Procurement of Plant
Design, Supply and Installation
JAIPUR METRO RAIL CORPORATION LIMITED
BIDDING DOCUMENT
for
Procurement
of
NCB No.-JP/EW/1B/E3

PART-I BIDDING PROCEDURES
Invitation for Bid (IFB), Preface
Section 1 - Instructions to Bidders (ITB)
Section 2 - Bid Data Sheet (BDS)
Section 3 - Evaluation and Qualification Criteria
Section 4 - Bidding Forms (BDF) - Volume - I
Section 5 – Eligible Countries (ELC)

JAIPUR METRO RAIL CORPORATION LTD.
Khanij Bhawan, Tilak Marg,
C- Scheme, Jaipur (Rajasthan) PIN-302005
Country: India
JAIPUR METRO RAIL CORPORATION LIMITED

Invitation for Bids (National Competitive Bidding)

Date: 09.08.2016

Loan No. and Title: 3062-IND: Jaipur Metro Rail Line 1-Phase B Project


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 is open to Bidders from eligible source countries of ADB.


3. National Competitive Bidding will be conducted in accordance with ADB's Single-Stage: Two-Envelope bidding procedure and is open to all Eligible bidders as described in the bidding documents.

4. Key details of the Bid are as under:

<table>
<thead>
<tr>
<th>Bid Security amount</th>
<th>:</th>
<th>Referred to Clause 21 of Instructions to Bidders (ITB)</th>
</tr>
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<tbody>
<tr>
<td>Completion period of the work</td>
<td>:</td>
<td>60 Weeks</td>
</tr>
<tr>
<td>Period of Bidding Documents on inspection and sale</td>
<td>:</td>
<td>From 09.08.2016 to 22.09.2016 (between 09:30 hrs and 18:00 hrs) on all working days and on 23.09.2016 (between 9:30 hrs and 15:00 hrs)</td>
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</tbody>
</table>

5. Only experienced and eligible bidders should participate in this bidding. Please refer to Section 3 (Evaluation and Qualification criteria) of the Bidding Document.

6. To obtain further information and inspect the bidding documents, bidders should contact:

   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: +91-141-5192450, 456 / +91-9001195205
   Facsimile number: 0141-5192451
   Electronic mail address: jmrctender1bew@gmail.com

7. To purchase the bidding documents in English, eligible bidders should:

   - Write to address above requesting the bidding documents for: “NCB No. JP/EW/1B/E3: Design, Manufacture, Supply, Installation, Testing and Commissioning (including Integrated Testing and Commissioning) and Maintenance for Two years During Defect Liability Period for Part-A- Machine Room Less Elevators and Part- B- Escalators for underground section of Jaipur Mass Rapid Transit System Project Phase-1B at Jaipur, Rajasthan, India”. The request for the bidding documents shall be delivered to the address above before the latest date and time of sale of bidding documents prescribed above in the ‘Key details of the Bid’.

   - Pay a non-refundable fee of INR 21,000 towards the cost of the bidding documents. Bidding document requested to be delivered by mail will be dispatched by registered/speed post/courier upon payment of an additional amount of INR 5,000. Payment(s) shall be made in the shape of ‘Demand Draft’ in favor of “Jaipur Metro Rail Corporation Ltd” payable at Jaipur. The Employer shall not be held responsible for the postal/courier delay, if any, in the delivery or non-delivery of the Bidding Documents.

8. Deliver your Bid:

   - to the address above
   - on or before the deadline: up to 15:00 Hrs on 23.09.2016.
   - together with a Bid Security in the form as described in the Bidding Document

Bids will be opened immediately after the deadline for bid submission in the presence of bidders’ representatives who choose to attend.
STANDARD BIDDING DOCUMENT

Procurement of Plant
Design, Supply, and Installation

Single-Stage: Two-Envelope
Bidding Procedure

Asian Development Bank
December 2015
Foreword

This Standard Bidding Document for Procurement of Plant – Design, Supply, and Installation (SBD Plant) has been prepared by the Asian Development Bank (ADB) and is based on the Master Procurement Document prepared by multilateral development banks and other public international financial institutions which reflects the majority view of these institutions. This document has the structure and the provisions of the Master Procurement Document, except where ADB-specific considerations have required a change.

The SBD Plant is intended to be used for the procurement of plant through international competitive bidding when

- the contract involves the design, supply, installation and commissioning of specially engineered plant and equipment such as turbines, generators, boilers, electrical switchyards/substations, pumping stations, telecommunication systems, process and wastewater treatment plants, and similar projects;
- the value of the plant and equipment represents the major part of the estimated contract value; and
- the nature and complexity of the plant and equipment is such that the facilities cannot safely be taken over by the Employer without comprehensive testing, pre-commissioning, commissioning and acceptance procedures being followed.

The SBD Plant documents anticipate that the contractor is responsible for each activity required to complete the facilities, e.g., design, manufacture, delivery, installation, testing, commissioning, training, and required civil works portions. However, these conditions may be adapted for single-responsibility contracts where some activities, such as parts of the preliminary design or site preparation works, are done by others.

An important feature of this SBD is that it can be used with minimum changes, as it does not contain explanatory commentary not forming part of the bidding document.

This SBD is supported by a User’s Guide. The User’s Guide contains detailed explanations and recommendations to Employers on how to prepare a specific bidding document for the procurement of plant and how to evaluate bids. The User’s Guide is not a part of the bidding document.

To obtain further information on procurement under ADB-financed projects, contact

Operations Services and Financial Management Department (OSFMD)
Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
Email: procurement@adb.org
Tel +63 2 632 2444
Fax +63 2 636 2444 [Attn: Director General, OSFMD]
www.adb.org
Procurement of Plant
Design, Supply, and Installation

Single-Stage: Two-Envelope
Bidding Procedure

BIDDING DOCUMENT
for
Procurement of

NCB No.-JP/EW/1B/E3


Issued on: August 2016

Invitation for Bids No.: 

NCB No.: JP/EW/1B/E3

Employer: Jaipur Metro Rail Corporation Limited, Jaipur

Country: INDIA
Preface

This Bidding Document for Procurement of Plant – Design, Supply, and Installation, has been prepared by Jaipur Metro Rail Corporation Limited and is based on the Standard Bidding Document for Procurement of Plant – Design, Supply, and Installation (SBD Plant) issued by the Asian Development Bank dated December 2015.

ADB’s SBD Plant has the structure and the provisions of the Master Procurement Document entitled “Procurement of Plant – Design, Supply, and Installation”, prepared by multilateral development banks and other public international financial institutions except where ADB-specific considerations have required a change.
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Procurement of Plant
Design, Supply and Installation
JAIPUR METRO RAIL CORPORATION LIMITED
BIDDING DOCUMENT
for
Procurement
of

NCB No.-JP/EW/1B/E3


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

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Section 1 - Instructions to Bidders

A. General

1. Scope of Bid

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.

1.2 Unless otherwise stated, throughout this Bidding Document definitions and interpretations shall be as prescribed in Section 7 (General Conditions of Contract).

2. Source of Funds

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.

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.

3. Fraud and Corruption

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

(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 participate 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

---

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).
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.

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.

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. 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 24.2.

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 ITB13.2 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.

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 labour, 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 labour, 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 labour 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.


21.1 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 Bids

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

28. Confidentiality

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.

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.

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.

29. Clarification of Bids

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.

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.

30. Deviations, Reservations, and Omissions

30.1 During the evaluation of Bids, the following definitions apply:

(a) “Deviation” is a departure from the requirements specified in the Bidding Document;
(b) “Reservation” is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and

(c) “Omission” is the failure to submit part or all of the information or documentation required in the Bidding Document.

