copy in CD is same as hard copy provided to you for publication.
2. Principal Secretary to Hon'ble Chief Minister (Finance Minister).
3. Commissioner, Commercial Taxes Department Rajasthan, Jaipur.
4. Accountant General, Rajasthan, Jaipur.
5. PS to ACS, Finance.
6. PS to Principal Secretary, Law.
7. PS to Principal Secretary, LSG & UDH and Chairman & Managing Director, JMRC.
8. PS to Secretary, Finance (Revenue).
9. Director, Public Relations, Jaipur.
10. SA, Finance (Computer Cell) Department, Secretariat, Jaipur.
11. Guard File.

Deputy Secretary to Government

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**GOVERNMENT OF RAJASTHAN
FINANCE DEPARTMENT
(TAX DIVISION)**

NOTIFICATION

Jaipur, dated December 8, 2011

In exercise of the powers conferred by section 9 of the Rajasthan Tax on Entry of Goods into Local Areas Act, 1999 (Act No.13 of 1999), the State Government being of the opinion that it is expedient in the public interest so to do, hereby makes the following amendments in this Department's notification number F.12(100)FD/Tax/2010-81 dated 06-10-2010, namely:-

AMENDMENTS


In the said notification,-

- (i) for the existing expression "Delhi Metro Rail Corporation Limited" wherever occurring, the expression "Jaipur Metro Rail Corporation Ltd. or Delhi Metro Rail Corporation Limited" shall be substituted.
- (ii) the existing expression "of DMRC" appearing in Annexure "B", shall be deleted.

This shall have effect from 06-10-2010.

[No. F.12(100)FD/Tax/10 - 76]

By Order of the Governor,


(Mewa Ram Jat)

Dy. Secretary to Government

Copy forwarded to the following for information and necessary action:-

1. Superintendent, Government Central Press, Jaipur 2011 along with a soft copy in CD for publication of this notification in part 4(c) of today's extra ordinary Gazette. It is requested that 10 copies of this notification may be sent to this Department and 20 copies along with bill may be sent to Commissioner, Commercial Taxes Department, Rajasthan, Jaipur. Please ensure that soft copy in CD is same as hard copy provided to you for publication.
2. Principal Secretary to Hon'ble Chief Minister (Finance Minister).
3. Commissioner, Commercial Taxes Department, Rajasthan, Jaipur.
4. Accountant General, Rajasthan, Jaipur.
5. PS to ACS, Finance.
6. PS to Secretary, Finance (Revenue).
7. Director, Public Relations, Jaipur.
8. SA, Finance (Computer Cell) Department, Secretariat, Jaipur.
9. Guard File.


Dy. Secretary to Government

**GOVERNMENT OF RAJASTHAN
FINANCE DEPARTMENT
(TAX DIVISION)**

NOTIFICATION

Jaipur, April 17, 2013

In exercise of the powers conferred by section 9 of the Rajasthan Tax on Entry of Goods into Local Areas Act, 1999 (Act No.13 of 1999), the State Government being of the opinion that it is expedient in the public interest so to do hereby, with immediate effect, makes the following amendments in this Department's notification No.F.12 (100)FD/Tax/10-81 dated 06.10.2010, as amended from time to time, namely:-

AMENDMENTS

In the List of goods required for execution of Metro Rail Project in Jaipur City of Annexure 'A' of said notification.-

- (i) the existing serial number 28 and entries thereto shall be substituted by the following, namely:-

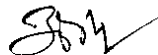
28.	Equipments required for provision of Signaling, Telecommunication and Ticketing systems (including electronic, electrical & IT), Cables, Batteries, Equipments racks and UPS
-----	--

- (ii) after existing serial number 32 and entries thereto the following new serial number 33 and entries thereto shall be added, namely:-

33.	Rolling stock including Sub-assemblies, Components, Accessories and Spares thereof
-----	--

[No. F.12 (100)FD/Tax/2010-10]

By Order of the Governor,

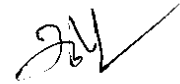


(Aditya Pareek)

Deputy Secretary to Government

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1. Superintendent, Government Central Press, Jaipur along with a soft copy in CD for publication of this notification in part 4(c) of extra ordinary gazette. It is requested that 10 copies of this notification may be sent to this department and 20 copies along with bill may be sent to Commissioner, Commercial Taxes Department Rajasthan, Jaipur. Please ensure that soft copy in CD is same as hard copy as provided to you for publication.
2. Principal Secretary to Hon'ble Chief Minister (Finance Minister).
3. Commissioner, Commercial Taxes Department, Rajasthan, Jaipur.
4. Accountant General, Rajasthan, Jaipur.
5. PS to ACS, UDH & LSG.
6. PS to Principal Secretary, Finance.
7. PS to Secretary, Finance (Revenue).
8. Director, Public Relations, Jaipur.
9. SA (Joint Director), Finance (Computer Cell) Department, Secretariat, Jaipur.
10. Guard File.



Dy. Secretary to the Government

**GOVERNMENT OF RAJASTHAN
FINANCE DEPARTMENT
(TAX DIVISION)**

NOTIFICATION

Jaipur, Dated:- 06-10-2010

In exercise of the powers conferred by sub-section (3) of section 8 of the Rajasthan Value Added Tax Act, 2003 (Act No. 4 of 2003), the State Government being of the opinion that it is expedient in the public interest so to do, hereby exempts from payment of tax payable on purchases of taxable goods and equipments mentioned in annexure-'A' of this notification, made by any registered dealer for exclusive use in execution of works contracts related to Metro Rail Project in Jaipur City awarded by the Delhi Metro Rail Corporation Limited for Jaipur Metro Rail Project on the following conditions, namely:-

1. That the purchasing registered dealer has a valid contract with the Delhi Metro Rail Corporation Limited for execution of works contracts related to Metro Rail project in Jaipur City;
2. That the purchasing registered dealer shall ensure that the sale invoice of goods contains the expression "The goods purchased by this invoice have been purchased in pursuance to contract with Delhi Metro Rail Corporation Limited for exclusive use in the Jaipur Metro Rail Project";
3. That the purchasing registered dealer shall submit a monthly statement of such taxable purchases to his assessing authority within fifteen days from the close of the month; and
4. That the purchasing registered dealer shall submit a declaration to the selling dealer in the form specified in Annexure- 'B' of this notification, for every taxable purchase made by him, duly certified by the authorized officer of the Delhi Metro Rail Corporation Limited. Exemption from payment of tax on such sales made by the selling dealer shall be allowed only on furnishing of the said declaration to his assessing authority.



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ANNEXURE-‘A’**List of goods required for execution of Metro Rail Project in Jaipur City**

S.No.	Name of Goods	S.No.	Name of Goods
1.	Cement	17.	Marble/granite/tiles/ kota stone
2.	Steel (a) TOR, TMT (b) HTS (c) Binding wire (d) Plate, structural Steel (i) Angle (ii) Channel (iii) SMB etc. (iv) Pipe	18.	Sanitary fitting/wares
3.	Aggregate	19.	Sheet AC/GI/others
4.	Sand	20.	Paver block/ CC blocks
5.	Ply	21.	Bitumen
6.	Batten- wooden	22.	Stainless steel pipe/hollow section
7.	Hardware -Nail etc	23.	Paint/snow-cem/putty etc
8.	Bearing i. Neoprene ii.Pot /PTFE	24.	Diesel/petrol
9.	Bentonite	25.	Tyre
10.	Ready mix concrete	26.	Spare part of 4 wheeler dumper, Tractor, Crane, Gantry
11.	Jacks	27.	Electrical cable/ fitting
12.	GI/CI/PVC/SW Pipes	28.	Signal& telecom cable & fittings equipments
13.	JCB, excavator, loader, truck, Car, Jeep, dumper, tractor, trailer, cranes, battery plant, concrete pump, placer, transit mixer, gantry, launchings girder, piling rig	29.	Rail
14.	Bricks/stone	30.	PSC sleeper, CI inserts
15.	Aluminum	31.	Track fittings: - Points and crossing, pandrol clip, rubber pad, liner
16.	Wooden/ply doors	32.	Ballast



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List of electrical equipment:

1. **25 Km. (S.P.) AC. Traction:** All equipment used for erecting of overhead (25 KV -A.C. traction System including. Contact wire, centenary wire, Droppers, Insulators, Masts, Portals, Drop Arm, Steel structures, Automatic Tensioning Device, Traction Return Rail Bonding, Earthing System etc.
2. **Power & Distribution transformers:** 220/132 KV, 132/33 KV, 33 KV /25 KV - Power 33/0.415 Aux.transformers, Booster transformers etc.
3. **Sub Stations:**All the equipments installed in substation including single Bus Bar with Bus sectioning or Double Bus Bar with Bus coupler, circuit breakers, interrupters (220 KV, 132 KV, 25 KV single phase) for traction load and 33 KV side for Auxiliary loads, lightening protection equipment, Instrument transformers (current & Voltage), Protection Relays etc.
4. **H.T. & L.T. Cables :** All cables used for connecting the Equipments in the above stated system for operation & control.
5. **Stand By arrangement:** A) D.G. Set. 200 KVA at elevated Stations, D.G. Set. 2x1000/750 KVA at U.G. Station (chandpole)
B) Battery Chargers with Batteries for control supply.
6. Equipments used in supervisory control & Data Acquisition (SCADA) system with Optical Fibre Glass Cables.
7. All the Equipment used in Ventilation & Air Conditioning System.
8. Equipments used for Illumination.
9. Equipments used for provision of Fans.
10. Equipments used for provision of exhaust fans.
11. Equipments used for provision of Escalators/Lifts.
12. Equipments used for provision of Pump Sets.
13. Equipments required for cool drinking water.
14. Equipments for provision of Sign age on P.F & Sin Bldg's



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ANNEXURE-‘B’**DECLARATION FOR PURCHASE OF GOODS**

To,

.....

.....

(Name and complete address of the seller)

I/We hereby declare that the goods.....ordered vide our order
 No.....dated.....and purchased from you as per your
 VAT Invoice No..... dated.....for ₹
 (in words) have been purchased in
 pursuance to contract with Delhi Metro Rail Corporation Limited for exclusive
 use in the Jaipur Metro Rail Project

Seal

Signature

Name

TIN

**Certification to be made by the authorized officer of the Delhi Metro Rail
 Corporation limited**

No.

Dated:

It is hereby certified that the goods mentioned above have been utilized in
 completion of Metro Rail Project in Jaipur City.

Seal

Signature of Authorized officer of DMRC

Name

Designation

[No. F.12(100) FD/Tax/10- 78]

By Order of the Governor,

(Bhawani Singh Detha)

Deputy Secretary to Government

Copy forwarded to the following for information and necessary action:

1. Superintendent, Government Central Press, Jaipur for publication of this notification in part 4(c) of extra ordinary gazette along with a soft copy in CD. It is requested 10 copies of this notification may sent to this department and 20 copies along with bill may be sent Commissioner, Commercial Taxes Department Rajasthan, Jaipur, Please ensure that soft copy in CD is same as hard copy provided to you for publication.
2. Principal Secretary to Hon'ble Chief Minister (Finance Minister).
3. Commissioner, Commercial Taxes Department Rajasthan, Jaipur.
4. Accountant General, Rajasthan, Jaipur.
5. PS to ACS, Finance.
6. PS to Principal Secretary, Law.
7. PS to Principal Secretary, LSG & UDH and Chairman & Managing Director, JMRC .
8. PS to Secretary, Finance (Revenue).
9. Director, Public Relations, Jaipur.
10. SA, Finance (Computer Cell) Department, Secretariat, Jaipur.
11. Guard File.

Deputy Secretary to Government

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**GOVERNMENT OF RAJASTHAN
FINANCE DEPARTMENT
(TAX DIVISION)**

NOTIFICATION

Jaipur, dated December 8, 2011

In exercise of the powers conferred by sub-section (3) of section 8 of the Rajasthan Value Added Tax Act, 2003 (Act No. 4 of 2003), the State Government being of the opinion that it is expedient in the public interest so to do, hereby makes the following amendments in this Department's notification number F.12(100)FD/Tax/2010-78 dated 06-10-2010, namely:-

AMENDMENTS

In the said notification,-

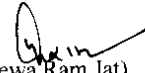
(i) for the existing expression "Delhi Metro Rail Corporation Limited" wherever occurring, the expression "Jaipur Metro Rail Corporation Ltd. or Delhi Metro Rail Corporation Limited" shall be substituted.

(ii) the existing expression "of DMRC" appearing in Annexure "B", shall be deleted.

This shall have effect from 06-10-2010.

[No. F.12(100)FD/Tax/10 -73]

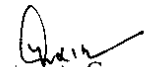
By Order of the Governor.


(Mewa Ram Jat)

Dy. Secretary to Government

Copy forwarded to the following for information and necessary action:-

1. Superintendent, Government Central Press, Jaipur 2011 along with a soft copy in CD for publication of this notification in part 4(c) of today's extra ordinary Gazette. It is requested that 10 copies of this notification may be sent to this Department and 20 copies along with bill may be sent to Commissioner, Commercial Taxes Department, Rajasthan, Jaipur. Please ensure that soft copy in CD is same as hard copy provided to you for publication.
2. Principal Secretary to Hon'ble Chief Minister (Finance Minister).
3. Commissioner, Commercial Taxes Department, Rajasthan, Jaipur.
4. Accountant General, Rajasthan, Jaipur.
5. PS to ACS, Finance.
6. PS to Secretary, Finance (Revenue).
7. Director, Public Relations, Jaipur.
8. SA, Finance (Computer Cell) Department, Secretariat, Jaipur.
9. Guard File.


Dy. Secretary to Government

**GOVERNMENT OF RAJASTHAN
FINANCE DEPARTMENT
(TAX DIVISION)**

NOTIFICATION
Jaipur, April 24 , 2013

In exercise of the powers conferred by sub-section (3) of section 8 of the Rajasthan Value Added Tax Act, 2003, (Act No. 4 of 2003), the State Government being of the opinion that it is expedient in the public interest so to do hereby, with immediate effect, makes the following amendments in this Department's notification No.F.12(100)FD/Tax/10-78 dated 06.10.2010, as amended from time to time, namely:-

AMENDMENTS

In the List of goods required for execution of Metro Rail Project in Jaipur City of Annexure 'A' of said notification.-

- (i) the existing serial number 28 and entries thereto shall be substituted by the following, namely:-

28.	Equipments required for provision of Signaling, Telecommunication and Ticketing systems (including electronic, electrical & IT), Cables, Batteries, Equipments racks and UPS
-----	--

- (ii) after existing serial number 32 and entries thereto the following new serial number 33 and entries thereto shall be added, namely:-

33.	Rolling stock including Sub-assemblies, Components, Accessories and Spares thereof
-----	--

[No. F.12(100)FD/Tax/10-11]

By Order of the Governor,




(Aditya Pareek)

Deputy Secretary to the Government

Copy forwarded to the following for information and necessary action:

1. Superintendent, Government Central Press, Jaipur along with a soft copy in CD for publication of this notification in part 4(c) of **today's extra ordinary Gazette**. It is requested that 10 copies of this Notification may be sent to this department and 20 copies along with bill may be sent to Commissioner, Commercial Taxes Department, Rajasthan, Jaipur. Please ensure that soft copy in CD is same as hard copy as provided to you for publication.
2. Principal Secretary to Hon'ble Chief Minister (Finance Minister).
3. Commissioner, Commercial Taxes Department, Rajasthan, Jaipur.
4. Accountant General, Rajasthan, Jaipur.
5. PS to ACS, UDH & LSG.
6. PS to Principal Secretary, Finance.
7. PS to Principal Secretary, Law
8. PS to Secretary, Finance (Revenue).
9. Director, Public Relations, Jaipur.
10. SA, Finance (Computer Cell) Department, Secretariat, Jaipur.
11. Guard File.