### 31. Examination of Technical Bids

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. 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.
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.

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 Plant
Design, Supply and Installation
JAIPUR METRO RAIL CORPORATION LIMITED
BIDDING DOCUMENT
for
Procurement
of
NCB No.-JP/EW/1B/E3

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 | The number of the Invitation for Bids (IFB) is: **NCB/JP/EW/1B/E3**  
The Employer is:  
**JAIPUR METRO RAIL CORPORATION LTD.**  
Khani Bhawan, Tilak Marg,  
C-Scheme, Jaipur (Rajasthan),  
India, PIN-302005  
The ICB may be read as National Competitive Bidding (NCB)  
The name of the NCB:  
The identification number of the NCB is: **JP/EW/1B/E3**  
The number and identification of lots (contracts) comprising this NCB is: One |
| --- | --- |

| ITB 2.1 | The Borrower is: INDIA  
The borrower has received the financing from Asian Development Bank for the project defined below.  
The name of the Project is: Jaipur Metro Rail Project (Phase-1B). |
| --- | --- |

### B. Contents of Bidding Documents

| ITB 7.1 | For **clarification purposes** only, the Employer’s address is:  
Attention: Director Project |
| --- | --- |
C. Preparation of Bids

| ITB 11.2 (k) | The Bidder shall submit with its Technical Bid the following additional documents:

(i) One set of original Bid Documents issued by the Employer. All the pages of every part of the Bid Documents issued by the Employer and submitted by the Bidder shall be stamped and signed by the authorized signatory of the Bidder.

(ii) Tender Index: The Bidder shall include with his Bid an index which cross refers all of the Employer’s requirements elaborated in these documents to all the individual sections within this Bid for the Technical Package. The bid package must be clearly presented, all pages numbered and aid out in a logical sequence with main and sub headings to facilitate evaluation.

| ITB 11.3 (d) | The Bidder shall submit with its Price Bid the following additional documents:
<table>
<thead>
<tr>
<th>Section 2 - Bid Data Sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tender Index:</strong> The Bidder shall include with his Bid an index which cross refers all of the Employer’s requirements elaborated in these documents to all the individual sections within this Bid for the Financial Package. The bid package must be clearly presented, all pages numbered and aid out in a logical sequence with main and sub headings to facilitate evaluation.</td>
</tr>
<tr>
<td><strong>ITB 12.1</strong></td>
</tr>
<tr>
<td><strong>ITB 13.1</strong></td>
</tr>
<tr>
<td><strong>ITB 13.2</strong></td>
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<tr>
<td><strong>ITB 13.4</strong></td>
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<tr>
<td><strong>ITB 16.1 (b)</strong></td>
</tr>
<tr>
<td><strong>ITB 18.1</strong></td>
</tr>
<tr>
<td><strong>ITB 18.4(a)(i)</strong></td>
</tr>
<tr>
<td><strong>ITB 18.6</strong></td>
</tr>
<tr>
<td><strong>ITB 19.1</strong></td>
</tr>
<tr>
<td>(a)</td>
</tr>
<tr>
<td>(b)</td>
</tr>
<tr>
<td>(c)</td>
</tr>
<tr>
<td>(d)</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>ITB 20.1</th>
<th>The bid validity period shall be 180 days.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITB 21.1</td>
<td>The Bidder shall furnish a bid security in the amount of: Indian Rupees 16.28 Lacs.</td>
</tr>
<tr>
<td>ITB 21.2</td>
<td>The ineligibility period will be N/A</td>
</tr>
<tr>
<td>ITB 21.4</td>
<td>Any bid not accompanied by an irrevocable and callable bid security shall be rejected by the Employer as nonresponsive. However, if a bidder submits a bid security that deviates in form, amount, and/or period of validity, the Employer shall request the Bidder to submit a compliant bid security within 14 days of receiving such a request. Failure to provide a compliant bid security within the prescribed period of receiving such a request shall cause the rejection of the Bid.</td>
</tr>
<tr>
<td>ITB 22.1</td>
<td>In addition to the original Bid, the number of copies is: Two</td>
</tr>
<tr>
<td>ITB 22.2</td>
<td>The written confirmation of authorization to sign on behalf of the Bidder shall consist of:</td>
</tr>
<tr>
<td></td>
<td>(a) A written power of attorney authorizing the signatory(ies) of the Bid to commit the Bidder of each member of the partnership, consortium or joint venture. In case of Foreign Partner(s), Power of Attorney(s) and Board Resolution confirming authority on the person(s) issuing the Power of Attorney for such actions, shall be submitted duly notarized by the notary public of origin.</td>
</tr>
<tr>
<td></td>
<td>(b) Where the Bidder comprises a partnership, consortium or joint venture, the Bidder shall update the following information:</td>
</tr>
<tr>
<td></td>
<td>(i) Memorandum of Understanding signed by all Participants shall be provided; and</td>
</tr>
<tr>
<td></td>
<td>(ii) nomination of one of the members of the partnership, consortium or joint venture to be in-charge; and this authorization shall be covered in the Power of Attorney signed by the legally authorized signatories of all members of consortium or joint venture.</td>
</tr>
<tr>
<td>ITB 22.2</td>
<td>The Bidder shall submit an acceptable authorization within 14 days.</td>
</tr>
</tbody>
</table>

D. Submission and Opening of Bids
<table>
<thead>
<tr>
<th>ITB 23.1</th>
<th>Bidders shall not have the option of submitting their bids electronically.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITB 23.1 (b)</td>
<td>N/A.</td>
</tr>
<tr>
<td>ITB 24.1</td>
<td>For <strong>bid submission purposes</strong> only, the Employer’s address is</td>
</tr>
<tr>
<td></td>
<td><strong>Attention:</strong> Director Project</td>
</tr>
<tr>
<td></td>
<td><strong>Street address:</strong> RAJSICO Building, Udyog Bhawan, Tilak Marg, C-Scheme</td>
</tr>
<tr>
<td></td>
<td><strong>Floor/Room number:</strong> 3rd floor</td>
</tr>
<tr>
<td></td>
<td><strong>City:</strong> Jaipur (Rajasthan)</td>
</tr>
<tr>
<td></td>
<td><strong>ZIP code:</strong> 302 005</td>
</tr>
<tr>
<td></td>
<td><strong>Country:</strong> India</td>
</tr>
<tr>
<td></td>
<td><strong>The deadline for bid submission is</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Date:</strong> 23.09.2016</td>
</tr>
<tr>
<td></td>
<td><strong>Time:</strong> 15.00 hrs</td>
</tr>
</tbody>
</table>

| ITB 27.1          | The bid opening of Technical Bids shall take place at                   |
|-------------------| Jaipur Metro Rail Corporation Limited,                                  |
|                   | 3rd Floor, RAJSICO Building, Udyog Bhawan                               |
|                   | **T i l a m e r g , C-Scheme,** City: Jaipur (Rajasthan)               |
|                   | **ZIP Code:** 302 005                                                   |
|                   | **Country:** India                                                     |
|                   | **Date:** 23.09.2016                                                   |
|                   | **Time:** Immediately after the deadline for bid submission.           |

| ITB 27.1          | “Electronic bid opening procedure” - NOT APPLICABLE.                    |