Deputy Secretary to the Government

**GOVERNMENT OF RAJASTHAN
FINANCE DEPARTMENT
(TAX DIVISION)**

NOTIFICATION

Jaipur, dated : February 08, 2016

In exercise of the powers conferred by sub-section (3) of section 8 of the Rajasthan Value Added Tax Act, 2003 (Act No.4 of 2003), the State Government being of the opinion that it is expedient in public interest so to do, hereby, with effect from 01.01.2016, makes the following amendments in this department's notification number F.12(100)FD/Tax/10-78 dated 06.10.2010, as amended from time to time, namely :-

Amendments

In the said notification,-

- (i) the existing condition 4 shall be substituted by the following, namely:-
"That the purchasing registered dealer shall generate a declaration in Form VAT-72 electronically through the official website of the Commercial Taxes Department, in the manner as provided therein and furnish a duly signed copy of Form VAT-72 so generated, to the selling dealer along with the duly filled in and signed certificate of the authorized officer of the Jaipur Metro Rail Corporation Ltd. or Delhi Metro Rail Corporation Limited, as provided in ANNEXURE-B appended hereto."; and
- (ii) the existing Annexure-B appended to the said notification shall be substituted by the following, namely:-

"ANNEXURE-B

Certificate to be made by the authorized officer of the Jaipur Metro Rail Corporation Ltd. or Delhi Metro Rail Corporation Limited

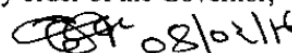
No. _____ Dated: _____
It is hereby certified that the goods mentioned in Form VAT-72 No. generated by M/S. have been utilized in completion of Metro Rail Project in Jaipur City.

Seal

Signature of Authorized officer of DMRC:
Name:
Designation:....."

[F.12(79)FD/Tax/2014-Pt-I-151]

By order of the Governor,




(Dr. Devraj)

Joint Secretary to the Government

Copy forwarded to the following for information and necessary action:-

1. Superintendent, Government Central Press, Jaipur along with a soft copy in CD for publication of this notification in part 4(c) of **today's extra ordinary Gazette**. It is requested that 10 copies of this notification may be sent to this Department and 20 copies along with bill may be sent to Commissioner, Commercial Taxes Department, Rajasthan, Jaipur. Please ensure that soft copy in CD is same as hard copy provided to you for publication.
2. Secretary to Hon'ble Chief Minister (Finance Minister).
3. Commissioner, Commercial Taxes Department, Rajasthan, Jaipur.
4. Accountant General, Rajasthan, Jaipur.
5. PS to Principal Secretary, Finance.
6. PS to Principal Secretary, Law.
7. PS to Secretary, Finance (Revenue).
8. Director, Public Relations, Jaipur.
9. Additional Director, Finance (Computer Cell) Department for uploading the notification on website of Finance Department.
10. Guard File.

 08/02/16

Joint Secretary to the Government


**GOVERNMENT OF RAJASTHAN
FINANCE DEPARTMENT
(TAX DIVISION)**

NOTIFICATION

Jaipur, Dated: 06-10-2010

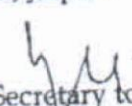
In exercise of the powers conferred by sub-section (3) of section 8 of the Rajasthan Value Added Tax Act, 2003 (Act No. 4 of 2003), the State Government being of the opinion that it is expedient in the public interest so to do, hereby exempts from payment of tax payable by any registered dealer on transfer of property in goods involved in execution of works contracts related to Metro Rail project in Jaipur City awarded by the Delhi Metro Rail Corporation Limited for Jaipur Metro Rail Project.

[No. F.12(100) FD/Tax/10-79]
By Order of the Governor,


(Bhawan Singh Detha)
Deputy Secretary to Government

Copy forwarded to the following for information and necessary action:

1. Superintendent, Government Central Press, Jaipur for publication of this notification in part 4(c) of extra ordinary gazette along with a soft copy in CD. It is requested 10 copies of this notification may sent to this department and 20 copies along with bill may be sent Commissioner, Commercial Taxes Department Rajasthan, Jaipur, Please ensure that soft copy in CD is same as hard copy provided to you for publication.
2. Principal Secretary to Hon'ble Chief Minister (Finance Minister).
3. Commissioner, Commercial Taxes Department Rajasthan, Jaipur.
4. Accountant General, Rajasthan, Jaipur.
5. PS to ACS, Finance.
6. PS to Principal Secretary, Law.
7. PS to Principal Secretary, LSG & UDH and Chairman & Managing Director, JMRC.
8. PS to Secretary, Finance (Revenue).
9. Director, Public Relations, Jaipur.
10. SA, Finance (Computer Cell) Department, Secretariat, Jaipur.
11. Guard File.


Deputy Secretary to Government

**GOVERNMENT OF RAJASTHAN
FINANCE DEPARTMENT
(TAX DIVISION)**

NOTIFICATION

Jaipur, dated December 8, 2011

In exercise of the powers conferred by sub-section (3) of section 8 of the Rajasthan Value Added Tax Act, 2003 (Act No.4 of 2003), the State Government being of the opinion that it is expedient in the public interest so to do, hereby makes the following amendment in this Department's notification number F.12(100)FD/Tax/2010-79 dated 06-10-2010, namely:-

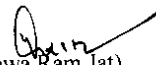
AMENDMENT

In the said notification, after the existing expression "awarded by the" and before the existing expression "Delhi Metro Rail Corporation Limited", the expression "Jaipur Metro Rail Corporation Ltd. or the" shall be inserted.

This shall have effect from 06-10-2010.

[No. F.12(100)FD/Tax/10 -74]

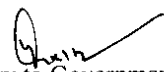
By Order of the Governor,


(Mewa Ram Jat)

Dy. Secretary to Government

Copy forwarded to the following for information and necessary action:-

1. Superintendent, Government Central Press, Jaipur 2011 along with a soft copy in CD for publication of this notification in part 4(c) of today's extra ordinary Gazette. It is requested that 10 copies of this notification may be sent to this Department and 20 copies along with bill may be sent to Commissioner, Commercial Taxes Department, Rajasthan, Jaipur. Please ensure that soft copy in CD is same as hard copy provided to you for publication.
2. Principal Secretary to Hon'ble Chief Minister (Finance Minister).
3. Commissioner, Commercial Taxes Department, Rajasthan, Jaipur.
4. Accountant General, Rajasthan, Jaipur.
5. PS to ACS, Finance.
6. PS to Secretary, Finance (Revenue).
7. Director, Public Relations, Jaipur.
8. SA, Finance (Computer Cell) Department, Secretariat, Jaipur.
9. Guard File.


Dy. Secretary to Government

**GOVERNMENT OF RAJASTHAN
FINANCE DEPARTMENT
(TAX DIVISION)**

Jaipur, Dated: 11.8.2006

In pursuance of clause (3) of Article 348 of the Constitution of India, the Governor is pleased to authorize the publication of this Notification No F.12(63)FD/Tax/2005-81 dated 11.8.2006, in English language, in the Rajasthan Gazette of Finance (Tax) Department.

By Order of the Governor,


(Arun Gupta)

Deputy Secretary to Government

NOTIFICATION

Jaipur, Dated: 11.8.2006

In exercise of the powers conferred by sub-section (2) of section 20 of the Rajasthan Value Added Tax Act, 2003 (Act No. 4 of 2003), read with sub-rule (2) of rule 40 of the Rajasthan Value Added Tax Rules, 2006, the State Government hereby notifies that the awarder or any person authorised by him, at the time of credit of any sum to the account of the contractor or at the time of making such payment by any mode, for carrying out any work, shall deduct, in lieu of tax, an amount equal to 3% of such sum:

Provided that in case of contractors having exemption certificate under notification No. F.12(63)FD/Tax/2005-80 dated 11.8.2006, the awarder or any person authorised by him shall deduct in lieu of tax an amount equal to rate of exemption fee as mentioned in the said exemption certificate.

[No.F.12(63)FD/Tax/2005-81]

By Order of the Governor,


(Arun Gupta)

Deputy Secretary to Government

Copy forwarded to the following for information and necessary action:

1. Superintendent, Government Central Press, Jaipur for publication of this notification in part 4(c) of extra ordinary gazette. 10 copies of this notification may sent to this department and 20 copies along with bill may be sent to Commissioner, Commercial Taxes Department Raj. Jaipur.
2. Principal Secretary to Chief Minister (Finance Minister).
3. PS to Chairman, Rajasthan VAT Grievances Redressal Committee, Jaipur.
4. Commissioner, Commercial Taxes Department, Rajasthan, Jaipur.
5. PS to Principal Secretary, Finance.
6. PS to Secretary, Finance (II).
7. PS to Director, Public Relations Jaipur.
8. ACP, Finance Department, Secretariat, Jaipur.
9. Guard file.


Deputy Secretary to Government

**GOVERNMENT OF RAJASTHAN
FINANCE DEPARTMENT
(TAX DIVISION)**

NOTIFICATION

Jaipur, Dated: 06.10.2010


In exercise of the powers conferred by sub-section (2) of section 20 of the Rajasthan Value Added Tax Act, 2003 (Act No. 4 of 2003), read with sub-rule (2) of rule 40 of the Rajasthan Value Added Tax Rules, 2006, the State Government hereby makes the following amendment in this department's notification No.F.12(63) FD/Tax/ 2005-81 dated 11.08.2006, as amended from time to time, namely:-

AMENDMENT

In the said notification, after the existing last proviso, the following new proviso shall be added, namely:-

"Provided further that in case of works contracts related to Metro Rail Project in Jaipur City awarded by the Delhi Metro Rail Corporation Limited for Jaipur Metro Rail Project, no amount in lieu of tax shall be deducted by the Delhi Metro Rail Corporation Limited or any person authorized by him."

[No. F.12(100) FD/Tax/10-80]
By Order of the Governor,


(Bhawant Singh Detha)
Deputy Secretary to Government

Copy forwarded to the following for information and necessary action:

1. Superintendent, Government Central Press, Jaipur for publication of this notification in part 4(c) of extra ordinary gazette along with a soft copy in CD. It is requested 10 copies of this notification may sent to this department and 20 copies along with bill may be sent Commissioner, Commercial Taxes Department Rajasthan, Jaipur, Please ensure that soft copy in CD is same as hard copy provided to you for publication.
2. Principal Secretary to Hon'ble Chief Minister (Finance Minister).
3. Commissioner, Commercial Taxes Department Rajasthan, Jaipur.
4. Accountant General, Rajasthan, Jaipur.
5. PS to ACS, Finance.
6. PS to Principal Secretary, Law.
7. PS to Principal Secretary, LSG & UDH and Chairman & Managing Director, JMRC.
8. PS to Secretary, Finance (Revenue).
9. Director, Public Relations, Jaipur.
10. SA, Finance (Computer Cell) Department, Secretariat, Jaipur.
11. Guard File.


Deputy Secretary to Government

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**GOVERNMENT OF RAJASTHAN
FINANCE DEPARTMENT
(TAX DIVISION)**

NOTIFICATION

Jaipur, dated December 8, 2011

In exercise of the powers conferred by sub-section (2) of section 20 of the Rajasthan Value Added Tax Act, 2003 (Act No.4 of 2003), read with sub-rule (2) of rule 40 of the Rajasthan Value Added Tax Rules, 2006, the State Government being of the opinion that it is expedient in the public interest so to do, hereby makes the following amendment in this Department's notification number F.12(63)FD/Tax/2005-81 dated 11-08-2006, as amended from time to time, namely:-

AMENDMENT

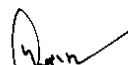
In the said notification, the existing last proviso shall be substituted by the following, namely:-

"Provided further that in case of works contracts related to Metro Rail Project in Jaipur City awarded by the Jaipur Metro Rail Corporation Ltd. or Delhi Metro Rail Corporation Limited for Jaipur Metro Rail Project, no amount in lieu of tax shall be deducted by the Jaipur Metro Rail Corporation Ltd. or Delhi Metro Rail Corporation Limited or any person authorized by them."

This shall have effect from 06-10-2010.

[No. F.12(100)FD/Tax/10 -75]

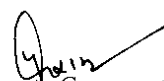
By Order of the Governor.


(Mewa Ram Jat)

Dy. Secretary to Government

Copy forwarded to the following for information and necessary action:-

1. Superintendent, Government Central Press, Jaipur 2011 along with a soft copy in CD for publication of this notification in part 4(c) of today's extra ordinary Gazette. It is requested that 10 copies of this notification may be sent to this Department and 20 copies along with bill may be sent to Commissioner, Commercial Taxes Department, Rajasthan, Jaipur. Please ensure that soft copy in CD is same as hard copy provided to you for publication.
2. Principal Secretary to Hon'ble Chief Minister (Finance Minister).
3. Commissioner, Commercial Taxes Department, Rajasthan, Jaipur.
4. Accountant General, Rajasthan, Jaipur.
5. PS to ACS, Finance.
6. PS to Secretary, Finance (Revenue).
7. Director, Public Relations, Jaipur.
8. SA, Finance (Computer Cell) Department, Secretariat, Jaipur.
9. Guard File.


Dy. Secretary to Government

[TO BE PUBLISHED IN THE GAZETTE OF INDIA, EXTRAORDINARY, PART II,
SECTION 3, SUB-SECTION (i)]

**GOVERNMENT OF INDIA
MINISTRY OF FINANCE
(DEPARTMENT OF REVENUE)
NOTIFICATION
No.9/2016-Service Tax,**

New Delhi, the 1st March, 2016

G.S.R.....(E).-In exercise of the powers conferred by sub-section (1) of section 93 of the Finance Act, 1994 (32 of 1994), the Central Government being satisfied that it is necessary in the public interest so to do, hereby makes the following further amendments in the notification of the Government of India in the Ministry of Finance (Department of Revenue) No.25/2012-Service Tax, dated the 20th June, 2012, published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i) *vide* number G.S.R. 467 (E), dated the 20th June, 2012, namely:-

1. In the said notification,-

(a) in the first paragraph,-

(i) in entry 6, for clause (b) and clause (c), the following clauses shall be substituted, namely,-

“(b) a partnership firm of advocates or an individual as an advocate other than a senior advocate, by way of legal services to-

(i) an advocate or partnership firm of advocates providing legal services;

(ii) any person other than a business entity; or

(iii) a business entity with a turnover up to rupees ten lakh in the preceding financial year; or

(c) a senior advocate by way of legal services to a person other than a person ordinarily carrying out any activity relating to industry, commerce or any other business or profession;”;

(ii) after entry 9A, the following entry shall be inserted with effect from 1st March, 2016, namely,-

“9B. Services provided by the Indian Institutes of Management, as per the guidelines of the Central Government, to their students, by way of the following educational programmes, except Executive Development Programme, -

- (a) two year full time residential Post Graduate Programmes in Management for the Post Graduate Diploma in Management, to which admissions are made on the basis of Common Admission Test (CAT), conducted by Indian Institute of Management;
- (b) fellow programme in Management;
- (c) five year integrated programme in Management.”;

(iii) after entry 9B as so inserted, the following entries shall be inserted, namely:-

“9C. services of assessing bodies empanelled centrally by Directorate General of Training, Ministry of Skill Development and Entrepreneurship by way of assessments under Skill Development Initiative (SDI) Scheme;

9D. services provided by training providers (Project implementation agencies) under Deen Dayal Upadhyaya Grameen Kaushalya Yojana under the Ministry of Rural Development by way of offering skill or vocational training courses certified by National Council For Vocational Training.”;

(iv) after entry 12, with effect from the 1st March, 2016, the following entry shall be inserted, namely-

“12A. Services provided to the Government, a local authority or a governmental authority by way of construction, erection, commissioning, installation, completion, fitting out, repair, maintenance, renovation, or alteration of -

- (a) a civil structure or any other original works meant predominantly for use other than for commerce, industry, or any other business or profession;
- (b) a structure meant predominantly for use as (i) an educational, (ii) a clinical, or (iii) an art or cultural establishment; or
- (c) a residential complex predominantly meant for self-use or the use of their employees or other persons specified in the Explanation 1 to clause (44) of section 65 B of the said Act;

under a contract which had been entered into prior to the 1st March, 2015 and on which appropriate stamp duty, where applicable, had been paid prior to such date:

provided that nothing contained in this entry shall apply on or after the 1st April, 2020.”;

(v) in entry 13, after item (b), the following items shall be inserted with effect from 1st March, 2016, namely –

- “(ba) a civil structure or any other original works pertaining to the ‘In-situ rehabilitation of existing slum dwellers using land as a resource through

private participation under the Housing for All (Urban) Mission/Pradhan Mantri Awas Yojana, only for existing slum dwellers.

- (bb) a civil structure or any other original works pertaining to the 'Beneficiary-led individual house construction / enhancement under the Housing for All (Urban) Mission/Pradhan Mantri Awas Yojana';

(vi) in entry 14, with effect from 1st March, 2016,

A. for item (a), the following shall be substituted, namely:-

“(a) railways, excluding monorail and metro;

Explanation.-The services by way of construction, erection, commissioning or installation of original works pertaining to monorail or metro, where contracts were entered into before 1st March, 2016, on which appropriate stamp duty, was paid, shall remain exempt.”.

B. after item (c), the following item shall be inserted, namely –

“(ca) low cost houses up to a carpet area of 60 square metres per house in a housing project approved by the competent authority under:

- (i) the “Affordable Housing in Partnership” component of the Housing for All (Urban) Mission/Pradhan Mantri Awas Yojana;
- (ii) any housing scheme of a State Government.”.

(vii) after entry 14, with effect from the 1st March, 2016, the following entry shall be inserted, namely-

“14A. Services by way of construction, erection, commissioning, or installation of original works pertaining to an airport or port provided under a contract which had been entered into prior to 1st March, 2015 and on which appropriate stamp duty, where applicable, had been paid prior to such date:

provided that Ministry of Civil Aviation or the Ministry of Shipping in the Government of India, as the case may be, certifies that the contract had been entered into before the 1st March, 2015:

provided further that nothing contained in this entry shall apply on or after the 1st April, 2020;”;

(viii) in entry 16, for the words “one lakh rupees”, the words “one lakh and fifty thousand rupees” shall be substituted;

(ix) in entry 23,-

(A) after clause (b), the following clause shall be inserted with effect from 1st June 2016, namely,-

“(bb) stage carriage other than air-conditioned stage carriage;”;

(B) clause (c) shall be omitted;

(x) in entry 26, after clause (p), the following clause shall be inserted, namely,-

“(q) Niramaya' Health Insurance Scheme implemented by Trust constituted under the provisions of the National Trust for the Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities Act, 1999 (44 of 1999).”;

(xi) after entry 26B, the following entry shall be inserted, namely,-

“26C. Services of life insurance business provided by way of annuity under the National Pension System regulated by Pension Fund Regulatory and Development Authority of India (PFRDA) under the Pension Fund Regulatory And Development Authority Act, 2013 (23 of 2013);”;

(xii) after entry 48, the following entries shall be inserted, namely,-

“49. Services provided by Employees' Provident Fund Organisation (EPFO) to persons governed under the Employees' Provident Funds and Miscellaneous Provisions Act, 1952 (19 of 1952);

50. Services provided by Insurance Regulatory and Development Authority of India (IRDA) to insurers under the Insurance Regulatory and Development Authority of India Act, 1999 (41 of 1999);

51. Services provided by Securities and Exchange Board of India (SEBI) set up under the Securities and Exchange Board of India Act, 1992 (15 of 1992) by way of protecting the interests of investors in securities and to promote the development of, and to regulate, the securities market;

52. Services provided by National Centre for Cold Chain Development under Ministry of Agriculture, Cooperation and Farmer's Welfare by way of cold chain knowledge dissemination;”;

(xiii) after entry 52 as so inserted, the following entries shall be inserted with effect from 1st June 2016, namely:-

“53. Services by way of transportation of goods by an aircraft from a place outside India upto the customs station of clearance in India.”;

(b) in paragraph 2, -

(i) after clause (b), the following clause shall be inserted with effect from such date on which the Finance Bill, 2016 receives assent of the President of India, namely: -

‘(ba) “approved vocational education course” means, -

(i) a course run by an industrial training institute or an industrial training centre affiliated to the National Council for Vocational Training or State Council for Vocational Training offering courses in designated trades notified under the Apprentices Act, 1961 (52 of 1961); or

(ii) a Modular Employable Skill Course, approved by the National Council of Vocational Training, run by a person registered with the Directorate General of Training, Ministry of Skill Development and Entrepreneurship;’;

(ii) for clause (oa), the following shall be substituted with effect from such date on which the Finance Bill, 2016, receives assent of the President of India, namely: -

‘(oa) “educational institution” means an institution providing services by way of:

(i) pre-school education and education up to higher secondary school or equivalent;

(ii) education as a part of a curriculum for obtaining a qualification recognised by any law for the time being in force;

(iii) education as a part of an approved vocational education course;’;

(iii) after clause (zd), the following clause shall be inserted, namely:-

‘(zdd) “senior advocate” has the meaning assigned to it in section 16 of the Advocates Act, 1961 (25 of 1961);’

2. Save as otherwise provided in this notification, this notification shall come into force on the 1st of April, 2016.

[F. No.334/8/2016 -TRU]

(K. Kalimuthu)

Under Secretary to the Government of India

Note:-The principal notification was published in the Gazette of India, Extraordinary, *vide* notification No. 25/2012 - Service Tax, dated the 20th June, 2012, *vide* number G.S.R. 467 (E), dated the 20th June, 2012 and last amended *vide* notification number 07/2016 - Service Tax, dated the 18th February, 2016 *vide* number G.S.R. 184(E), dated the 18th February, 2016.

Annexure-II

(Refer Clause 41 of SCC)

(To be stamped in accordance with Stamp Act)

INDENTURE FOR STAGE PAYMENT

THIS INDENTURE made onbetween(hereinafter called the contractor) which expression shall where the context do admits or implies be deemed to include its executors, administrators and assigns of the one part and the Jaipur Metro Rail Corporation Ltd. (hereinafter called JMRC of the other part.

WHEREAS by the agreement (LOA No dated.....) (hereinafter called the said agreement) the contractor has agreed to “Design, Manufacture, Supply, Installation, Testing and Commissioning of PIDS, PAS and Master Clock System for two underground Metro Stations at Chhoti Chaupar and Badi Chaupar on East–West Corridor of Jaipur Metro Phase- 1B” and whereas the contractor has applied to the JMRC Ltd. That they may be allowed advance on the security of materials absolutely belonging to them and brought by them to the site of the works covered under the project of the said agreement for use in the construction of such of the work as they have under taken to execute at rates fixed for the finished work (inclusive of the cost of materials and labour and other charges).

AND WHEREAS the JMRC Ltd. Has agreed to make stage payment to the contractor the total sum of Rs.----- (Rupees -----only) for stage payment Bill. The quantities and other particulars of which are detailed in this bill for the said works signed by the Contractor on “.....” and JMRC Ltd has reserved to itself option of making any further advances till date on the security of other materials brought by the contractor to site of the said work.

NOW THIS INDENTURE WITNESS that in pursuance of the said agreement and its consideration of the sum of Rs. ----- (Rupees -----only) on or before the execution of these present amount paid to the contractor by the JMRC Ltd (the receipt where of the contractor) both hereby acknowledge and of such further Stage payment, if any, as may be made to him so aforesaid to the contractor do the covenant and agreed with the JMRC Ltd and declare as follows:

1. That the said sum of **Rs. ----- (Rupees ----- only)** so Stage Payment by the JMRC Ltd to the contractors as aforesaid and all or any further sum or sum’s advanced as aforesaid shall be employed by the contractor in or towards the execution of the said works and for no other purpose whatsoever.
2. That the Stage Payment detailed in the said running account bill which have been offered to and accepted by the JMRC Ltd as security are absolutely the contractor’s own property and free from encumbrances of any kind and the contractor’s shall not make any application for or receive any further payments on the security of work executed which are not absolutely his own property and free from encumbrances of any kind the Contractor indemnifies the JMRC Ltd against all claims on any materials in respect of which any Stage Payment has been made to him as aforesaid.
3. That the Stage Payment detailed in the said running account bill and all other stage payments on the security of which further payments or Stage Payment any hereafter be made as aforesaid (hereinafter

called the said materials) shall be used by the contractor solely in the execution of the said works in accordance with the directions of the Project Manager / JMRC Ltd and in the terms of the said agreement.

4. That the contractor shall be fully liable for the materials/components and shall make at his own cost all necessary and adequate arrangement for the proper watch, safe custody and protection against all risks including, acts of the God of the said materials/components and provide on approved insurance in favour of JMRC Ltd that until used in construction as aforesaid the said materials shall remain at the site of said works in the contractor's custody and on his own responsibility and shall at the time be open to inspection by the Project Manager /JMRC Ltd. This insurance will be valid for a period until this material is approved and fixed in the building or advance has been fully recovered from contractor.
5. That the said materials/components shall not on any account be removed/shifted from the site of the works except with the written permission of the Project Manager /JMRC Ltd.
6. That issue of any Stage Payment excess of what is finally required to be used at site would be the contractor's property without any liability on JMRC Ltd., who would recover the cost of this from the contractor.
7. That the contractor hereby charges all the said materials components with the repayment to the JMRC of the said sum of **Rs. ----- (Rupees -----only)** and any further sum or sums advanced as aforesaid and all cost charges. Damages and expenses payable under these presents provided always and it is hereby agreed and declared that not with power contained therein, if any, whenever the convenient for payment, and repayment herein before contained shall become enforceable and the money owned shall not be paid in accordance therewith, the JMRC Ltd., may at any time thereafter adopt all or any of the following courses as he may deem best.
 - a. That if the contractor shall at any time not be able to complete any part of the Component / equipment as per provision in contract Agreement it shall be considered as the work being left incomplete by the contractor and action as per the conditions of the contract shall be taken.
 - b. Deduct all or any of the money owing out of the performance security or any sum due to the contractor under the said agreement.

That in the event of any conflict between the provisions of these presents and the said agreement the provisions of these presents shall prevail.

This widening shall be co-extensive to the agreement dated between Jaipur Metro Rail Corporation Limited, Khanij Bhawan, Tilak Marg, C-Scheme, Jaipur (Rajasthan), India, PIN-302 005. (Client) and (Contractor).

IN WITNESS where of the said contractor and by the order under the direction of JMRC Ltd has here set their respective hands the day and years first above written.

Signed, Sealed & Delivered by the said Contractor:

**IN THE PRESENCE OF:
WITNESS:**

1. NAME:

Signature:

SIGNED BY (ADDRESS)

BY THE ORDER AND DIRECTION OF THE JMRC LTD IN THE PRESENCE OF:

SIGNATURE:

WITNESS

(NAME AND ADDRESS)

Annexure-III**REQUIREMENTS UNDER GCC/SCC**

S.N	DESCRIPTION	Clause Ref.	REQUIREMENT
i	Amount of Performance Security	Clause 11 of the SCC	10% of the Contract Price in types and proportions of currencies in which the contract price is payable. In the event of variations during the execution of the contract which result in payments to the Contractor over and above the contract price, the Performance Security shall be suitably adjusted.
ii	Latest 'date for commencement' of the Works	Clause 4 of the SCC	As per the referred clauses of SCC
iii	'Time for completion' of the work from the date of commencement of the work	Clause 8.2 of the GCC	<i>As per key dates in Appendix-4, Section 9 of Contract.</i>
iv	Liquidated Damages	Clause 28 of the SCC	i) 0.05% of the fixed Lump Sum price per day of delay for the Key Dates related to the Taking-Over of a Section, and the Taking-Over of the whole of the Works. ii) 0.005% of the fixed Lump Sum price per day of delayed other than the ones relating to the Taking-Over of a Section. iii) The maximum limit shall be 10% of the contract price.
v	'Defects Liability Period' for the whole of the Works	Clause 29 of the SCC	As per clause 29 of SCC from the date of ROD for the equipments and systems employer starts using and accepted by employer for DLP.
vi	Amount of advance payment	Clause 10 of the SCC	As per the referred clauses of SCC
vii	Amount of Professional Indemnity Insurance (PII). (for	Clause 52 of SCC	Rs 1 million

	the contracts having Design in scope of work)		
viii	Insurance cover for Contractor's All Risk and other requirements as specified in the GCC	Clause 34 of the GCC	100% of the Total Contract Price.
ix	Amount of Third Party Insurance	Clause 34 of GCC	INR 0.50 Million for any one incident, with no. of incidents unlimited.
x	Period in which all insurances have to be submitted	Clause 34 of GCC	Within 12 weeks from the "Date of commencement of Work"
xi	Contract Key Dates		As per Appendix-4 of Contract Forms

- (a) he will execute and complete the Sub-contract works/supply, and will carry out each and all of the obligations, duties and undertakings of the Sub-contractor/Vendor under the Sub-contract when and if such obligations, duties and undertakings shall become due and performable, in accordance with the terms of the Sub-contract (as the same may from time to time be varied or amended with the consent of the Employer); and
 - b) he will supply to the Contractor and in specific cases wherever required to the Employer's Representative with all information as may be required from time to time in relation to progress of the Sub-contract works/supply.
- 2. The Sub-contractor/Vendor undertakes to indemnify the Employer against each and every liability which the Employer may have to any person whatsoever and against any claims, demands, proceedings, loss, damages, costs and expenses sustained, incurred or payable by the Employer provided that the Sub-contractor/Vendor shall have no greater liability to the Employer by virtue of this Warranty than the liability of the Contractor to the Employer under the Contract insofar as and to the extent that the same has arisen by reason of any breach by the Sub-contractor/Vendor of his obligations under the Sub-contract.
- 3. No allowance of time by the Employer hereunder or by the Contractor under the Sub-contract nor any forbearance or forgiveness in or in respect of any matter or thing concerning this Warranty or the Sub-contract on the part of the Employer or the Contractor, nor anything that the Employer or the Contractor may do or omit or neglect to do, shall in any way release the Sub-contractor/Vendor from any liability under this Warranty.
- 4. The Sub-contractor/Vendor agrees that he will not without first giving the Employer not less than 21 day's prior notice in writing exercise any right he may have to terminate the Sub-contract or treat the same as having been repudiated by the Contractor or withhold performance of his obligations under the Sub-contract.
- 5.
 - (1) In the event that the Contract or the employment of the Contractor under the Contract is terminated for any reason whatsoever and if so requested by the Employer in writing within 21 days of such termination, the Sub-contractor/Vendor shall carry out and complete his obligations under this Warranty and shall enter into a novation agreement with the Employer and the Contractor in which the Sub-contractor/Vendor will undertake inter alia to perform the Sub-contract and be bound by its terms and conditions as if the Employer had originally been named as a contracting party in place of the Contractor. The said novation agreement will be in such form as the Employer may reasonably require.
 - (2) In the event that the Employer does not require the Sub-contractor/Vendor to enter into a novation agreement as required by Sub-clause 5(1), the Sub-contractor/Vendor shall have no claim whatsoever against the Employer for any damage, loss or expense howsoever arising out of or in connection with this Warranty.
- 6. Insofar as the copyright or other intellectual property rights, in any plans, calculations, drawings, documents, materials, know-how and information relating to the Sub-contract works/supply shall be vested in the Sub-contractor/Vendor, the Sub-contractor/Vendor grants to the Employer, his successors and assignees a royalty free, non-exclusive and irrevocable licence (carrying the right to grant sub-licences) to use and reproduce any of the works designs or inventions incorporated and

referred to in such documents or materials and any such know-how and information for all purposes relating to the works of the Mass Rapid Transport System – Jaipur Metro, without limitation the design, manufacture, installation, reconstruction, completion, reinstatement, extension, remedy of any defect of the works. To the extent beneficial ownership of any such copyright or other intellectual property right is vested in anyone other than the Sub-contractor/Vendor, the Sub-contractor/Vendor shall use best endeavours to procure that the beneficial owner thereof shall grant a like licence to the Employer. For the avoidance of doubt, any such licence granted shall not be determined if the Sub-contractor/Vendor shall for any reason cease to be employed in connection with the Sub-contract Works.