**E. Evaluation and Comparison of Bids**

<table>
<thead>
<tr>
<th>ITB 37.1</th>
<th>The currency that shall be used for bid evaluation and comparison purposes to convert all bid prices expressed in various currencies into a single currency is: Indian Rupees (INR)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The source of the selling exchange rate shall be: Reserve Bank of India</td>
</tr>
<tr>
<td></td>
<td>The date for the selling exchange rate shall be: 28 days prior to the deadline for submission of the bids.</td>
</tr>
<tr>
<td><strong>ITB 38.1</strong></td>
<td>A margin of preference shall not apply.</td>
</tr>
</tbody>
</table>
Procurement of Plant
Design, Supply and Installation
JAIPUR METRO RAIL CORPORATION LIMITED
BIDDING DOCUMENT
for
Procurement
of
NCB No.-JP/EW/1B/E3


PART-I BIDDING PROCEDURES

Section 3 - Evaluation and Qualification Criteria

JAIPUR METRO RAIL CORPORATION LTD.
Khanij Bhawan, Tilak Marg,
C- Scheme, Jaipur (Rajasthan) PIN-302005
Country: India
# Section 3 - Evaluation and Qualification Criteria

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### 1. Evaluation

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<td>Alternative Technical Solutions</td>
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<tr>
<td>Economic Evaluation</td>
<td>3-2</td>
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### 2. Qualification

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<th>Page</th>
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<tr>
<td>Government-Owned Enterprise</td>
<td>3-4</td>
</tr>
<tr>
<td>United Nations Eligibility</td>
<td>3-4</td>
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<td>Contracts of Similar Size and Nature</td>
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<tr>
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<td>3-10</td>
</tr>
<tr>
<td>Subcontractors</td>
<td>3-11</td>
</tr>
</tbody>
</table>
1. **Evaluation**

1.1 **Technical Evaluation**

In addition to the criteria listed in ITB 34.1 (a) – (b), other relevant factors are as follows:

Evaluation of the Bidder’s Technical Proposal will include an assessment of the Bidder’s technical capacity to mobilize key equipment and personnel for the contract consistent with its proposal regarding work methods, scheduling, and material sourcing in sufficient detail and fully in accordance with the requirements stipulated in Section 6 (Employer’s Requirements).

Non-compliance with equipment and personnel requirements described in Section 6 (Employer’s Requirements) shall not normally be a ground for bid rejection and such non-compliance will be subject to clarification during bid evaluation and rectification prior to contract award.

1.2 **Alternative Technical Solutions**

Not Applicable.

1.3 **Economic Evaluation**

In addition to the criteria listed in ITB 39.2I (a)–(e), other relevant factors are as follows:

Adjustments in price that result from the procedures outlined below shall be added, for purposes of comparative evaluation only, to arrive at an “Evaluated Bid Price.” Bid prices quoted by Bidders shall remain unaltered.

1.3.1 **Quantifiable Deviations and Omissions**

Quantifiable Deviations and Omissions from the contractual obligations: the evaluation shall be based on the evaluated cost of fulfilling the contract in compliance with all contractual obligations under this Bidding Document.

1.3.2 **Time Schedule**

Time to complete the plant and services from the effective date specified in Article 3 of the Contract Agreement for determining the time for completion of pre-commissioning activities is: 60 weeks. No credit will be given for earlier completion.

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 Applicable.

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

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Compliance Requirements</th>
<th>Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single Entity</td>
<td>Joint Venture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All Partners</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Combined</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Each Partner</td>
</tr>
<tr>
<td></td>
<td></td>
<td>One Partner</td>
</tr>
</tbody>
</table>

#### 2.1.1 Nationality

Nationality in accordance with ITB Subclause 4.2.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Single Entity</th>
<th>Joint Venture</th>
<th>Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>must meet requirement</td>
<td>must meet requirement</td>
<td>not applicable</td>
</tr>
<tr>
<td></td>
<td>ELI-1; ELI-2 with attachments</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 2.1.2 Conflict of Interest

No conflicts of interest in accordance with ITB Subclause 4.3.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Single Entity</th>
<th>Joint Venture</th>
<th>Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>must meet requirement</td>
<td>must meet requirement</td>
<td>not applicable</td>
</tr>
<tr>
<td></td>
<td>ELI-1; ELI-2 with attachments</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 2.1.3 ADB Eligibility

Not having been declared ineligible by ADB, as described in ITB Subclause 4.4.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Single Entity</th>
<th>Joint Venture</th>
<th>Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>must meet requirement</td>
<td>must meet requirement</td>
<td>not applicable</td>
</tr>
<tr>
<td></td>
<td>Letter of Technical Bid</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 2.1.4 Government-Owned Enterprise

Bidder required to meet conditions of ITB Subclause 4.5.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Single Entity</th>
<th>Joint Venture</th>
<th>Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>must meet requirement</td>
<td>must meet requirement</td>
<td>not applicable</td>
</tr>
<tr>
<td></td>
<td>ELI-1; ELI-2 with attachments</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 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.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Single Entity</th>
<th>Joint Venture</th>
<th>Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>must meet requirement</td>
<td>must meet requirement</td>
<td>not applicable</td>
</tr>
<tr>
<td></td>
<td>ELI-1; ELI-2 with attachments</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Letter of Technical Bid
2.2 Pending Litigation and Arbitration

Pending litigation and arbitration criterion shall apply.¹

2.2.1 Pending Litigation and Arbitration

<table>
<thead>
<tr>
<th>Criteria Requirement</th>
<th>Compliance Requirements</th>
<th>Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>All pending litigation and arbitration, if any, shall be treated as resolved against the Bidder and so shall in total not represent more than 60 percent of the Bidder’s net worth calculated as the difference between total assets and total liabilities.</td>
<td>Single Entity</td>
<td>Joint Venture</td>
</tr>
<tr>
<td></td>
<td>All Partners Combined</td>
<td>Each Partner</td>
</tr>
<tr>
<td>must meet requirement by itself or as partner to past or existing Joint Venture</td>
<td>not applicable</td>
<td>must meet requirement by itself or as partner to past or existing Joint Venture</td>
</tr>
</tbody>
</table>

¹
### 2.3 Financial Situation

#### 2.3.1 Historical Financial Performance

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Compliance Requirements</th>
<th>Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirement</td>
<td>Single Entity</td>
<td>Joint Venture</td>
</tr>
<tr>
<td>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 three 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.</td>
<td>must meet requirement</td>
<td>not applicable</td>
</tr>
</tbody>
</table>
### 2.3.2 Average Annual Turnover

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Compliance Requirements</th>
<th>Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirement</td>
<td>Single Entity</td>
<td>Joint Venture</td>
</tr>
<tr>
<td></td>
<td>All Partners Combined</td>
<td>Each Partner</td>
</tr>
<tr>
<td>Minimum average annual turnover of INR 28.31 Crores calculated as total certified payments received for contracts in progress or completed, within the last three years.</td>
<td>must meet requirement</td>
<td>must meet requirement</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Compliance Requirements</th>
<th>Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirement</td>
<td>Single Entity</td>
<td>Joint Venture</td>
</tr>
<tr>
<td>The Bidder must demonstrate that it has the financial resources to meet:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) its current contract commitments, as defined in FIN-4 (Total Financial Requirements for Current Contract Commitments), plus</td>
<td>must meet requirement</td>
<td>not applicable</td>
</tr>
<tr>
<td>(b) the requirements for the Subject Contract of INR 3.48 Crores</td>
<td>must meet requirement</td>
<td>must meet requirement</td>
</tr>
</tbody>
</table>

NOTE: The entries made under clause 2.3.2 and 2.3.3 and Section-4 (FIN-1 to FIN-5) shall have cross references to submitted financial statements. The above Statements shall also be certified by Chartered Accountant.
## 2.4 Bidder’s Experience