7. In the event of any ambiguity or conflict between the terms of the Sub-contract and this Warranty, the terms of this Warranty shall prevail.
8. The provisions of this Warranty shall be without prejudice to and shall not be deemed or construed so as to limit or exclude any rights or remedies which the Employer may have against the Sub-contractor/Vendor whether in tort or otherwise.
9. Nothing contained in this Warranty shall vary or affect the Sub-contractor's/Vendor's rights and obligations under the Sub-contract.
10. The Employer shall be entitled to assign the benefit of this Warranty at any time without the consent of the Sub-contractor/Vendor being required.
11. All documents arising out of or in connection with this Warranty shall be served:
 - (1) upon the Employer at [], marked for the attention of [];
 - (2) upon the Sub-contractor/Vendor, at [] India.
12. The Employer and the Sub-contractor/Vendor may change their respective nominated addresses for service of documents to another address in India but only by prior written notice to each other. All demands and notices must be in writing.
13. This Warranty shall be governed by and construed according to the laws for the time being in force in India.
14.
 - (1) Any dispute or difference of any kind whatsoever between the Employer and the Sub-contractor/Vendor arising under out of or in connection with this Warranty shall be referred to arbitration in accordance with the Arbitration as described in the Contract.
 - (2) In the event that the Employer is of the opinion that the issues in such a dispute or difference will or may touch upon or concern a dispute or difference arising under out of or in connection with the Contract ("the Contract Dispute") then provided that an arbitrator has not already been appointed pursuant to Clause 14(1), the Employer may by notice in writing to the Sub-contractor/Vendor require and the Sub-contractor/Vendor shall be deemed to have consented to the referral of such dispute or difference to the arbitrator to whom the Contract Dispute has been or will be referred.
 - (3) Save as expressly otherwise provided, the arbitrator shall have full power to open up, review and revise any decision, opinion, instruction, notice, order, direction, withholding of approval or consent, determination, certificate, statement of objection, assessment or valuation by the Employer's Representative or the Contractor relating to the dispute or difference.

IN WITNESS whereof this Warranty has been executed as a deed on the date first before written.

THE COMMON SEAL of)

[])

was affixed hereto in)

the presence of:-)

3. The Designer further agrees that he will not, without first giving the Employer not less than 21 days' previous notice in writing, exercise any rights it may have to terminate the Consultancy Agreement or to treat the same as having been repudiated by the Contractor or to discontinue the performance of any duties to be performed by the Designer pursuant thereto. The Designer's right to terminate the Consultancy Agreement or to treat the same as having been repudiated or to discontinue the performance thereof shall cease if, within such period of notice and subject to Clause 4, the Employer shall give notice in writing to the Designer requiring the Designer to accept the instructions of the Employer or his appointee to the exclusion of the Contractor in respect of the carrying out and completion of the Contract Works upon the terms and conditions of the Consultancy Agreement.
4. Any notice given by the Employer under Clause 2 or 3 shall state that the Employer or his appointee accepts liability for payment of the fees payable to the Designer under the Consultancy Agreement and for performance of the Contractor's obligations under the Consultancy Agreement, including payment of any fees outstanding at the date of such notice.
5. The Employer shall be entitled to assign the benefit of this Warranty at any time without the consent of the Designer being required.
6. All documents arising out of or in connection with this Warranty shall be served:
 - (1) upon the Employer at [] marked for the attention of [];
 - (2) upon the Designer at [].
7. The Employer and the Designer may change their respective nominated addresses for service of documents to another address in India but only by prior written notice to each other. All demands and notices must be in writing.
8. This Warranty shall be governed by and construed according to the laws for the time being in force in India.
9. Except to the extent (if any) expressly permitted by the Consultancy Agreement, the Designer shall not sub-contract any of the Designer's obligations under the Consultancy Agreement without the prior written consent of the Employer's Representative.
10. Without prejudice to its obligations under this Warranty, the Designer shall maintain with well established underwriters of repute and on terms and conditions reasonably acceptable to the Employer, professional indemnity insurance (as per Clause 41 of the Special Conditions of Contract) in respect of the Designer and its sub-consultants for Indian Rupees One Million ~~two hundred fifty thousand~~ (11,250,000 10,00,000 Rupees) in relation to his design of the Works for any one occurrence or series of occurrences arising out of any one event from the date of notification of acceptance until 5 years after the issue of Performance Certificate for the whole of works. The Designer shall immediately inform the Employer if for any reason professional indemnity insurance is not maintained in accordance with this Warranty or becomes void or unenforceable.

11. Insofar as the patent, copyright or other intellectual property rights in any Design Data (as defined in the Contract), plans, calculations, drawings, documents, materials, computer software, know-how and information relating to the Works shall be vested in the Designer, the Designer grants to the Employer his successors and assigns a royalty-free, non-exclusive and irrevocable licence (carrying the right to grant sub-licences) to use and reproduce any of the works designs or inventions incorporated and referred to in such documents or materials and any such know-how and information for all purposes relating to the Works (including without limitation the design, construction, reconstruction, completion, reinstatement, extension, repair and operation of the Works). To the extent beneficial ownership of any such patent, copyright or other intellectual property right is vested in anyone other than the Designer or the Contractor, the Designer shall use his best endeavours to procure that the beneficial owner thereof shall grant a like licence to the Employer. Any such licence granted shall not be determined if the Designer shall for any reason cease to be employed in connection with the Works.
12. (1) Any dispute or difference of any kind whatsoever between the Employer and the Designer arising under out of or in connection with this Warranty shall be referred to arbitration in accordance with Clause 45 of GCC . "Dispute" as defined in the Contract shall be deemed to include any such dispute or difference between the Employer and the Designer.
- (2) In the event that the Employer is of the opinion that the issues in such a dispute or difference will or may touch upon or concern a dispute or difference arising under out of or in connection with the Contract ("the Contract Dispute") then provided that an arbitrator has not already been appointed, the Employer may by notice in writing to the Designer require and the Designer shall be deemed to have consented to the referral of such dispute or difference to the arbitrator to whom the Contract Dispute has been or will be referred.
- (3) Save as expressly otherwise provided, the arbitrator shall have full power to open up, review and revise any decision, opinion, instruction, notice, order, direction, withholding of approval or consent, statement of objection, determination, certificate, assessment or valuation by the Employer's Representative or the Contractor, relating to the dispute or difference.

IN WITNESS whereof this Warranty has been executed as a deed on the date first before written.

THE COMMON SEAL of)
 [Designer])
 was affixed hereto in)
 the presence of:-)

Annexure-VI

PARENT COMPANY UNDERTAKING

(On Non-Judicial Stamp Paper)

(Refer Clause 9 of SCC)

THIS UNDERTAKING is made the day of

BY [] [whose registered office is at]/[of] [] ("the Parent Company").

TO The JAIPUR METRO RAIL CORPORATION LIMITED together with its successors and assigns, "the Employer") of:

RAJSICO Building
3rd Floor,
Udhyog Bhawan Premises ,
C-Scheme, Jaipur ,
India.

1.1.a.c.1.1.1 WHEREAS

(A) By a contract _____ dated [] ("the Contract") made between (1) the Jaipur Metro Rail Corporation Limited (" the Employer") and

(2) [] ("the Contractor") the Contractor has agreed to design, execute, complete and remedy any defects in the works ("the Works") upon the terms and conditions contained in the Contract.

(B) Pursuant to the terms of the Contract, the Contractor has agreed to procure the provision of an undertaking in the terms hereof.

(C) The Parent Company is the beneficial owner of []% [see Note 1] of the issued share capital of [the Contractor] [see Note 2].

(D) At the request of the Contractor, the Parent Company has agreed to provide this undertaking.

NOW IT IS HEREBY UNDERTAKEN AND AGREED as follows:

1. In consideration of the Employer entering into the Contract with the Contractor, the Parent Company hereby undertakes to the Employer that, without the written consent of the Employer, it will not [and will ensure that none of the companies referred to in Recital (C) will] [see Note 5]:-

(a) sell transfer assign or otherwise dispose of or deal with ownership of the whole or any part of EITHER [the share holding or other interest in the [Contractor] [see Note 3] OR [the share holdings or other interests] [see Note 4] referred to in Recital (C) in any way which will affect the beneficial ownership and control in [the Contractor] [see Note 3] of the Parent Company [and the other companies referred to in Recital (C)] [see Note 5]; and

(b) take any action which may result in the Contractor being unable to comply with his obligations or perform in any way his duties under the Contract [or take any action which may result in [the

subsidiary forming part of the Contractor] [see Note 3] being unable to comply with his obligations or perform in any way his duties under the [joint venture or other relevant] agreement] [see Note 6]

until such time as the Works shall have been completed, all the Contractor's obligations under the Contract shall have been performed and the Maintenance and Defects Liability Period (as defined in the Contract) for the whole and every part of the Works shall have elapsed and further that it will ensure [that the subsidiary forming part of the Contractor will take all steps necessary to ensure [see Note 6]] compliance by the Contractor with the provisions of the Contract.

2. The obligations of the Parent Company under this Undertaking shall remain in full force and effect and shall not be affected or discharged in any way and the Parent Company hereby waives notice of:-
 - (a) any suspension of the Works, variation or amendment to the Contract (including without limitation extension of time for performance) or any concession or waiver by the Employer in respect of the Contractor's obligations [and/or the obligations of [] [see Note 7];
 - (b) any provision of the Contract being or becoming illegal, invalid, void, voidable or unenforceable;
 - (b) the termination of the Contract or of the employment of the Contractor [and/or [] [see Note 7] under the Contract for any reason;
 - (d) any forbearance or waiver of any right of action or remedy the Employer may have against the Contractor [and/or [] [see Note 7] or negligence by the Employer in enforcing any such right of action or remedy;
 - (e) any bond, undertaking, security or other guarantee held or obtained by the Employer for any of the obligations of the Contractor [and/or [] [see Note 7] under the Contract or any release or waiver thereof.
3. This Undertaking shall extend to any variation of or amendment to the Contract and to any agreement supplemental thereto agreed between the Employer and the Contractor [and/or [] [see Note 7] and for the avoidance of doubt the Parent Company hereby authorises the Employer and the Contractor [and/or [] [see Note 7] to make any such amendment, variation or supplemental agreement.
4. All documents arising out of or in connection with this Undertaking shall be served:
 - (a) upon the Employer, at [] marked for the attention of [];
 - (b) upon the Parent Company, at [] India. [Note 8]
5. The Employer and the Parent Company may change their respective nominated addresses for service of documents to another address in India but only by prior written notice to each other. All demands and notices must be in writing.
6. This Undertaking shall be governed by and construed according to the laws for the time being in force in India and the Parent Company agrees to submit to the jurisdiction of the courts of India.

IN WITNESS whereof this Undertaking has been executed as a deed on the date first before written.

THE COMMON SEAL of)
[])
was affixed hereto)
in the presence of:-)

Notes: (for preparation of but not for inclusion in the engrossment of this Undertaking)

1. If the Parent Company is not the immediate parent company, the chain of ownership must be recited, identifying each company in the chain and the shareholdings or other interests in each subsidiary.
2. If the Contractor comprises more than one company, that fact and the joint venture or other relevant agreement must be recited. In such case, insert the name of the subsidiary forming part of the joint venture, partnership or consortium, and in respect of which the parent company undertaking is being given.
3. If Note 2 applies, refer to the subsidiary of the Parent Company and not the Contractor.
4. If Note 1 applies, use this alternative.
5. If Note 1 applies, add this provision.
6. If Note 2 applies, add this provision.
7. If Note 2 applies, add this provision and insert the name of the subsidiary.
8. The address for service shall be in India.

Annexure-VII**PARENT COMPANY GUARANTEE**

(On Non-Judicial Stamp Paper)

(Refer Clause 9 of SCC)THIS GUARANTEE is made the day of**BETWEEN:-**

- (1) [] whose registered office is at [] [and [] whose registered office is at [] ("the Guarantor").
- (2) The Jaipur Metro Rail Corporation Limited (together with its successors and assigns, "the Employer") of:

RAJSICO Building
3rd Floor,
Udhyog Bhawan Premises ,
C-Scheme, Jaipur ,
India.

WHEREAS

- (A) By a contract _____ dated [] ("the Contract") made between (1) the Jaipur Metro Rail Corporation Limited ("the Employer") and
- (2) [] ("the Contractor"), the Contractor has agreed to design, execute, complete and remedy any defects in the Works upon the terms and conditions contained in the Contract.
- (B) Pursuant to the terms of the Contract, the Contractor has agreed to procure the provision of a guarantee in the terms hereof. [see Note 1].
- (C) At the request of the Contractor, the Guarantor has agreed to guarantee performance of the Contract by the [Contractor] [see Note 2] as set out herein.

IT IS HEREBY AGREED AS FOLLOWS:

1. In consideration of the Employer entering into the Contract with the Contractor, the Guarantor irrevocably and unconditionally guarantees to the Employer as a primary obligation and not as a surety due performance by the [Contractor] [see Note 2] of all of its obligations and liabilities under and in accordance with the Contract save that nothing herein shall be construed as imposing greater obligations or liabilities on the Guarantor than are imposed on the [Contractor] [see Note 2] in the Contract.
2. The obligations of the Guarantor under this Guarantee shall remain in full force and effect and shall not be affected or discharged in any way by and the Guarantor hereby waives notice of:-

- (a) any suspension of the Works, variation to or amendment of the Contract (including without limitation extension of time for performance) or any concession or waiver by the Employer in respect of the Contractor's obligations [and/or the obligations of []] [see Note 3] under the Contract;
 - (b) any provision of the Contract being or becoming illegal, invalid, void, voidable or unenforceable;
 - (c) the termination of the Contract or of the engagement of the Contractor [and / or [....]] [see Note 3] under the Contract for any reason;
 - (d) any forbearance or waiver of any right of action or remedy the Employer may have against the Contractor [and / or [....]] [see Note 3] or negligence by the Employer in enforcing any such right of action or remedy;
 - (e) any bond, undertaking, security or other guarantee held or obtained by the Employer for any of the obligations of the Contractor [and / or [....]] [see Note 3] under the Contract or any release or waiver thereof.
3. This Guarantee shall extend to any variation of or amendment to the Contract and to any agreement supplemental thereto agreed between the Employer and the Contractor [and/or []] [see Note 3] and for the avoidance of doubt the Guarantor hereby authorises the Employer and the Contractor [and/or []] [see Note 3] to make any such amendment, variation or supplemental agreement.
 4. This Guarantee is a continuing guarantee and accordingly shall cover all of the obligations and liabilities of the [Contractor] [see Note 2] under the Contract and remain in full force and effect until all the said obligations and liabilities of the Contractor shall have been carried out, completed and discharged in accordance with the Contract. This Guarantee is in addition to any other security which the Employer may at any time hold and may be enforced without first having recourse to any such security or taking any steps or proceedings against the Contractor.
 5. Until expiry of the Maintenance and Defects Liability Period (as defined in the Contract) for the whole and every part of the Works, the Guarantor shall not on any ground whatsoever make any claim or threaten to make any claim whether by proceedings or otherwise against the Contractor [and/or []] [see Note 3] for the recovery of any sum paid by the Guarantor pursuant to this Guarantee. Any such claim shall be subordinate to any claims (contingent or otherwise) which the Employer may have against the Contractor [and/or []] [see Note 3] arising out of or in connection with the Contract until such time as such claims shall be satisfied by the Contractor [and/or []] [see Note 3] or the Guarantor as the case may be. To that intent the Guarantor shall not claim or have the benefit of any security which the Employer holds or may hold for any monies or liabilities due or incurred by the Contractor [and/or []] [see Note 3] to the Employer and, in case the Guarantor receives any sum from the Contractor [and/or []] [see Note 3] in respect of any payment by the Guarantor hereunder, the Guarantor shall hold such sum in trust for the Employer for so long as any sum is payable (contingently or otherwise) under this Guarantee.
 6. The Employer shall be entitled to assign the benefit of this Guarantee at any time without the consent of the Guarantor or the [Contractor] [see Note 2] being required.
 7. All documents arising out of or in connection with this Guarantee shall be served:

(a) upon the Employer, at [], marked for the attention of [];

(b) upon the Guarantor, at [] India [Note 4]

8. The Employer and the Guarantor may change their respective nominated addresses for service of documents to another address in India but only by prior written notice to each other. All demands and notices must be in writing.
9. This Guarantee shall be governed by and construed according to the laws for the time being in force in India and the Contractor agrees to submit to the jurisdiction of the courts of India.

IN WITNESS whereof this Guarantee has been executed as a deed on the date first before written.

THE COMMON SEAL of)

[])

was affixed hereto in)

the presence of:-)

Notes (for preparation of but not inclusion in the engrossment of this Guarantee)

1. If the Contractor comprises more than one company, that fact, the joint venture or other relevant agreement and the relationship of the Guarantor to its subsidiary forming part of the Contractor must be recited.
2. If Note 1 applies, replace the word "Contractor" with name of the subsidiary being guaranteed.
3. If Note 1 applies, add additional wording and insert the name of the subsidiary being guaranteed.
4. The address for service shall be in India

Annexure-VIII**CONTRACTOR'S WARRANTY**
(On Non-Judicial Stamp Paper)**(Refer Clause 9 of SCC)****THIS AGREEMENT** is made the _____ day of _____**BETWEEN:**

1. [_____] of [_____] [and [see Note 1]] ([jointly] "the Contractor")
2. [_____] [of]/[whose registered office is at] [_____] (together with its successors and assigns, "the Employer")

(d) WHEREAS

- (A) By a contract _____ dated [_____] ("the Contract") made between (1) the Jaipur Metro Rail Corporation Limited ("the Employer") and (2) the Contractor, the Contractor has agreed to design, execute, complete, test and commission (including Integrated Testing and Commissioning) and remedy any defect in the Works upon the terms and conditions contained in the Contract.
- (B) [See Note 3].
- (C) At the request of the Employer and pursuant to the terms of the Contract the Contractor has agreed to enter into this Warranty.

(e) NOW IT IS AGREED AS FOLLOWS:

1. The Contractor hereby warrants and undertakes that:
 - (a) he will design, execute, complete, test and commission (including Integrated Testing and Commissioning) and remedy any defect in the Works in accordance with the terms of the Contract; and
 - (b) he owes a duty of care to the Employer in relation to the performance of its duties under the Contract; and
 - (c) he will replace free of cost to the Employer any defect or failure of equipment provided in the Works for a period of 24 months from the date of issue of Completion Certificate of the last Section of the Works; and
 - (d) he agrees that should any design modification be required to any equipment or component as a consequence of failure analysis, the period of 24 months shall re-commence from the date when the modified part is commissioned into service, and such modification shall be carried out free of cost to the Employer in all sub-systems and systems for all sections; and
 - (e) he shall maintain the manufacture or spare of replacement parts for at least 10 years.

2. The liability of [the companies comprising [see Note 3]] the Contractor under this Warranty [shall be joint and several and [see Note 3]] shall not be released, diminished or in any way affected by any independent inquiry or investigation into the Works or any matter related to the Contract whether carried out by or on behalf of the Employer or any liability or right of action which may arise out of such inquiry or investigation.
3. Insofar as the copyright or other intellectual property rights in any plans, calculations, drawings, documents, materials, plant, know-how and other information relating to the Works shall be vested in the Contractor, the Contractor grants to the Employer his successors and assigns a royalty free, non-exclusive and irrevocable licence (carrying the right to grant sub-licences) to use and reproduce any of the works designs or inventions incorporated and referred to in such documents or materials and any such know-how and information for all purposes relating to the Works or the Mass Rapid Transport System – Phase Two including without limitation the design, manufacture, supply, installation, testing and commissioning (including Integrated Testing and Commissioning) reinstatement, extension and the remedy of any defect in the Works. To the extent that beneficial ownership of any such copyright or other intellectual property rights is vested in anyone other than the Contractor, the Contractor shall use best endeavours to procure that the beneficial owner thereof shall grant a like licence to the Employer. For the avoidance of doubt, any such licence granted shall not be determined if the Contractor shall for any reason cease to be employed in connection with the Works.
4. The provisions of this Warranty shall be without prejudice to and shall not be deemed or construed so as to limit or exclude any rights or remedies which the Employer may have against the Contractor, whether in tort or otherwise.
5. Nothing contained in this Warranty shall vary or affect the Contractor's rights and obligations under the Contract.
6. The address for service of all documents arising out of or in connection with this Warranty shall be:-
 - (a) upon the Employer at [] India. [Note 4]
 - (b) upon the Contractor at [] India. [Note 4]
7. The Employer and the Contractor may change their respective nominated addresses to another address in India but only by prior written notice to each other. All notices must be in writing.
8. This Warranty shall be governed by and construed according to the laws for the time being in force in India.
9.
 - (1) Any dispute or difference of any kind whatsoever between the Employer and the Contractor arising under out of or in connection with this Warranty shall be referred to arbitration in accordance with the Conciliation and Arbitration rules set out in the General Conditions of Contract. "Dispute" as defined in the Contract shall be deemed to include any such dispute or difference between the Employer and Contractor.
 - (2) In the event that the Employer is of the opinion that the issues in such a dispute or difference will or may touch upon or concern a dispute or difference arising under out of or in connection with the Contract ("the Contract Dispute") then provided that an arbitrator has not already been appointed pursuant to Clause 9(1), the Employer may by notice in writing to the Contractor

require and the Contractor shall be deemed to have consented to the referral of such dispute or difference to the arbitrator to whom the Contract Dispute has been or will be referred.

- (3) Save as expressly otherwise provided, the arbitrator shall have full power to open up, review and revise any decision, opinion, instruction, notice, order, direction, withholding of approval or consent, determination, certificate, statement of objections relating to the dispute.
- (4) Subject to the foregoing provisions of this clause 9, the Employer and the Contractor agree to submit to the jurisdiction of the Courts of India at Delhi.

IN WITNESS whereof this Warranty has been executed as a deed on the date written at the head hereof.

THE COMMON SEAL of _____)

[_____])

was affixed hereto in _____)

the presence of:- _____)

Notes (for preparation of and not inclusion in the engrossment of this Warranty)

- (1) If the Contractor comprises more than one company, each such company shall be a party and liability under this warranty will be joint and several, with consequential grammatical changes.
- (2) If Note 1 applies, that fact and the joint venture or other relevant agreement must be recited.
- (3) Delete if Note 1 does not apply.
- (4) The address for service shall be in India.

Annexure-IX

59.0 ADB Environment Management Plan

SN	Project Activity	Potential Impact	Mitigation measures	Institutional Responsibilities	Cost Estimate
PRE-CONSTRUCTION					
PC1	Contractor Preparatory Works (Upon issuance of Notice to Proceed)		<p>The Contractor will complete the following activities no later than 30 days upon issuance of Notice to Proceed</p> <ol style="list-style-type: none"> 1.) Submit appointment letter and resume of the Contractor's Health and Safety Officer (HSO) and environmental focal person to CSC 2.) HSO will engage CSC-Environment Specialist to a meeting to discuss in detail the EMP, seek clarification and recommend corresponding revisions if necessary 3.) HSO will request CSC-ES copy of monthly monitoring formats and establish deadlines for submission. 4.) HSO will submit for CSC-ES approval an action plan to secure all permits and approvals needed to be secured during construction stage which include but not limited to: i) operation of crushers and hot mix plants, ii) transport and storage of hazardous materials (e.g. fuel, lubricants, explosives), iii) waste disposal sites and disposal management plan, iv) temporary storage location, iv) water use, and v) emission compliance of all vehicles. Arrangements to link with government health programs on hygiene, sanitation, and prevention of communicable diseases will also be included in the action plan. 5) HSO will submit for approval of CSC-ES the construction camp layout before its establishment. 	Contractor and CSC	Part of contractor's cost
PC2	Coordinate with the Jaipur Development Authority on Traffic Management Plan	Nuisance from traffic congestion	<p>The Contractors will discuss and coordinate the implementation of the traffic re-routing scheme particularly in Chotti Chaupad and Badi Chaupad when it starts the cut and cover activities and the hauling and disposal of excavated materials to the Ambaban village.</p> <p>At the minimum, the traffic management plan will have the following components: construction traffic, ensuring access to properties, accommodating pedestrians, parking, access by construction vehicles, faulty traffic lights and problem interchanges, use of public roads, parking provision during construction, use of residential streets and traffic diversion due to temporary road closures, and construction and use of temporary access roads.</p>	Contractor and CSC	Part of Contractor's cost

Page 85

SN	Project Activity	Potential Impact	Mitigation measures	Institutional Responsibilities	Cost Estimate
PC3	Community Liaison	Complaints	<p>To ensure that ongoing feedback is provided on the progress of the JMSP together with feedback on the environmental management performance of the project.</p> <p>Contractor will provide a minimum of two (2) weeks notification to directly affected residents, businesses and other relevant groups of the intended construction commencement date. In providing a mechanism for communication between the contractor and the community and informing the public of construction details (timing, expected impacts), the concessionaire will undertake consultation and information activities.</p> <p>At least 30 days before the start of tunnelling, the Contractor with supervision from the Archeology Department will employ a ground penetrating radar (GPR), detect the presence of buried artifacts along the tunnel alignment.</p>	Contractor, CSC and JMRC Safeguards cell	Part of Contractor's cost
PC4	Ground staking	Chance find of artifacts	<p>The Contractor, on behalf of the JMRC, will coordinate with the Archeology Department to designate an on-site representative during the entire duration of the project.</p>	Contractor, CSC	Part of construction cost
PC5	Briefing on working near heritage resource.	Damage to heritage resource. Cultural conflicts	<p>All workers will undergo a briefing with the Archeology Department to ensure safeguarding of heritage resource and cultural/religious practices.</p> <p>A proof of compliance to this requirement to include the name of participants and date and location of briefing will form part of the monthly report to the CSC.</p>	Contractor, CSC	Part of construction cost
CONSTRUCTION					
C1.0	Tunnel boring and cut and fill	Damage to heritage resources. Tunnel boring namely Chandpole Gate, Krishna Temple, Isar Lat, Jantar Mantar, Hawa Mahal, Chotti Chaupad, and Badi Chaupad.	No heritage resources are inadvertently damaged during construction.		

SN	Project Activity	Potential Impact	Mitigation measures	Institutional Responsibilities	Cost Estimate
C1.1	Ground Settlement under the Chandpole Gate	Ground settlement	<p>The contractor will ensure that no inadvertent damage is incurred to the Chandpole gate.</p> <p>Ground settlement cannot be avoided in tunneling works due to the loss of volume loss, which is estimated at 0.45% for the JMRP. Estimated settlement under the Chandpole gate is less than 5mm. The contractor will ensure that the design value is not exceed and the trigger value = 3.5mm and Allowable value = 4.2 meters are implemented.</p> <p>Tilt meters will be installed at key positions on the gate to ensure the 2/1000 design value is observed with trigger and allowable values of 1.4/1000 and 1.7/1000, respectively</p> <p>Crack meters will be installed at key positions to ensure design value of 3.0mm is not exceeded with 2.1mm trigger value and 2.5 mm allowable value</p> <p>The contractor will immediately cease all operation if any of the trigger values are breached. The CSC will advise the contractor mitigation measures and practices to control settlement, tilt, and cracks to include but not limited to structural reinforcement and operation parameters of the TBM.</p> <p>The contractor will ensure that no structural damage is incurred and cosmetic damages are repaired under the supervision and control of the Jaipur Archeology Department.</p>	Contractor and CSC	Part of Contractor's cost
C1.2	Vibration from the tunnel boring machine	Cosmetic and Structural damages to the structures along the underground metro alignment along Chandpole Bazar and Tripolia Bazar. Most notable are	<p>Expected vibration at the Chandpole Gate during tunneling is 0.682 mm/s which is lower than internationally accepted 5mm/s. However, to be on the safe side and as practice in DMRC, the Contractor is to ensure that vibration levels at the Chandpole Gate foundation will not exceed 2.0 mm/s</p>	Contractor and CSC	Part of Contractors Cost

SN	Project Activity	Potential Impact	Mitigation measures	Institutional Responsibilities	Cost Estimate
C1.3	Surface noise from excavating equipment in Chotti and Badi Choupad	Damage and nuisance to Krishna Temple, Jantar Mantar, and Hawa Mahal. Disturbance of patients in the Pink City Hospital near Chaudary Hospital, Maharaja School at the corner of Chotti Choupad.	<p>The contractor will ensure that noise from construction activities does not result to exceedances of relevant limits prescribed in the Indian Ambient Air Quality Standards for Commercial Area and Silence Zone. Mitigation measures to be implemented by the Contractors are:</p> <ol style="list-style-type: none"> 1) liaise with local residents on how to best minimize construction noise along the Chotti and Badi Choupads. 2) local residents and shop owners should be informed of the nature and duration of intended activities prior to commencement and kept updated as to changes in the management and mitigation plan 3) equipment compounds will be located off-site 4) noise barriers will be installed at critical work areas particularly around the Choupads 5) enclose especially noisy activities if above the noise limits 6) employ transportable noise screens between noise sources and identified noise sensitive areas for the duration of noisy construction activities 7) maximize the possibility of scheduling noisy activities at the same time to minimize the duration of exposure <p>Noise from vehicles particularly for hauling of excavated materials to the dump site will be controlled through strict adherence to operating and maintenance instructions, routing of heavy vehicles away from noise sensitive areas whenever possible, conform with speed limits, and construction vehicles will only use routes specified in the traffic management plan.</p>		
C1.4	Demolition of Chotti and Badi Choupads	Loss of heritage structures	The project calls for the demolition of the Chotti and Badi Choupads and its restoration to its original condition as a requirement from Jaipur Development Authority. The demolition and restoration will be under the supervision and control of these agencies.	Contractor, CSC	Part of construction cost