### 2.4.1 Contracts of Similar Size and Nature

<table>
<thead>
<tr>
<th>Criteria Requirement</th>
<th>Compliance Requirements</th>
<th>Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single Entity</td>
<td>Joint Venture</td>
</tr>
<tr>
<td></td>
<td>All Partners Combined</td>
<td>Each Partner</td>
</tr>
<tr>
<td>Participation in at least <strong>one contract</strong> that has been successfully completed within the <strong>last 7 years</strong> and that is similar to the proposed contract, where the value of the Bidder’s participation exceeds <strong>INR 13 Crores</strong>. The similarity of the Bidder’s participation shall be based on the physical size, nature of works, complexity, methods, technology or other characteristics as described in Section 6 (Employer’s Requirements).</td>
<td>must meet requirement</td>
<td>must meet requirement</td>
</tr>
<tr>
<td>Or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation in at least <strong>two contracts</strong> that has been successfully completed within the <strong>last 7 years</strong> and that is similar to the proposed contract, where the value of the Bidder’s participation exceeds <strong>INR 8 Crores</strong>. Each The similarity of the Bidder’s participation shall be based on the physical size, nature of works, complexity, methods, technology or other characteristics as described in Section 6 (Employer’s Requirements).</td>
<td>must meet requirement</td>
<td>must meet requirement</td>
</tr>
<tr>
<td>Or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation in at least <strong>three contracts</strong> that has been successfully completed within the <strong>last 7 years</strong> and that is similar to the proposed contract, where the value of the Bidder’s participation exceeds <strong>INR 6.5 Crores</strong>. The similarity of the Bidder’s participation shall be based on the physical size, nature of works, complexity, methods, technology or other characteristics as described in Section 6 (Employer’s Requirements).</td>
<td>must meet requirement</td>
<td>must meet requirement</td>
</tr>
</tbody>
</table>
## 2.4.2 Experience in Key Activities

(Must be complied with by the Bidder. In case of a Joint Venture Bidder, at least one of the partners must have experience in the key activity. If the activity can be subcontracted, the requirement must be specified in criterion 2.5 of Section 3.)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Single Entity</th>
<th>Joint Venture</th>
<th>Submission Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>For the above or other contracts executed during the period stipulated in 2.4.1 above, a minimum experience in the following key activities:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Experience of “Design, Manufacture, Supply, Installation, Testing, Commissioning of at least 03 Machine Room Less Elevators for Railway Station(s) / Metro Station(s) / Suburban Railway Station(s) / Airport(s) completed in last 7 years”</td>
<td>must meet requirements</td>
<td>must meet requirements</td>
<td>not applicable</td>
</tr>
<tr>
<td>b) Experience of “Design, Manufacture, Supply, Installation, Testing, Commissioning of at least 09 Escalators for Railway Station(s) / Metro Station(s) / Suburban Railway Station(s) / Airport(s) completed in last 7 years”</td>
<td>must meet requirements</td>
<td>must meet requirements</td>
<td>not applicable</td>
</tr>
<tr>
<td>c) If the member of JV responsible for manufacturing &amp; supplying of Machine Room Less Elevator(s) is of foreign origin then they should have experience of manufacturing and supplying at least 03 Machine Room Less Elevators for Railway Station(s) / Metro Station(s) / Suburban Railway Station(s) / Airport(s) completed in last 7 years, excluding the country of origin.</td>
<td>must meet requirements</td>
<td>not applicable</td>
<td>not applicable</td>
</tr>
<tr>
<td>d) If the member of JV responsible for manufacturing &amp; supplying of Escalator(s) is of foreign origin then they should have experience of manufacturing and supplying at least 09 Escalators for Railway Station(s) / Metro Station(s) / Suburban Railway Station(s) / Airport(s) completed in last 7 years, excluding the country of origin.</td>
<td>must meet requirements</td>
<td>not applicable</td>
<td>not applicable</td>
</tr>
</tbody>
</table>
2.5 Subcontractors (Not Applicable)
Procurement of Plant
Design, Supply and Installation
JAIPUR METRO RAIL CORPORATION LIMITED
BIDDING DOCUMENT
for
Procurement
of
NCB No.-JP/EW/1B/E3


PART-I BIDDING PROCEDURES

Section 4 - Bidding Forms (BDF)
Volume - I

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

<table>
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<tr>
<th>Form Type</th>
<th>Page</th>
</tr>
</thead>
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<tr>
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<tr>
<td>Letter of Price Bid</td>
<td>4-4</td>
</tr>
<tr>
<td>Price Schedule</td>
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<tr>
<td>Bid Security</td>
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<td>Bid-Securing Declaration</td>
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<td>Method Statement</td>
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</tr>
<tr>
<td>Mobilization Schedule</td>
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</tr>
<tr>
<td>Construction Schedule</td>
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</tr>
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<td>Bidders Qualification</td>
<td>4-24</td>
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<td>Form FIN - 1: Historical Financial Performance</td>
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<tr>
<td>Form FIN - 2: Average Annual Turnover</td>
<td>4-29</td>
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<tr>
<td>Form FIN - 3: Availability of Financial Resources</td>
<td>4-30</td>
</tr>
<tr>
<td>Form FIN- 4: Financial Requirements for Current Contract Commitments</td>
<td>4-31</td>
</tr>
<tr>
<td>Form FIN- 5: Compliance Check of Financial Resources</td>
<td>4-32</td>
</tr>
<tr>
<td>Form EXP - 1: Contracts of Similar Size and Nature</td>
<td>4-34</td>
</tr>
<tr>
<td>Form EXP - 2: Experience in Key Activities</td>
<td>4-35</td>
</tr>
<tr>
<td>Form EXP - 3: Subcontractors</td>
<td>4-36</td>
</tr>
</tbody>
</table>
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:....................................
NCB No.: JP/EW/1B/E3
Invitation for Bid No.: JP/EW/1B/E3

To,
Chairman and Managing Director
JAIPUR METRO RAIL CORPORATION LTD.
Khanij Bhawan, Tilak Marg,
C-Scheme, Jaipur (Rajasthan),
India, PIN–302 005


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) We are not participating, as a Bidder in more than one bid in this bidding process in accordance with ITB 4.3(e), other than alternative offers submitted in accordance with ITB 13.
Section IV Bidding Forms

(g) 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.

(h) [We are not a government-owned enterprise] / [We are a government-owned enterprise but meet the requirements of ITB 4.5].

(i) 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.

(j) 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.

(k) It is confirmed and declared that we, or any of our associate, have not been engaged in any fraudulent and corrupt practice as defined in ITB 3 and clause 6 of General Conditions of Contract.

(l) We do hereby undertake that we have not been banned for business by any central / state government department or public sector undertaking and also that none of our work was rescinded by the JMRC after award of contract during last 5 years due to non performance

Name .........................................................................................................................

In the capacity of ........................................................................................................

Signed ...........................................................................................................................

Duly authorized to sign the Bid for and on behalf of ....................................................

Date ..............................................................................................................................

---

1 Use one of the two options as appropriate.
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:....................................
NCB No.: JP/EW/1B/E3
Invitation for Bid No.: JP/EW/1B/E3

To,
Chairman and Managing Director,
JAIPUR METRO RAIL CORPORATION LTD.
Khanij Bhawan, Tilak Marg,
C-Scheme, Jaipur (Rajasthan),
India, PIN–302 005


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 for 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, excluding any discounts offered in item (d) below 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 bid price from the Grand Summary (Schedule No. 5) should be entered by the Bidder inside this box. Absence of the total bid price in the Letter of Price Bid may result in the rejection of the bid.

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

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

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

<table>
<thead>
<tr>
<th>Name of Recipient</th>
<th>Address</th>
<th>Reason</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.

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.

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:
   BOQ Part I for Machine Room Less Elevators.
   BOQ Part II for Escalators.

2. The Schedules do 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.

4. The Country of Origin of the items quoted for shall be as per the list of eligible countries under Section 5. The following extract of ADB guidelines shall be referred to, while deciding the country of origin of each item by the bidder.
   “To be eligible, goods must have been mined, grown, or produced in an ADB member country. That is, the goods should have come into existence in an ADB member country in the form in which they are to be purchased. Goods are produced or deemed to come into existence when through manufacturing, processing, or substantial and major assembling of components, another commercially recognized product results that is substantially different from its components. For example, where a computer is assembled or manufactured needs to be an eligible source, and not the source of the computer’s components.”

5. After award of the contract, the bidder shall be at liberty to change the country of origin of any item contained in the BOQ at vendor approval stage, without any financial obligation on either side, irrespective of the country of origin, indicated at the time of quoting of the bid. However, the items shall be as per the specifications as given in the Employer’s Requirement (Section 6) and the Country of Origin shall be as per Section 5, in any case.

Pricing

6. 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, or prices shall be subject to adjustment in accordance with the corresponding Appendix (Price Adjustment) to the Contract Agreement.

7. 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.

8. Payments will be made to the Contractor in the currency or currencies indicated under each respective item.
9. 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.

10. “The bidder can quote the bid price against each item in INR or in Foreign Currency/Currencies or in a combination of both as indicated in Section 2 – (Bid Data Sheet). The bidder is advised to read the BOQ provisions carefully and quote the price accordingly. Each column of the currency is to be quoted independently and no inter conversion of currency is required”.
Schedules of Rates and Prices

Refer Section-4 Volume-2 (BoQ)
BOQ Part I for Machine Room Less Elevators.
    BOQ Part II for Escalators.
Bid Security

Bank Guarantee

Bank’s name, and address of issuing branch or office

Beneficiary: Name and address of employer

Date: 

Bid Security No.: 

We have been informed that (name of the bidder) (hereinafter called "the Bidder") has submitted to you its bid dated (name of contract) under Invitation for Bids No. ("the IFB"). Furthermore, we understand that, according to your conditions, bids must be supported by a bid guarantee.

At the request of the Bidder, we hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of (amount in figures) (amount in words) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder:

(a) has withdrawn its Bid during the period of bid validity specified by the Bidder in the Letters of Technical and Price Bid; or
(b) does not accept the correction of errors in accordance with the Instructions to Bidders (hereinafter "the ITB"); or
(c) having been notified of the acceptance of its Bid by the Employer during the period of bid validity, (i) fails or refuses to execute the Contract Agreement, or (ii) fails or refuses to furnish the Performance Security, in accordance with the ITB.

This guarantee will expire (a) if the Bidder is the successful Bidder, upon our receipt of copies of the Contract Agreement signed by the Bidder and the Performance Security issued to you upon the instruction of the Bidder; or (b) if the Bidder is not the successful Bidder, upon the earlier of (i) our receipt of a copy of your notification to the Bidder of the name of the successful Bidder, or (ii) 28 days after the expiration of the Bidder’s bid.

Consequently, any demand for payment under this guarantee must be received by us at the office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458.

In case of a joint venture, the bid security must be in the name of all partners to the joint venture that submits the bid.

--- Note ---

1 All italicized text is for use in preparing this form and shall be deleted from the final document.
2 Or 758 as applicable.
Bid-Securing Declaration

N/A
Technical Proposal

- Site Organization
- Method Statement
- Mobilization Schedule
- Construction Schedule
- Plant
- Personnel
- Equipment
- Proposed Subcontractors for Major Items of Plant and Services
- Manufacturer’s Authorization
- Time Schedule
- Functional Guarantee of the Proposed Facilities
Site Organization
Method Statement
Mobilization Schedule
Construction Schedule
Plant
**Personnel**

**Form PER – 1: Proposed Personnel**

Bidders should provide the details of proposed personnel and their experience record in the relevant Information Forms below for each of the candidate.

<table>
<thead>
<tr>
<th></th>
<th>Title of position*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Name</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Title of position*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Name</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Title of position*</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Name</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Title of position*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Name</td>
</tr>
</tbody>
</table>

**etc.**

<table>
<thead>
<tr>
<th></th>
<th>Title of position*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Name</td>
</tr>
</tbody>
</table>

---

* 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.

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Date of birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel information</td>
<td>Professional qualifications</td>
<td></td>
</tr>
<tr>
<td>Present employment</td>
<td>Name of employer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Address of employer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Telephone</td>
<td>Contact (manager/personnel officer)</td>
</tr>
<tr>
<td></td>
<td>Fax</td>
<td>E-mail</td>
</tr>
<tr>
<td></td>
<td>Job title</td>
<td>Years with present employer</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Company/Project/Position/Relevant Technical and Management Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
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), using the Forms below. A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder.

<table>
<thead>
<tr>
<th>Item of Equipment</th>
<th>Equipment Information</th>
<th>Name of manufacturer</th>
<th>Model and power rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capacity</td>
<td>Year of manufacture</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Status</td>
<td>Current location</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Details of current commitments</td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>Indicate source of the equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[ ] Owned [ ] Rented [ ] Leased [ ] Specially manufactured</td>
<td></td>
</tr>
</tbody>
</table>

Omit the following information for equipment owned by the Bidder.

<table>
<thead>
<tr>
<th>Owner</th>
<th>Name of owner</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Address of owner</td>
</tr>
<tr>
<td></td>
<td>Telephone Contact name and title</td>
</tr>
<tr>
<td></td>
<td>Fax Telex</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Agreements</th>
<th>Details of rental/lease/manufacture agreements specific to the project</th>
</tr>
</thead>
</table>
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.

<table>
<thead>
<tr>
<th>Major Items of Plant and Services</th>
<th>Proposed Subcontractors or Manufacturers</th>
<th>Nationality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Manufacturer’s Authorization

N/A
Time Schedule

N/A
Functional Guarantee of the Proposed Facilities

Not Applicable.
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

<table>
<thead>
<tr>
<th>Bidder’s Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bidder’s legal name</td>
<td></td>
</tr>
<tr>
<td>In case of Joint Venture, legal name of each partner</td>
<td></td>
</tr>
<tr>
<td>Bidder’s country of constitution</td>
<td></td>
</tr>
<tr>
<td>Bidder’s year of constitution</td>
<td></td>
</tr>
<tr>
<td>Bidder’s legal address in country of constitution</td>
<td></td>
</tr>
<tr>
<td>Bidder’s authorized representative (name, address, telephone numbers, fax numbers, e-mail address)</td>
<td></td>
</tr>
</tbody>
</table>

Attached are copies of the following documents:

- 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
- 2. Authorization to represent the firm or Joint Venture named above, in accordance with ITB 22.2
- 3. In case of Joint Venture, letter of intent to form Joint Venture or Joint Venture agreement, in accordance with ITB 4.1
- 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.

<table>
<thead>
<tr>
<th>Joint Venture/Subcontractor Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bidder’s legal name</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Joint Venture Partner’s or Subcontractor’s legal name</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Joint Venture Partner’s or Subcontractor’s country of constitution</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Joint Venture Partner’s or Subcontractor’s year of constitution</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Joint Venture Partner’s or Subcontractor’s legal address in country of constitution</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Joint Venture Partner’s or Subcontractor’s authorized representative information (name, address, telephone numbers, fax numbers, e-mail address)</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Attached are copies of the following documents:

- Articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and ITB 4.2
- Authorization to represent the firm named above, in accordance with ITB 22.2
- In the case of government-owned enterprise, documents establishing legal and financial autonomy and compliance with commercial law, in accordance with ITB 4.5

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

Choose one of the following:

- No pending litigation and arbitration.
- Below is a description of all pending litigation and arbitration against the Bidder (or each Joint Venture member if Bidder is a Joint Venture).