SN	Project Activity	Potential Impact	Mitigation measures	Institutional Responsibilities	Cost Estimate
C1.4.1		Chance heritage finds during the cut and fill operations	Please refer to FIDIC Sec. 4.24 Fossils. Recording (including chain of custody) will be made by the contractor to be validate by the CSC, and expert verification will be made by the Jaipur Archeology Department. Temporary work stoppage in the immediate area of the chance find for up to 72 hours to allow for the on-site representative of Archeology Department to visit the site to make an assessment and provide instructions. Work in the areas adjacent to the chance find will continue as provided in the detailed design.	Contractor and CSC	
C2	Spoil Disposal (Ambabari Village)	Generate sediment laden runoff from the work site during monsoon. Contamination of disposal sites from construction debris. Community hazard of uncollected and improperly disposed materials.	A spoil management plan will be implemented that details the location of spoil disposal sites, transporting soil, and disposing of soil. The Contractor will perform the following: 1) disposed spoils on permitted sites as instructed by the JMRC 2) ensure the adequacy of the disposal site to handle the volume of spoils that will be generated 3) Prepare, submit and seek approval from the CSC a spoil dump plan that provides the: i) dump size, layout, and form, ii) means of controlling water and wind erosion, iii) measures to prevent spoil dump contamination, vehicular, and public access. 4) Explore the possibility of using spoil materials to rehabilitate borrow pits to 5) All hauling vehicles should be maintained at an acceptable working order and serviced regularly 6) Haul vehicles should be routed away from noise sensitive areas 7) Speed limit in built up areas is 40 km/h 8) All haul vehicles should be covered or soil sprayed with water before leaving the site specially during windy condition 9) Spoil dumps shall have slopes no steeper than 1V:2.5H 10) Final shaping, topsoiling, and immediate revegetation 11) No vehicles are to be allowed to enter n revegetated spoils dump The Contractor shall secure necessary permits from pertinent groundwater authorities before establishing borewells.		
C3	Groundwater Extraction	Depletion of groundwater Compete with existing groundwater users	Water conservation and recycling will be observed in all aspects of constructions to include water main breaks, watering roads for dust control, spraying concrete, equipment cleaning and site clean-up.	Contractor and CSC	Part of Construction Cost

SN	Project Activity	Potential Impact	Mitigation measures	Institutional Responsibilities	Cost Estimate
C4	Disruption of essential services	Nuisance from temporary damage or shifting in utilities particularly buried water pipes and electrical lines	<p>The Contractor will ensure that the public will be minimally affected when constructing in close proximity to essential services through:</p> <ol style="list-style-type: none"> 1) coordinate and secure necessary permits for utility shifting with the Jaipur Development Authority and other service utility agencies to locate all services prior to construction in any particular area 2) inform residents of planned interruptions through local media, fliers, and public address system 3) all planned interruptions schedules will be submitted to the safeguards cell JMRC no later than 10 working days before the interruption 4) all affected landowners, tenants, institutions, and businesses to be notified in writing prior to commencement and kept updated in changes of schedule 5) in the event of unforeseen disruptions, the contractor will take all reasonable actions to have the service promptly restored 6) relevant utility agencies will be informed of the construction proximity to essential service line and be kept on standby in the event of unforeseen disruption <p>All unplanned interruption will be immediately reported to the safeguards cell within 24 hour through an incident report.</p>		
C5	Construction camp, Batchling plant and casting yard operations, and occupational safety	<p>Solid and liquid waste generation. Communicable diseases Hazardous materials storage Re-fueling Lighting Emergency preparedness Excavation and tunneling Personal protective equipment Energy management</p>	Please refer to SHE.	Contractor and CSC	Part of construction cost

SN	Project Activity	Potential Impact	Mitigation measures	Institutional Responsibilities	Cost Estimate
C6	Cleanup Operations, Restoration and Rehabilitation		Contractor shall prepare site restoration plans, which shall be subject for review and approval by the CSC, JMRC Safeguard Cell, Jaipur Development Authority and the Archeology Department to ensure consistency with zoning and town plans. The clean-up and restoration operations are to be implemented by the Contractor prior to demobilization. All spaces excavated and not occupied by the foundation or other permanent works shall be refilled with earth up to surface of surrounding ground.	Contractor and CSC	Part of construction cost
OPERATION					
O1	Noise and Vibration	Vibration from train operation may cause structural or cosmetic damage to Chandpole Gate, Krishna Temple, Isar Lat, Jantar Mantar, and Hawa Mahal.	The JMRC will continue and maintain the monitoring sites established by the contractor for noise and vibration and will observe the same trigger values	JMRC	Operating cost
O2	Waste water from Depot	Contamination of groundwater by petroleum laden waste	JMRC will install wastewater treatment plant at the Mansarovar depot station capable for removing petroleum contaminants and will meet national standards before re-injection to the groundwater.	JMRC	Operating Cost
O3	Depletion of groundwater	Water requirement for train and facility cleaning, and water for commuters. Each station will require 18,000 liters per day, platform washing is 5 liters/square meter, 70,000 li.day for car washing, and plus passenger water requirement.	Rain water harvesting facilities will be installed at Mansarovar station. All stations will employ a cooling water recirculation system for air-conditioning. Only recycled water will be use for facility cleaning and landscape irrigation. All toilets will be equipped with low-flow fixtures.	JMRC	Operating Cost

ADB Environmental Monitoring Plan

Envtl Indicators	Parameters	Methods/Guidelines	Tentative Location	Frequency and duration	Standards	Approx. Cost	Implementation	Supervision
Construction Phase								
Air Quality	TSPM, PM ₁₀ , NO _x , SO _x , CO _x	Qualitative analysis of dust development at selected sites/sensitive spots through High Volume Sampler	2 locations at Chotti and Badi Chupad where cut and fill activities will be implemented	24 hours continuous every month until the stations are completed	National Ambient Air Quality Standards (NAAQS)	36@10,000 =Rs. 360,000	Contractor	CSC
Water Quality	DO, Turbidity, Conductivity, pH, E.Coli, TSS, Oil and Grease and TDS	<ul style="list-style-type: none"> Collect and analyze sample from source Observation of blockage of waterways - extent and secondary impacts Water pollution incidents due to unsafe disposal of waste and spoil, analyzing effects on local fisheries Observations on vehicle and equipment washing practices in rivers 	Ground water at construction camps and	Quarterly	National Drinking Water Quality Standards (NDWQS) and Water Quality Guidelines	12@3,750 =Rs. 45,000	Contractor	CSC,
Noise Levels	(1 hr L _{eq} dB(A)) WHO Standards	<ul style="list-style-type: none"> Point source measurements in dB (A) at settlement sites/sensitive spots for noise level at 2.5 and 15 m from road shoulder Traffic volume measurements 	Krishna Temple, Janlar Mantar, and Hawa Mahal. Pink City Hospital near Chaudary Hospital, Maharaja School at the corner of Chotti Chupad	Monthly	Indian Ambient Air Quality Standards for Noise	8x12x3@2, 450 =Rs. 705,600	Contractor	SC, PD/DOR

Envil Indicators	Parameters	Methods/Guidelines	Tentative Location	Frequency and duration	Standards	Approx. Cost	Implementation	Supervision
Vibration	PPV mm/s	Accelerometer	Krishna Temple, Jantar Mantar, and Hawa Mahal, Pink City Hospital near Chandpole, Chaudary Hospital, Majaraja School at the corner of Chotti Chaupad	Monthly	Commercial: 10 mm/s (day). Archeological structures: 2.5 mm/s	36*200,000 = Rs7,200,000	Contractor	CSC
Underground artifacts	Number and location	Ground Penetrating Radar	Along the entire tunnel length	Once 30 days before tunneling	None	Rs200,000	Contractor	CSC
Operation Phase								
Water Quality	DO, Turbidity, Conductivity, pH, E.Coli, TSS, Oil and Grease and TDS	<ul style="list-style-type: none"> Collect and analyze sample from source Observation of blockage of waterways - extent and secondary impacts Water pollution incidents due to unsafe disposal of waste and spoil, analyzing effects on local fisheries Observations on vehicle and equipment washing practices in rivers 	2 stations	Annual	National Drinking Water Quality Standards (NDWQS) and Water Quality Guidelines	Rs. 45,000	JMRC	SPCB
Vibration	PPV mm/s	Accelerometer	Krishna Temple, Jantar Mantar, and Hawa Mahal, Pink City Hospital near Chandpole, Chaudary Hospital, Majaraja School at the corner of Chotti Chaupad	Annual	Commercial: 10 mm/s (day). Archeological structures: 2.5 mm/s	Rs200,000	JMRC	Department of Archeology



Procurement of Works

JAIPUR METRO RAIL CORPORATION LIMITED

BIDDING DOCUMENT

for

Procurement on Direct Contract Mode

of

DC No.- JP/JS15 (Phase-1B)

**BID DOCUMENTS FOR DESIGN, MANUFACTURE, SUPPLY,
INSTALLATION TESTING & COMMISSIONING OF PUBLIC
ADDRESS SYSTEM, PASSENGER INFORMATION DISPLAY
SYSTEM AND MASTER CLOCK SYSTEM FOR JMRC PHASE 1B**

PART-III CONDITIONS OF CONTRACT AND CONTRACT FORMS

Section 9 – Contract Forms (COF)

JAIPUR METRO RAIL CORPORATION LTD.

Khanij Bhawan, Tilak Marg,

C- Scheme, Jaipur (Rajasthan) PIN-302005

Country: India

Section 9 - Contract Forms

Table of Forms

Notification of Award	9-2
Contract Agreement	9-4
Appendix 1 - Terms and Procedures of Payment	9-7
Appendix 2 - Price Adjustment	9-22
Appendix 3 - Insurance Requirements	9-23
Appendix 4 - Time Schedule	9-26
Appendix 5 - List of Major Items of Plant and Services and List of Approved Subcontractors	9-28
Appendix 6- Scope of Works and Supply by the Employer.....	9-29
Appendix 7 - List of Documents for Approval or Review.....	9-30
Appendix 8 - Functional Guarantees	9-31
 Performance Security	 9-32
 Advance Payment Security	 9-34

Notification of Award

[*Employer's letterhead*]

Letter of Acceptance

[*date*]

To: [*Name and address of the contractor*]

1. This is to notify you that your Bid dated [*date*] for execution of the [*Design, Manufacture, Supply, Installation, Testing and Commissioning of PIDS, PAS and Master Clock System*] for the Contract Price in the aggregate of [*amounts in numbers and words*] [*name of currency*], as corrected and modified in accordance with the Instructions to Bidders is hereby accepted by Jaipur Metro Rail Corporation.
2. The resulting Contract for JP/JS15 (Ph-1B) will consist of and be constituted by this Letter of Acceptance together with
 - a. Notice of Invitation for Bid and Instructions To Bidder
 - b. Employer's Requirements- General Specification
 - c. Employer's Requirements- Particular Specification
 - d. Employer's Requirements -Safety, Health and Environment
 - e. The Special Conditions of Contract
 - f. The General Conditions of Contract
 - g. Bid Drawings
3. All the works will be executed in accordance with conditions, specifications & standards stipulated in the Bid.
4. You shall furnish.
 - a. Power of Attorney, Board Resolution, MOU between the consortium members as per Contract conditions.
 - b. Performance Security/Bond, Parent Company Undertaking, Parent Company Guarantee, contractor's Warrantee, Designer's Warrantee as applicable.
5. You shall also undertake not to use information gained in the contract for any purpose without obtaining the prior approval of JMRC and shall not make any public announcement or divulge any material relating to project both in India & overseas without the prior written consent of JMRC.
6. The DLP is to be administrated by JMRC/O&M, however at any time during the DLP JMRC at its sole discretion may assign any of their nominated third party for administering the DLP obligation by [*Name of the contractor*]. Acceptance of assignment of any such party by JMRC shall be binding on [*Name of the contractor*]
7.
 - a). The date of issue of this "Letter of Acceptance" shall be treated as the "Notice to Proceed" for the purpose of this contract for the commencement of the works.
 - b). The completion period of contract will be as per key date.
8. This letter to acceptance shall form part of the Contract Agreement to be signed letter and shall be binding as Contract Agreement till dated agreement is signed.

9. The Letter of Acceptance is sent to you in duplicate. You are required to return one copy duly signed on all pages including your unconditional acceptance thereof so as to reach the undersigned within two days of issuance of this letter.

Thanking You.

Authorized Signature:

Name and Title of Signatory:

Name of Agency:

Attachment: Contract Agreement

Contract Agreement

THIS AGREEMENT made on the [*insert number*] day of [*insert month*], [*insert year*],

BETWEEN

(1) [*Jaipur Metro Rail Corporation*], a corporation incorporated under the laws of [*India*] and having its principal place of business at [*address of employer*] (hereinafter called “the Employer”), and (2) [*name of contractor*], a corporation incorporated under the laws of [*country of contractor*] and having its principal place of business at [*address of contractor*] (hereinafter called “the Contractor”).

WHEREAS the Employer desires to engage the Contractor to design, manufacture, test, deliver, install, complete and commission certain Facilities, viz. [*list of facilities*] (“the Facilities”) and the Contractor have agreed to such engagement upon and subject to the terms and conditions hereinafter appearing.

NOW IT IS HEREBY AGREED as follows:

Article 1 Contract Documents

- 1.1 **Contract Documents** (Reference GCC Clause 2)
The following documents shall constitute the Contract between the Employer and the Contractor, and each shall be read and construed as an integral part of the Contract:
 - (a) This Contract Agreement and the Appendixes hereto
 - (b) Letter of Acceptance.
 - (c) Post Bid Proceeds
 - (d) Letter of Bid and Price Schedules submitted by the Contractor
 - (e) Employer's Requirements
 - (f) List of eligible countries that was specified in section 5 of bidding document.
 - (g) Special Condition of Contract SCC
 - (h) General Condition of Contract GCC
 - (i) Other completed Bidding Forms submitted with the Letter of Bid
 - (j) Any other documents forming part of the Employer's Requirements
- 1.2 **Order of Precedence** (Reference GCC Clause 2)
In the event of any ambiguity or conflict between the Contract Documents listed above, the order of precedence shall be the order in which the Contract Documents are listed in Article 1.1 (Contract Documents) above.
- 1.3 **Definitions** (Reference GCC Clause 1)
Capitalized words and phrases used herein shall have the same meanings as are ascribed to them in the General Conditions.

Article 2 Contract Price and Terms of Payment

- 2.1 **Contract Price** (Reference GCC Clause 11 & SCC 7)
The Employer hereby agrees to pay to the Contractor the Contract Price in consideration of the performance by the Contractor of its obligations hereunder. The Contract Price shall be the aggregate of [*. . . amounts of foreign currency in words . . .*], [*. . . amounts in figures. . .*] as specified in Price Schedule No. 5 (Grand Summary), [*. . . amounts of local*

currency in words . . .], [. . . amounts in figures. . .], or such other sums as may be determined in accordance with the terms and conditions of the Contract.

2.2 Terms of Payment (Reference GCC Clause 12 & SCC Clause 8)

The terms and procedures of payment according to which the Employer will reimburse the Contractor are given in the Appendix (Terms and Procedures of Payment) hereto.

Payments shall be made into a bank account, nominated by the Contractor in Indian rupees in a bank in India unless otherwise permitted in Special Conditions of Contract. If payments are to be made in more than one currency, separate bank accounts may be nominated by the Contractor for each currency, and payments shall be made by the Employer accordingly.

In the event that the amount payable under Schedule No. 1 is adjusted in accordance with GCC 11.2 or with any of the other terms of the Contract, the Employer shall arrange for the documentary credit to be amended accordingly

**Article 3
Effective Date**

3.1 Effective Date (Reference GCC Clause 1 & SCC Clause 5)

The Effective Date for this Contract for commencement of work shall be the date of issue of Letter of Acceptance (LOA)

3.2 Each party shall use its best efforts to fulfill the following conditions for which it is responsible as soon as practicable.

- (a) This Contract Agreement has been duly executed for and on behalf of the Employer and the Contractor.
- (b) The Contractor has submitted to the Employer the performance security and the advance payment guarantee.
- (c) The Employer has paid the Contractor the advance payment.
- (d) The Contractor has been advised that the documentary credit referred to in Article 2.2 above has been issued in its favor.

**Article 4
Communications**

4.1 The address of the Employer for notice purposes, pursuant to GCC 4.1 is: [*Employer's address*].

4.2 The address of the Contractor for notice purposes, pursuant to GCC 4.1 is: [*Contractor's address*].

**Article 5.
Appendixes**

5.1 The Appendixes listed in the attached List of Appendixes shall be deemed to form an integral part of this Contract Agreement.

5.2 Reference in the Contract to any Appendix shall mean the Appendixes attached hereto, and the Contract shall be read and construed accordingly.