<table>
<thead>
<tr>
<th>Year</th>
<th>Matter in Dispute</th>
<th>Value of Pending Claim in INR Equivalent</th>
<th>Value of Pending Claim as a Percentage of Net Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**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: ___________________

<table>
<thead>
<tr>
<th>Financial Data for Previous . . . . Years [INREquivalent]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1:</td>
</tr>
</tbody>
</table>

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 three 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 INR at the specified exchange rate at the end of the period reported.

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: _________________

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount Currency</th>
<th>Exchange Rate</th>
<th>INR Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

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: ___________________

<table>
<thead>
<tr>
<th>No.</th>
<th>Source of financing</th>
<th>Amount (INR equivalent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Working Capital (to be taken from FIN-1)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Credit Line*</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Other Financial Resources</td>
<td></td>
</tr>
</tbody>
</table>

Total Available Financial Resources

* 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: ___________________

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of Contract</th>
<th>Employer’s Contact (Address, Tel, Fax)</th>
<th>Contract Completion Date</th>
<th>Outstanding Contract Value (X)</th>
<th>Remaining Contract Period in months (Y)</th>
<th>Monthly Resources Requirement (X / Y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>For Single Entities:</th>
<th>Total Available Financial Resources from FIN-3 (C)</th>
<th>Total Monthly Financial Requirement for Current Contract Commitments (CCC) from FIN-4 (D)</th>
<th>Available Financial Resources net of CCC (C-D)</th>
<th>≥ Requirement*</th>
</tr>
</thead>
<tbody>
<tr>
<td>____________________</td>
<td>________</td>
<td>_________</td>
<td>________</td>
<td>N</td>
</tr>
<tr>
<td>(Name of Bidder)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Form FIN-5B: For Joint Ventures**

<table>
<thead>
<tr>
<th>For Joint Ventures:</th>
<th>Total Available Financial Resources from FIN-3 (C)</th>
<th>Total Monthly Financial Requirement for Current Contract Commitments (CCC) from FIN-4 (D)</th>
<th>Available Financial Resources net of CCC (C-D)</th>
<th>≥ Requirement*</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Partner:</td>
<td>__________________________</td>
<td>__________________________</td>
<td>__________________________</td>
<td>B(%) of Requirement</td>
</tr>
<tr>
<td></td>
<td>________</td>
<td>_________</td>
<td>________</td>
<td></td>
</tr>
<tr>
<td>(Name of Partner)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Each (Other) Partner:</th>
<th></th>
<th></th>
<th></th>
<th>A(%) of Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>__________________________</td>
<td>__________________________</td>
<td>__________________________</td>
<td>A(%) of Requirement</td>
</tr>
<tr>
<td>(Name of Partner 1)</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td></td>
</tr>
</tbody>
</table>

|                      | __________________________ | __________________________ | __________________________ | A(%) of Requirement |
| (Name of Partner 2)   | ____ | ____ | ____ |                          |

|                      | __________________________ | __________________________ | __________________________ | A(%) of Requirement |
| (Name of Partner 3)   | ____ | ____ | ____ |                          |

| All combined partners |                      |                  |                            | 100% of Requirement from Section 3 - 2.3.3(b) |
|_______________________|______________________|____________________|____________________|________________________|
|                      | __________________________ | __________________________ | __________________________ |                          |

\[ \sum (C-D)^b = \]
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.

\[ a \quad \text{Requirement for the subject contract is defined in Criterion 2.3.3(b) of Section 3. Value } A \text{ is the required percentage of the subject contract, which each partner must meet; and value } B \text{ is the required percentage of the subject contract, which one partner must meet. } A \text{ and } B \text{ values are defined in Criterion 2.3.3 of Section 3 (Evaluation and Qualification Criteria).} \]

\[ b \quad \Sigma (C - D) = \text{sum of available financial resources net of current contract commitments (CCC) for all partners.} \]
Form EXP – 1: Contracts of Similar Size and Nature

Fill out one (1) form per contract.

<table>
<thead>
<tr>
<th>Contract Identification</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Award Date</td>
<td>Completion Date</td>
</tr>
<tr>
<td>Role in Contract</td>
<td>Contractor</td>
</tr>
<tr>
<td>Total Contract Amount</td>
<td>INR</td>
</tr>
<tr>
<td>Percent of Total Amount</td>
<td></td>
</tr>
<tr>
<td>Employer’s name</td>
<td>Address</td>
</tr>
<tr>
<td>Phone number</td>
<td>Fax number</td>
</tr>
<tr>
<td>Email</td>
<td></td>
</tr>
</tbody>
</table>

Description of the similarity in accordance with Criterion 2.4.1 of Section 3

Design, Manufacture, Supply, Installation, Testing, Commissioning of either Elevator(s) OR Escalator(s) OR both for Railway Station(s) / Metro Station(s) / Suburban Railway Station(s) / Airport(s)
Form EXP - 2: Experience in Key Activities

Fill out one (1) form per contract.

<table>
<thead>
<tr>
<th>Contract with Similar Key Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contract No. . . . of . . . . . . . . .</strong></td>
</tr>
<tr>
<td><strong>Award Date</strong></td>
</tr>
<tr>
<td><strong>Role in Contract</strong></td>
</tr>
<tr>
<td><strong>Total Contract Amount</strong></td>
</tr>
<tr>
<td><strong>If partner in a Joint Venture or subcontractor, specify participation of total contract amount</strong></td>
</tr>
<tr>
<td><strong>Employer’s name</strong></td>
</tr>
<tr>
<td><strong>Address</strong></td>
</tr>
<tr>
<td><strong>Telephone number</strong></td>
</tr>
<tr>
<td><strong>Fax number</strong></td>
</tr>
<tr>
<td><strong>E-mail</strong></td>
</tr>
</tbody>
</table>

**Description of the key activities in accordance with Criterion 2.4.2 of Section 3**

- a) Experience of “Design, Manufacture, Supply, Installation, Testing, Commissioning of at least 03 Machine Room Less Elevators for Railway Station(s) / Metro Station(s) / Suburban Railway Station(s) / Airport(s) completed in last 7 years”
- b) Experience of “Design, Manufacture, Supply, Installation, Testing, Commissioning of at least 09 Escalators for Railway Station(s) / Metro Station(s) / Suburban Railway Station(s) / Airport(s) completed in last 7 years”
- c) If the member of JV responsible for manufacturing & supplying of Machine Room Less Elevator(s) is of foreign origin then they should have experience of manufacturing and supplying at least 03 Machine Room Less Elevators for Railway Station(s) / Metro Station(s) / Suburban Railway Station(s) / Airport(s) completed in last 7 years, excluding the country of origin.
- d) If the member of JV responsible for manufacturing & supplying of Escalator(s) is of foreign origin then they should have experience of manufacturing and supplying at least 09 Escalators for Railway Station(s) / Metro Station(s) / Suburban Railway Station(s) / Airport(s) completed in last 7 years, excluding the country of origin.
Form EXP - 3: Subcontractors