IN WITNESS WHEREOF the Employer and the Contractor have caused this Agreement to be duly executed by their duly authorized representatives the day and year first above written.

Signed by, for and on behalf of the Employer

[*Signature*]

[*Title*]

in the presence of

[*Signature*]

[*Title*]

Signed by, for and on behalf of the Contractor

[*Signature*]

[*Title*]

in the presence of

[*Signature*]

[*Title*]

APPENDIXES

Appendix 1 - Terms and Procedures of Payment

Appendix 2 - Price Adjustment

Appendix 3 - Insurance Requirements

Appendix 4 - Time Schedule

Appendix 5 - List of Major Items of Plant and Services and List of Approved Subcontractors

Appendix 6 - Scope of Works and Supply by the Employer

Appendix 7 - List of Documents for Approval or Review

Appendix 8 - Functional Guarantees

Appendix 1 - Terms and Procedures of Payment

General Requirements

1. This Contract is a fixed Lump Sum priced Contract for Design, Manufacture, Supply, Installation, Testing and Commissioning of PIDS, PAS and Master Clock System for two underground Metro Stations at Chhoti Chaupar and Badi Chaupar on East–West Corridor of Jaipur Metro Phase- 1B
The price to be quoted shall be in accordance with provisions of SCC Clause 7.
- A. **Apportionment Of Fixed Lump Sum Price To Sections and To Cost Centres and Milestones under each Section.**
2. The whole of Works including design are divided into Section EW-B and Section MS as detailed in Annexure B to this appendix. Each Section is divided into the various Cost Centres named according to their general scope of work as detailed. The scope of the work for EW-B section also includes the corresponding work in the respective OCC at Mansarover.
3. The fixed Lump Sum price for whole of the Works shall be apportioned by the Contractor amongst the various Sections. The apportioned amount for each Section will be further distributed among various Cost Centres included in that Section, separately for foreign currency and for the Rupee portion. The apportioned amount for each Cost Centres will be further distributed amongst various Milestones included in that Cost Centre, separately for the foreign currency and the Rupee portion as in Annexure C & D to this appendix.
4. The sum of amounts shown against Milestones in a Cost Centre is the Cost Centre Total that is to be carried forward to the Section Summary. The division of the respective Cost Centre Totals between Indian Currency and Foreign currency shall be shown in the said Summary. The Section Summary will be carried forward to the Bid's Total.
5. The scope and extent of the Works are to be ascertained by reference to the Contract Documents as a whole and shall not be limited in any manner whatsoever by the descriptions of the Cost Centres under each Section or of the Milestones under each Cost Centre, as given in the Appendices to the Pricing document.
6. The amount apportioned to Section MS shall not be more than 10% of Fixed Lump Sum Price. Please refer to Clause 9 below.
7. The sum of the amounts apportioned to Cost Centres 'A' and 'B' of a Section except Section MS shall not exceed 5% and 10% respectively of the apportioned amount for that Section.
8. The sum of the amounts apportioned to Cost Centres 'D' and 'E' of a Section except Section MS shall not be less than 15% and 5% respectively of the apportioned amount for that Section.
9. The Contractor shall note that the apportionment of a Section Total into Cost Centres and then in to milestones should have relation to the Content of work involved. The Total Price of a Section shall not be apportioned more than 5% and 10% against Cost Centre A and B respectively. Also Total Price against a Section shall not be apportioned less than 15% and 5% against Cost Centre D and E respectively.

B. Milestones Achievement Periods

10. The Milestones under each Cost Centre identify verifiable steps towards the completion of the work within that Cost Centre under a Section. The Contractor shall indicate the date - within which he shall achieve each Milestone.

C. Milestone Payment Schedule (MPS)

10. The Contractor shall submit with his Bid the Milestone Payment Schedule which shall show in tabular form the anticipated accumulated value to work done of all Cost Centres for Sections put together except Cost Centre B of Section MS.

The Contractor shall also submit monthly cash flows for the Contract as a whole except Cost Centre B of Section MS.

Both Milestones Payment Schedules and monthly cash flows shall be submitted for each currency of the Contract separately.

12. The MPS covers the period which will commence on the first day of the calendar month next after the month containing the Commencement Date of the Works as per the Contract. The first application for interim payment may be made not earlier than during the month following the calendar month next after the month containing the Commencement Date of the Works, such first application relating to the first month (i.e. month 1) of the MPS.

D. Bid Total

12. The Bid's Total submitted by the Contractor shall be in the format shown in the Pricing Document, Annexure A to Appendix 1, Contract Forms, Section 9.
13. The Pricing Document contains Sections, with Cost Centres under each Section and Milestones under each Cost Centre. The Sections, Cost Centres and Milestones have been prepared to indicate the extent of detail required in the bid. The Bidder shall prepare and complete documents, in this format, as being his bid and submit as part of the Financial Package. A Minimum BOQ is given in Section 4 of Bidding Documents (Table-I, Section 4) which gives the minimum BOQ to be covered as part of the scope of the work. The bidder should fill Schedule 1,2,3,4,5 of Section 4 using the minimum BOQ as a baseline reference classifying specified items into various schedules. Any other item or enhancement to the listed items required to complete the JP/JS15 (Ph-1B) Contract shall also be provided as part of this lump sum Contract and should be filled in schedules.
14. The prices quoted by the Bidder in **Schedule 1,2,3,4,5 of Section 4** and activities given as part of the pricing document, shall be evaluated for reasonability. Bidder is advised to quote reasonable and appropriate/correlated rates for the bill of quantities so as to enable evaluating the reasonability of price.

Offer found unreasonable may be rejected.

JMRC reserves the right of deleting/adding some of the items in **Schedule 1,2,3,4,5 of Section 4** of the pricing document during project implementation stage based on the Project Requirement.

JMRC reserves the right of variation of any items in **Schedule 1,2,3,4,5 of Section 4** upto +/- 25% at the same unit prices during Project implementation stage based on the Project Requirement.

15. The Pricing Document completed and submitted by the Bidder, as part of his bid, should use an indexing and page numbering system such that its extent and completeness is clearly evident.

E. Currency

16. Section Totals, Cost Centre Totals and Milestone amounts shall be indicated in Indian Rupees and in a foreign currency wherever required.

F. Cost Centres

17. Cost Centres under each Section are fixed and shall not be changed by the Bidder. The Bidder, however, may add additional Milestones in a Cost Centre provided such Milestones genuinely relate to that Cost Centre activity. The Cost Centres represent the major items of the Works for which the Employer will pay the Contractor, and the Contractor shall ensure that he has allowed for all his costs he requires for the Contract to meet the Employer's Requirements.

18. If during the course of execution, it becomes necessary, to meet the Employer's Requirements (as indicated in these Bidding Documents), to add more Milestones in a Cost Centre, the Lump Sum Price of the whole of Works, which will remain unaltered, will be reapportioned amongst the Sections, and further redistributed under the Cost Centres in each Sections and the Milestones in each Cost Centre. The liability of the Employer will be limited to the fixed Lump Sum price already accepted and the Contractor will have no right to claim any thing over and above the fixed Lump Sum price for any such addition of Milestones in any Cost Centre. The decision of the Employer will be final and binding in such matters and will not be subject to Conciliation or Arbitration.

G. Milestones

19. The Milestones represent the completion of verifiable activities to be undertaken by the Contractor. A date for the achievement of each of the Works shall be entered in the column provided. Milestones that lead to the achievement of a Stage must always precede the Key Date for achievement of that Stage.

H. Employer's Default

20. In the event that the Employer fails to make any payment on its respective due date, the Employer shall pay to the Contractor interest on the amount of such delayed payment at the rate equal to State Bank of India prime lending rate plus 2% per annum or 10% per annum whichever is lower for period of delay until payment has been made in full.

(B) Payment Procedures

The terms of payment shall be in accordance with provisions of SCC, Clause 8.

Annexure A – BID TOTAL

(THIS DOCUMENT IS TO BE PREPARED AND COMPLETED BY THE CONTRACTOR)

The fixed Lump Sum Price of this Contract is:

Rupees _____ (In figures)

and _____ (In words)

(In Foreign Currencies) _____ (In figures)

_____ (In words)

The above fixed Lump Sum Price shall be apportioned among the Sections as below:

		Total Apportioned Amounts of Sections	
SN	Sections	Foreign Currency	Rupees Amount
EW-B	CHOTI CHAUPAR TO BADI CHAUPAR		
MS	MISCELLANEOUS		
BID TOTAL (TOTAL FOR ALL SECTIONS)			

Annexure B – SECTION SUMMARIES**SECTION EW-B - CHOTI CHAUPAR TO BADI CHAUPAR**

Cost Centres	Description of Cost Centres	Foreign Currency	Rupee Amount
A	Preliminaries and General Requirements		
B	Detailed Design		
C	Manufacture and Delivery		
D	Installation and Site Testing		
E	System Acceptance Tests, Integrated Testing and Commissioning		
SECTION TOTAL CARRIED TO BID TOTAL			

SECTION MS - MISCELLANEOUS

Cost Centres	Description of Cost Centres	Foreign Currency	Rupee Amount
A	Contract Spares		
B	Supervision of Maintenance		
SECTION TOTAL CARRIED TO BID TOTAL			

Annexure C -SECTION EW-B - CHOTI CHAUPAR TO BADI CHAUPAR**COST CENTRE A – PRELIMINARIES AND GENERAL REQUIREMENTS**

This Cost Centre comprises all those obligations and ongoing activities throughout the Contract not associated directly with any other Cost Centre.

This Cost Centre includes but is not limited to :

- Works Programme for JP/JS15 (Ph-1B) Contract.
- Submission of Plans for JP/JS15 (Ph-1B) Contract and their review by Employer's Representative with "No Objection" or as "No Objection Subject To" such as:
 - a) Preliminary System Assurance Plans
 - b) EMC Management Plans.
 - c) RAMS Plans
 - d) Deleted
 - e) Quality Plans.
 - f) Site Safety Plans.
 - g) Site Environmental Plans.
- Submission of Interface Management Plan mutually agreed and signed with Designated Contractors.
- Submission of Preliminary System Design for JP/JS15 (Ph-1B) Contract and its review by Employer's Representative with "No Objection" or as "No Objection Subject To"
- Submission of System Verification and Validation Documents for complete JP/JS15 (Ph-1B) Contract and its review by Employer's Representative with "No Objection" or as "No Objection Subject To"
- Submission of Specifications for the Line Side/Indoor Equipments for Complete JP/JS15 (Ph-1B) Contract and their review by Employer's Representative with "No Objection" or as "No Objection Subject To".
- Submission of the requirement of power, space and mounting details for EW-B Section.
- Any other item(s) considered necessary to comply with the Scope of Work

MILE STONE NO.	WORK DESCRIPTION	Apportioned Amount		Date for completion of Milestone
	MILESTONE ACTIVITY	Foreign Currency	Rupee Amount	
A1	Works Programme for complete JP/JS15 (Ph-1B) Contract			
A2	Preliminary System Assurance Plans for complete JP/JS15 (Ph-1B) Contract			
A3	Site Safety Plans for complete JP/JS15 (Ph-1B) Contract			
A4	Site Environmental Plans for complete JP/JS15 (Ph-1B) Contract			
A5	Interface Management Plan with Designated Contractors for Section EW-B.			
A6	Preliminary System Design for complete JP/JS15 (Ph-1B) Contract			
A7	System verification and validation documents for complete JP/JS15 (Ph-1B) Contract			
A8	Specifications for equipment including the requirement of power, space and mounting details			
A9	Earthing and Lightning Protection Design for both for indoor and outdoor equipments for complete JP/JS15 (Ph-1B) Contract.			
A10	Any other item(s) considered necessary to comply with the scope of Works			
COST CENTRE TOTAL CARRIED TO EW-B SECTION SUMMARY				

COST CENTRE B – DETAILED DESIGN

This Cost Centre comprises all those obligations and ongoing activities through out of the Contract not associated directly with any other Cost Centre.

This Cost Centre includes but is not limited to :

- Submission of Specifications of Equipments/Cables for JP/JS15 (Ph-1B) Contract and their review by Employer's Representative with "No Objection" or as "No Objection Subject To"
- Submission of Final design for Public Address system, Passenger Information Display System and Master Clock System for EW-B Section and its review by Employer's Representative with "No Objection" or as "No Objection Subject To".
- Submission of Final System Assurance Plans for JP/JS15 (Ph-1B) Contract and its review by Employer's Representative with "No Objection" or as "No Objection Subject To".
- Submission of Installation Plans, Method Statements, Installation Design & Drawings and and their review by Employer's Representative with "No Objection" or as "No Objection Subject To".
- Submission of Bill of Material for EW-B Section and its review by Employer's Representative with "No Objection" or as "No Objection Subject To".
- Submission of Delivery Schedules for Materials for EW-B section.
- Delivery of Reviewed As Built Drawings, Complete Configuration Data and all Related Software for EW-B section
- Any other item(s) considered necessary to comply with Scope of Work for EW-B section.

MILESTONE NO.	WORK DESCRIPTION	Apportioned Amount		Date of Completion
	MILESTONE ACTIVITY	Foreign Currency	Rupee Amount	
B1	Specifications for Various Cables & Equipments and associated accessories for complete JP/JS15 (Ph-1B) Contract.			
B2	Final Design for Public Address System for EW-B Section.			
B3	Final Design for Passenger Information Display System for EW-B Section.			
B4	Final Design for Master Clock System for EW-B Section.			
B5	Final Drawings for accepted Final Design for Public Address system, Passenger Information Display System and Master Clock System for EW-B Section			
B6	Final System Assurance for Complete JP/JS15 (Ph-1B) Contract.			
B7	Equipment installation methods, floor plans, cable route plans, cable termination and distribution plans for EW-B Section.			
B8	List of Materials required for this Section and Delivery Schedule thereof.			
B9	Submission of Interface Document with all other relevant Contractors.			
B10	Delivery of Reviewed As Built Drawings, Complete Configuration Data and all Related Software			
B11	Any other item(s) considered necessary to comply with Scope of Work			
COST CENTRE TOTAL CARRIED TO EW-B SECTION SUMMARY				

COST CENTRE C – MANUFACTURE AND DELIVERY

This Cost Centre comprises all those obligations and ongoing activities throughout the Contract not associated directly with any other Cost Centre.

This includes but is not limited to:

- Submission of Type Test Reports and their review by Employer's Representative with "No Objection" or as "No Objection Subject To".
- Submission of Factory Acceptance Test Reports and their review by Employer's Representative with "No Objection" or as "No Objection Subject To".
- Delivery of Public Address system, Passenger Information Display System and Master Clock System Equipments and associated Accessories at Contractor's premises in Jaipur.
- Delivery of Public Address system, Passenger Information Display System and Master Clock System Cables, Earthing Cable, Power Supply Cable & Associated Accessories at Contractor's premises in Jaipur.
- Any other item(s) considered necessary to comply with Scope of Work.

MILE STONE NO.	WORK DESCRIPTION	Apportioned Amount		Date of Completion
	MILESTONE ACTIVITY	Foreign Currency	Rupee Amount	
C1	Delivery of Earthing Cable, Power Supply Cable, PAS,PIDS and Master Clock Cables Main Distribution Frames, Intermediate Distribution Frames and Associated Accessories at Contractor's premises in Jaipur.			
C2	Delivery of Public Address System, Distribution Frames & Associated Accessories at Contractor's premises in Jaipur.			
C3	Delivery of Passenger Information Display System, Distribution Frames & Associated Accessories at Contractor's premises in Jaipur.			
C4	Delivery of Master Clock System & Associated Accessories at Contractor's premises in Jaipur.			
C5	Any other item(s) considered necessary to comply with Scope of Work.			
COST CENTRE TOTAL CARRIED TO EW-B SECTION SUMMARY				

COST CENTRE D – INSTALLATION AND SITE TESTING

This Cost Centre comprises all those obligations and ongoing activities throughout the Contract not associated directly with any other Cost Centre.