Not Applicable.
1. Fill up one (1) form per contract.
2. Value of successfully completed portion of any ongoing work up to period of bid preparation will also be considered for qualification of construction experience criteria. Substantially completed means 80% of the contract value.
3. For successfully or substantially completed works, value of work done shall be updated to 'the deadline for submission of bids' price level assuming 2% inflation per year for foreign currency and 5% inflation for Indian currency. Substantially completed means 80% of the contract value. For the purpose of evaluation, all prices will be converted to INR by using Exchange (Selling) rates for those currencies at the close of business of RBI at 31st December of each year.
4. Documentary proof such as successfully or substantially completed certificates from client clearly indicating the nature/scope of work, actual completion cost and actual date of completion for such work should be submitted. In case the work is executed for private client, copy of work order, bill of quantities, bill wise details of payment received certified by Chartered Accountant under his signature, stamp and membership number, Tax Deducted at Source (TDS) certificates for all payments received and copy of final/last bill paid by client shall be submitted.
5. Only the value of contract as executed by the Bidder/Member in its own name should be indicated. Where a work is undertaken by a group, only that portion of the contract which is undertaken by the concerned applicant/member should be indicated and the remaining done by the other members of the group be excluded. This is to be substantiated with documentary evidence which clearly mentioned the length of tunnel and number of stations along with its plan area completed.
Procurement of Plant
Design, Supply and Installation
JAIPUR METRO RAIL CORPORATION LIMITED
BIDDING DOCUMENT
for
Procurement
of
NCB No.-JP/EW/1B/E3

PART-I BIDDING PROCEDURES

Section 4 - Bidding Forms (BDF)
Volume-II (Price Schedules) Part-A & Part-B

JAIPUR METRO RAIL CORPORATION LTD.
Khanij Bhawan, Tilak Marg,
C- Scheme, Jaipur (Rajasthan) PIN-302005
Country: India
1. The Price Schedules are divided into separate Schedules as follows:

For Part – A :-


Schedule No. A / 2A O&M Documentation, Transfer of Technology and all other obligations as per Tender Documents.

Schedule No. A / 2B Training of Employer’s Staff

Schedule No. A / 3A Price for recommended Consumable Spares.

Schedule No. A / 3B Price for Unit Exchange Spares

Schedule No. A / 3C Prices for Mandatory / Contract Spares & Tools

Schedule No. A / 3D Prices for Annual Comprehensive Maintenance Charges for 3 years beyond Defect Liability Period.

Schedule No. A / 3E Prices for the unconditional withdrawal of deviations, conditions, qualifications, etc. separately for each deviation, condition, qualification etc.

Schedule No. A / 3F Recommended Spare Parts for 3 years after whole of the works is taken over, with a unit price for each spare part.

Schedule No. A / 3G Recommended Spare Parts for 10 years after whole of the works is taken over, with a unit price for each spare part with rate of escalation per year over base year, if any.

Schedule No. A / 3H Recommended Spare Parts for 2 years during DLP with a unit price for each spare part (for reference only), Cost to be included in Schedule No. - A1

Schedule No. A / 7A Adjustment Price for addition of landing in the particular vertical rise of elevator

Schedule No. A / 7B Adjustment Price for Providing Regenerative Braking System with VVVF Drive.

Schedule No. A / 7C Adjustment Price for “Through Door Arrangement Elevators

Schedule No. A / 7D Additional Price for “Floating – Pit / Hanging Pit” Elevators.


Schedule No. A / 7F Adjustment of Price for change of Car Rear Panel from Stainless Steel to Glass

Schedule No. A / 7G Adjustment of Price for Conversion from 13 Passenger Elevator to 26 Passenger Elevator

and For Part – B :-


Schedule No. B / 2A O&M Documentation, Transfer of Technology and all other
obligations as per Tender Documents.

Schedule No. B / 2B  Training of Employer’s Staff
Schedule No. B / 3A  Price for recommended Consumable Spares.
Schedule No. B / 3B  Price for Unit Exchange Spares
Schedule No. B / 3C  Prices for Mandatory/ Contract Spares & Tools
Schedule No. B4  Prices for Annual Comprehensive Maintenance Charges for 3 years beyond Defect Liability Period.
Schedule No. B5  Prices for the unconditional withdrawal of deviations, conditions, qualifications, etc. separately for each deviation, condition, qualification etc.
Schedule No. B / 6A  Recommended Spare Parts for 3 years after whole of the works is taken over, with a unit price for each spare part.
Schedule No. B / 6B  Recommended Spare Parts for 10 years after whole of the works is taken over, with a unit price for each spare part with rate of escalation per year over base year , if any.
Schedule No. B / 6C  Recommended Spare Parts for 2 years during DLP with a unit price for each spare part (for reference only), Cost to be included in Schedule No.- B1
Schedule No. B / 7A  Adjustment Price for provision of one intermediate support for the escalator in the rise band above 9.5 meter.
Schedule No. B / 7B  Unit Price for the provision of Stainless Steel decking extension.

2. The Schedules do 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, or prices shall be subject to adjustment in accordance with the corresponding Appendix (Price Adjustment) to the Contract Agreement.

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.
1. GENERAL REQUIREMENTS

1.1 The Bidder’s attention is drawn to the General Conditions of Contract, Special Conditions of Contract and Employer’s Requirements. This Preamble will serve as a definitive guide to the terms of payment.

The Bidder shall note that this is a fixed priced contract

1.2 This Contract is a Design, Manufacture, Supply, Installation, Testing and Commissioning (including Integrated Testing and Commissioning) and maintenance for elevators during 2 (Two) years Defect Liability Period for the Jaipur Metro Rail Project, including but not limited to:

- Plans and programmes, test procedures, interface co-ordination meetings and documents; drawings, design calculations, and schedules safety, and quality plans, etc;
- offshore manufacture/procurement; operation of quality assurance programme at places of manufacture; carrying out of type tests, prototype tests, factory acceptance tests, tests before shipment; and the associated provision of necessary test equipment, tools and materials; inspection, packing, crating, storage and transit to Port of entry India;
- manufacture / procurement in India; operation of quality assurance programme at places of manufacture; carrying out of type tests, prototype tests, factory acceptance tests, tests before shipment; and the associated provision of necessary test equipment, tools and materials; inspection, packing, crating, Port Handling and Clearance for offshore products, including temporary storage;
- loading and transportation of imported and ex-works India to approved storage in Jaipur or any other part of Rajasthan;
- installation / erection (including provision of temporary services as required) and mounting all in accordance with the specifications, erection, aligning, fasteners and securing devices, adjusting as necessary, installation of power and monitoring devices;
- testing and putting to work of all plant and equipment, sub-systems, and systems, testing, retesting, fault finding, adjustments and reworking as necessary, submittal of all test reports;
- attendance upon statutory authorities inspections and tests, completion of all modifications to meet authorities approval and arranging approval from such authorities;
- maintenance of Machine Room Less elevator by the Contractor during the specified period.
- inspection and maintenance of installed plant and equipment;
- O&M Documentation, Transfer of Technology and other obligations;
- Operation, Maintenance and Spare Parts management, Manuals, including preparation;
- As-Built Drawings including preparation, submission, all subsequent revisions, changes required and re-submittals as necessary;
- Validation of RAM data as per the actual performance obtained during DLP as per employers requirement.
- supplying all tools, special tools, and special test instruments and equipment;
• training of Employer’s Staff in different disciplines overseas and in India

1.3 **Taxes, Levies, Duties, Cess, etc.**

Refer clause no-6 of SCC

Both Contract will Contain a cross-fall breach clause specifying that breach of one contract will constitute breach of the other.

The form of Contract agreement shall be as per the format provided in Contract Form (Section 9) of this Contract.

1.4 **Following Corridors / Sections are covered under this Package:-**

Corridor:- CHAND POLE to BADI CHOPAR

1.5 **Units and Currency**

The Bidder shall fill in each column with unit rate or lump sum, whichever the case may be, for each statement item of the various Statements, provided that he should consider it a reimbursable item, on the basis of the Tender Documents and pre-tender meeting and site visits.