- This shall include but not be limited to:
- Delivery to Site from Contractor's premises in Jaipur of Equipments/Cables and associated accessories.
- Pre Installation Test of Equipments/Cables and associated accessories delivered to site.
- Installation as per reviewed Installation Plans, Method Statements, Installation Design & Drawings.
- Submission of Installation Test Plans and their review by Employer's Representative with "No Objection" or as "No Objection Subject To".
- Installation Test as per reviewed Installation Test Plans.
- Submission of Partial Acceptance Test Plans and their review by Employer's Representative with "No Objection" or as "No Objection Subject To".
- Partial Acceptance Test as per reviewed Partial Acceptance Test Plans.
- Any other item(s) considered necessary to comply with the Scope of Works.

MILE STONE NO	WORK DESCRIPTION	Apportioned Amount		Date for completion
	MILESTONE ACTIVITY	Foreign Currency	Rupee Amount	
D1	Delivery to Site from Contractor's premises in Jaipur, Installation and Testing (includes Pre Installation Tests & Post Installation Tests) of all Station Indoor Equipments and Associated Accessories for the whole of EW-B Section.			
D2	Delivery to Site from Contractor's premises in Jaipur, Installation and Testing (includes Pre Installation Tests & Post Installation Tests) of all Outdoor Equipment and Associated Accessories of Public Address system, Passenger Information Display System and Master Clock System for the whole of EW-B Section.			
D3	Provision of Master Clock Timing source to other interfacing Contractors and completion of PAT for the same.			
D4	Completion of Partial Acceptance Tests for PAS, PIDS and Master Clock Systems for whole of Provision of Section.			
D5	Completion of PAT for recording of Live PAS broadcast from OCC on the CDRS.			
D6	Any other item(s) considered necessary to complete the Scope of Work.			
COST CENTRE TOTAL CARRIED TO EW-B SECTION SUMMARY				

COST CENTRE E – SYSTEM ACCEPTANCE TESTS AND INTEGRATED TESTING AND COMMISSIONING

This Cost Centre comprises all those obligations and ongoing activities throughout the Contract not associated directly with any other Cost Centre.

This shall include but not be limited to:

- System Acceptance Tests in accordance with Reviewed System Acceptance Plan with Designated Telecom System Project Contractors.
- Integrated Testing and Commissioning with all Designated Project Contractors (including existing Telecom system)
- Service Trials
- Any other items considered necessary to comply with the Scope of Work
-

MILE- STONE NO.	WORK DESCRIPTION	Apportioned Amount		Date of Completion
	MILESTONE ACTIVITY	Foreign Currency	Rupee Amount	
E1	Obtain the "Notice of No Objection" or "Notice of No Objection Subject to ---" from the Employer's Representative for the System Acceptance Test (SAT) for the Section as a whole.			
E2	Obtain the "Notice of No Objection" or "Notice of No Objection Subject to ---" from the Employer's Representative for the Integrated Testing and Commissioning for section as a whole.			
E3	Obtain the "Notice of No Objection" or "Notice of No Objection Subject to ---" from the Employer's Representative for completion of Service Trials for section as a whole.			
E4	Any other item(s) considered necessary to comply with the Scope of Work.			
COST CENTRE TOTAL CARRIED TO SECTION EW-B SUMMARY				

Annexure D**SECTION MS – MISCELLANEOUS****COST CENTRE A**

This Cost Centre comprises all those obligation and ongoing activities throughout Contract not associated directly with any other Cost Centre.

This Cost Centre includes but is not limited to:

- Submission of “List of Spares along with supporting Calculations and other information as per provisions of Contract” its review by Employer’s Representative with “No Objection” or as “No Objection Subject To”.
- Delivery to Employer of Contract Spares as per provisions of Contract.
- Any other item(s) considered necessary to comply with the scope of Works.

MILE STONE NO.	WORK DESCRIPTION	Apportioned Amount		Date of Completion
	MILESTONE ACTIVITY	Foreign Currency	Rupee Amount	
A1	Delivery to Employer of Contract Spares as per provisions of Contract.			
A2	Any other item(s) considered necessary to comply with the Scope of Work.			
COST CENTRE TOTAL CARRIED TO SECTION MS SUMMARY				

SECTION MS – MISCELLANEOUS**COST CENTRE B**

This Cost Centre comprises all those obligations and ongoing activities throughout the Contract not associated directly with any other Cost Centre.

This includes but is not limited to:

- Submission of Maintenance Plan and its review by Employer's Representative with "No Objection" or as "No Objection Subject To".
- Completion of Supervision of Maintenance as per provisions of contract
- Any other item(s) considered necessary to comply with Scope of Work.

MILE STONE NO.	WORK DESCRIPTION	Apportioned Amount		Date of Completion
	MILESTONE ACTIVITY	Foreign Currency	Rupee Amount	
B1	Completion of Supervision of Maintenance as per provisions of contract			
B2	Any other item(s) considered necessary to comply with Scope of Work.			
COST CENTRE TOTAL CARRIED TO SECTION MS SUMMARY				

Appendix 2 - Price Adjustment

Not used

Appendix 3 - Insurance Requirements

(A) Types of Insurance to Be Taken Out by the Contractor

In accordance with the provisions of GCC Clause 34, the Contractor shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contract, the types of insurance set forth below in the sums and with the deductibles and other conditions specified. The identity of the insurers and the form of the policies shall be subject to the approval of the Employer, such approval not to be unreasonably withheld.

(a) Cargo Insurance

Covering loss or damage occurring, while in transit from the supplier's or manufacturer's works or stores until arrival at the Site, to the Facilities (including spare parts therefore) and to the construction equipment to be provided by the Contractor or its Subcontractors.

Amount [in currency(ies)]	Deductible limits [in currency(ies)]	Parties insured [names]	From [place]	To [place]

(b) Installation All Risks Insurance

Covering physical loss or damage to the Facilities at the Site, occurring prior to completion of the Facilities, with an extended maintenance coverage for the Contractor's liability in respect of any loss or damage occurring during the defect liability period while the Contractor is on the Site for the purpose of performing its obligations during the defect liability period.

Amount [in currency(ies)]	Deductible limits [in currency(ies)]	Parties insured [names]	From [place]	To [place]

(c) Third Party Liability Insurance

Covering bodily injury or death suffered by third parties (including the Employer's personnel) and loss of or damage to property (including the Employer's property and any parts of the Facilities that have been accepted by the Employer) occurring in connection with the supply and installation of the Facilities.

Amount [in currency(ies)]	Deductible limits [in currency(ies)]	Parties insured [names]	From [place]	To [place]

(d) Automobile Liability Insurance

Covering use of all vehicles used by the Contractor or its Subcontractors (whether owned by them or not) in connection with the supply and installation of the Facilities. Comprehensive insurance in accordance with statutory requirements.

(e) Workers' Compensation

In accordance with the statutory requirements applicable in any country where the Facilities or any part thereof is executed.

(f) Employer's Liability

In accordance with the statutory requirements applicable in any country where the Facilities or any part thereof is executed.

(g) Other Insurance

The Contractor is also required to take out and maintain at its own cost the following types of insurance:

Details:

Amount [in currency(ies)]	Deductible limits [in currency(ies)]	Parties insured [names]	From [place]	To [place]

The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GCC Subclause 34.1, except for the Third Party Liability, Workers' Compensation, and Employer's Liability Insurance, and the Contractor's Subcontractors shall be named as co-insureds under all insurance policies taken out by the Contractor pursuant to GCC Sub clause 34.1, except for the Cargo, Workers' Compensation and Employer's Liability Insurance. All insurer's rights of subrogation against such co-insureds for losses or claims arising out of the performance of the Contract shall be waived under such policies.

(B) Types of Insurance to Be Taken Out by the Employer

The Employer shall at its expense take out and maintain in effect during the performance of the Contract the following insurance policies.

Details:

Amount [in currency(ies)]	Deductible limits [in currency(ies)]	Parties insured [names]	From [place]	To [place]

Appendix 4 - Time Schedule

KEY DATES

1 KEY DATES

The work includes a number of stages. These stages, which are inter-related with, and essential to, the completion of the PUBLIC ADDRESS SYSTEM, PASSENGER INFORMATION DISPLAY SYSTEM AND MASTER CLOCK SYSTEM are to be achieved by the Key Dates.

If the identified stage is not achieved by the stated Key Date, liquidated damages may become applicable as set out in the Contract.

1.1 STAGE 1 – Key Date 1 (KD1) : Preliminary Design Submission

Achievement: Submission to, and concurrence by, the Employer's Representative of the Preliminary System Design which consists of details as specified in the Employer's Requirements for this JP/JS15 (Ph-1B) Contract (Section 9 – Appendix 1 – Annexure C- A6, A7 & A8)

1.2 STAGE 2 – Key Date 2 (KD2) : Final Design Submission

Achievement: Submission to, and concurrence by, the Employer's Representative of the Final Design which consists of all the above documents as specified in the Employer's Requirements for this JP/JS15 (Ph-1B) Contract (Section 9 – Appendix 1- Annexure C — B2, B3 & B4)

1.3 STAGE 3 – Key Date 3 (KD3) : Delivery of equipments for the PUBLIC ADDRESS SYSTEM, PASSENGER INFORMATION DISPLAY SYSTEM AND MASTER CLOCK SYSTEM at Contractor's Premises in Jaipur.

Achievement: Delivery of equipments for the PUBLIC ADDRESS SYSTEM, PASSENGER INFORMATION DISPLAY SYSTEM AND MASTER CLOCK SYSTEM of the specified quantity at Contractor's Premises in Jaipur and their inspection by Employer's Representative.

1.4 STAGE 4 – Key Date 4 (KD4) : Completion of Partial Acceptance Test for the PUBLIC ADDRESS SYSTEM, PASSENGER INFORMATION DISPLAY SYSTEM AND MASTER CLOCK SYSTEM

Achievement: Putting into service the PUBLIC ADDRESS SYSTEM, PASSENGER INFORMATION DISPLAY SYSTEM AND MASTER CLOCK SYSTEM after completion of PAT at all stations. These achievements shall also include the integration of the required System of the PUBLIC ADDRESS SYSTEM, PASSENGER INFORMATION DISPLAY SYSTEM AND MASTER CLOCK SYSTEM with the OCC.

1.5 STAGE 5 – Key Date 5 (KD5): Completion of System Acceptance Test and Integrated Testing & Commissioning.

Achievement: This Key Date relates to the following:

Completion of the System Acceptance Test (SAT) and Integrated Testing & Commissioning activity for the full section & OCC.

1.6 STAGE 6 – Key Date 6 (KD6): Completion of Contract

Achievement: Delivery of Contract Spares, , Delivery of As Built Drawings, , Completion of DLP requirement to the satisfaction of Employer's Representative. Issue of Performance Certificate in accordance with GCC/SCC. Completion of Period of Supervision of Maintenance.

Key Dates

Sr. No.	Key Date	Choti Chaupar- Badi Chaupar
1	KD1	Within 10 weeks from LOA
2	KD2	Within 20 weeks from LOA
3	KD3	Within 40 weeks from LOA
4	KD4	20 weeks prior to ROD*
5	KD5	10 Weeks prior to ROD*
6	KD6	31.03.2020

* Tentative Date for Revenue Operation Date (ROD) is 31.03.2018

Appendix 5 - List of Major Items of Plant and Services and List of Approved Subcontractors

A list of major items of plant and services is provided below.

The following Subcontractors and Manufacturers are approved for carrying out the item of the facilities indicated. Where more than one Subcontractor is listed, the Contractor is free to choose between them, but it must notify the Employer of its choice in good time prior to appointing any selected Subcontractor. In accordance with GCC Subclause 19.1, the Contractor is free to submit proposals for Subcontractors for additional items from time to time. No Subcontracts shall be placed with any such Subcontractors for additional items until the Subcontractors have been approved in writing by the Employer and their names have been added to this list of Approved Subcontractors.

Major Items of Plant and Services	Approved Subcontractors and Manufacturers	Nationality

Appendix 6 - Scope of Works and Supply by the Employer

Refer Section 6: Employer's Requirements

Appendix 7 - List of Documents for Approval or Review

Refer Section 6: Employer's Requirements

Appendix 8 - Functional Guarantees

Not used

Performance Security

..... *Bank's name, and address of issuing branch or office*¹

Beneficiary: *Name and address of employer*

Date:

Performance Guarantee No.:

We have been informed that *name of the contractor*. (hereinafter called "the Contractor") has entered into Contract No. *reference number of the contract*. dated with you, for the execution of *name of contract and brief description of plant and services*. (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we *name of the bank*. hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of *name of the currency and amount in figures*². (*amount in words*.) such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire no later than the earlier of

(a) 18 months after our receipt of

- (i) a copy of the Completion Certificate; or
- (ii) a registered letter from the Contractor, attaching a copy of the notice to the project manager that the Facilities are ready for commissioning, and stating that 14 days have elapsed from receipt of such notice (or 7 days have elapsed if the notice was a repeated notice) and the project manager has failed to issue a Completion Certificate or inform the Contractor in writing of any defects or deficiencies; or
- (iii) a registered letter from the Contractor stating that no Completion Certificate has been issued but the Employer is making use of the Facilities; or

(b) the ____ day of ____, 2____.

Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458 (*or ICC Publication No. 758 as applicable*), except that subparagraph (ii) of Sub-Article 20(a) is hereby excluded.³

¹ All italicized text is for guidance on how to prepare this demand guarantee and shall be deleted from the final document.

² The guarantor shall insert an amount representing the percentage of the contract price specified in the contract and denominated either in the currency(ies) of the contract or a freely convertible currency acceptable to the employer.

³ Or the same or similar to this clause specified in the Uniform Rules for Demand Guarantees, ICC Publication No. 758, where applicable.

.....
Seal of bank and signature(s)

-- Note to Contractor --

If the institution issuing the performance security is located outside the country of the employer, it shall have a correspondent financial institution located in the country of the employer to make it enforceable.

Advance Payment Security

..... Bank's name, and address of issuing branch or office¹

Beneficiary: Name and address of employer

Date:

Advance Payment Guarantee No.:

We have been informed that name of the contractor. (hereinafter called "the Contractor") has entered into Contract No. reference number of the contract. dated with you, for the execution of name of contract and brief description of works. (hereinafter called "the Contract").

Furthermore, we understand that, according to the Conditions of the Contract, an advance payment in the sum name of the currency and amount in figures². (..... amount in words.) is to be made against an advance payment guarantee.

At the request of the Contractor, we name of the bank. hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of name of the currency and amount in figures³. (..... amount in words.) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor used the advance payment for purposes other than the costs of mobilization in respect of the Works.

It is a condition for any claim and payment under this guarantee to be made that the advance payment referred to above must have been received by the Contractor on its account number contractor's account number. at name and address of the bank.

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Contractor as indicated in copies of interim statements or payment certificates, which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate, indicating that 80% of the Contract Price has been certified for payment, or on the ... day of,, ⁴ whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458 (or ICC Publication No. 758 as applicable).

.....
Seal of bank and signature(s)

¹ All italicized text serves as a guide for preparing this demand guarantee and shall be deleted from the final document.

² The guarantor shall insert an amount representing the amount of the advance payment denominated either in the currency(ies) of the advance payment as specified in the contract, or in a freely convertible currency acceptable to the employer.

³ Footnote 2.

⁴ Insert the expected expiration date of the time for completion. The employer should note that in the event of an extension of the time for completion of the contract, the employer would need to request an extension of this guarantee from the guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [6 months][1 year], in response to the Employer's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."

-- Note to Contractor --

If the institution issuing the advance payment security is located outside the country of the employer, it shall have a correspondent financial institution located in the country of the employer to make it enforceable.