The price shall be quoted in INR and / OR any fully convertible currency of up to three foreign currencies:

i) Plant, Equipment, spare parts & Tools to be supplied from abroad shall be quoted in any fully convertible currency of up to three foreign currencies:

ii) Plant, Equipment, Spare Parts & Tools to be supplied from within India shall be quoted in Indian Rupees.

iii) Port handling, Port clearance, local transportation, insurance and other local costs incidental to the delivery of plant and equipment shall be quoted in Indian Rupees.

iv) Installation and maintenance services, provision of Operation and Maintenance manuals, Training, Transfer of Technology shall be quoted in INR (Indian Rupees) and /Or any fully convertible currency of up to three foreign currencies:

1.6 **Rates and Sums to be for Complete Work**

Bidders shall be deemed to have read the Employer’s Requirements and other parts of the Tender Documents to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The Statements of Prices do not describe the Works completely in all respects and reference must be made to the Conditions of Contract and the Employer’s Requirements on the detailed scope. No claim shall be considered in respect of any omission or alleged omission in the Statement of Prices of any cost required to bring the Works to completion.

Notwithstanding any limits that may be implied by wording of the individual items and/or explanations in the Preamble, the rates and sums, which the Bidder enters in the Statement of Prices, shall be for the work finished complete in every respect.

The Bidder shall be deemed to have taken full account of all requirements, liabilities, obligations and risks, whether expressed or implied, and to have priced the items accordingly. The items in the Statement of Prices are the only items against which payment will be made. The cost of any item of work not specifically described in the Statement of Prices but required for the execution of the Contract shall be allowed for in the unit rates for the items in the Statement of Prices. The entered rates and prices shall be deemed to be inclusive of labour, material, equipment, overheads, profits and all other direct and incidental costs of whatever nature and risks of every
kind necessary to design, manufacture, deliver, install, test and commission (including Integrated Testing and Commissioning) complete, and remedying any defects in the whole of the Works in accordance with the Contract and fulfilment of Bidder’s obligations under the Contract and shall bear a proper relationship to the cost of carrying out the work described.

In case of (Quantity) Variation order for Elevators as per SCC Clause – 32, for the Variation Elevators the Statement of prices -1 will be applicable as per Employer’s requirements and will be specified in the Variation Order.

1.7 Allowances in rates

Full allowance shall be made in the rates and sums against the various items in the Schedule of Prices and Quantities for all costs involved in performing the Works except to the extent that work is specifically described and paid for in the Schedule of Prices. The list below is not exhaustive and the Bidders are expected to take all costs involved while quoting the rates that will not be subject to variation on any account.

i) all setting out and survey work;
ii) payment of all patent rights and royalties;
iii) safety precautions and all measures to prevent damage and suppress fire and other hazards;
iv) the protection and safety of JMRC trains and services;
v) supplying, maintaining and removing on completion the Contractor’s own accommodation, offices, depots, stores, workshops, transport, welfare services and other facilities including telephones and facsimile machines and all charges in connection therewith;
vi) the supply, inspection and testing of materials and of the Works as specified including the provision and use of equipment and arrangements for the “Engineer” and others;

vii) maintaining public access within operating stations;
viii) providing transporting to the Site, setting to work, operating (including all fuel and consumable stores), maintaining and removing from the Site upon completion all Construction Plant and Contractor’s Equipment necessary for the execution of the Works and including the cost of all tests and other requirements in respect of such plant and equipment;
ix) working adjacent to or across existing services and installations;
x) complying with the requirements of the Employer in regard to Safety and Health, and Quality Assurance;
xii) co-ordination and interference to the Works by the works of Designated Contractors and others employed by employer being legitimate users of the facilities on or in the vicinity of the Site;
xiii) remedying of defects and shrinkage, and works of amendment, reconstruction, replacement of other faults, fair wear and tear excepted, during Defects Liability Periods;
xiv) insurance, including all risks in supply, erection, storage, transit, third party,
Workmen’s compensation and the like;
xv) tools and test equipment required for all tests prior and after delivery;
xvi) Licence (if required) from concern state government.
xvii) Clearance from Concern State Fire Services

1.8 Unit Rates

Bidder shall note that prices shall be quoted against each item in the statement of price even if Quantity indicated is NIL against them. The quoted price against these items should be comparable with the rates quoted against the items where quantities have been specified. These rates will not be made part of the evaluation process. The final accepted prices of these items can be utilized by the Employer at the time of Variation (if required) even if the present Quantity is NIL.

Items against which, no rate or sum is entered by the Bidder, whether quantities are stated or not, shall be regarded as covered by other rates in the Statement of Prices.

1.9 Tender Pricing

(a) Bidders shall quote for the entire work on a “single responsibility” basis such that the total tender price covers all Contractor’s obligations mentioned in or to be reasonably inferred from the Tender Documents in respect of the design, manufacture, including procurement and subcontracting (if any), delivery, construction, installation, completion of the whole of Works. This includes all requirements under the Contractor’s responsibilities for testing and commissioning of the works including integrated testing and commissioning, the acquisition of all permits, approvals and licenses, etc.; the operation, maintenance and training services and such other items and services as are specified in the tender documents. 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. The Bidder shall take regard of the actual site conditions and the items entered in the various Schedules. The Bidder shall price his tender accordingly and the unit prices entered against a line item shall be the full and only price paid for all work performed against that item except as described in the Tender Documents.

(b) Bidders are required to quote the price for the commercial, contractual and technical obligations outlined in the tender documents. If a Bidder wishes to make deviations or wants to put conditions, qualifications, etc., such deviations, conditions, qualifications etc. shall be listed in a Schedule No. A5 forming part of BOQ. The Bidder shall also provide in this Schedule the additional price, if any, for the unconditional withdrawal of the deviations, qualifications, conditions etc. This additional price for the unconditional withdrawal has to be given separately for each deviation, qualification, condition, etc. Any deviation / qualification / condition that is not priced for unconditional withdrawal shall not be considered.

The Bidder shall price the Schedules of Prices in Indian Rupees, and US Dollar / Euro / any other freely convertible foreign Currency or any combination of these currencies

2. CONTENTS OF THE SCHEDULE OF PRICES

2.1. The Pricing Document for Base tender is divided into separate Schedules of Prices as follows:
<table>
<thead>
<tr>
<th>Schedule No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A / 2A</td>
<td>O&amp;M Documentation, Transfer of Technology and all other obligations as0020per Tender Documents.</td>
</tr>
<tr>
<td>A / 2B</td>
<td>Training of Employer’s Staff</td>
</tr>
<tr>
<td>A / 3A</td>
<td>Price for recommended Consumable Spares.</td>
</tr>
<tr>
<td>A / 3B</td>
<td>Price for Unit Exchange Spares</td>
</tr>
<tr>
<td>A / 3C</td>
<td>Prices for Mandatory / Contract Spares &amp; Tools</td>
</tr>
<tr>
<td>A / 3A</td>
<td>Price for Annual Comprehensive Maintenance Charges for 3 years beyond Defect Liability Period.</td>
</tr>
<tr>
<td>A / 5</td>
<td>Prices for the unconditional withdrawal of deviations, conditions, qualifications, etc. separately for each deviation, condition, qualification etc.</td>
</tr>
<tr>
<td>A / 6A</td>
<td>Recommended Spare Parts for 3 years after whole of the works is taken over, with a unit price for each spare part.</td>
</tr>
<tr>
<td>A / 6B</td>
<td>Recommended Spare Parts for 10 years after whole of the works is taken over, with a unit price for each spare part with rate of escalation per year over base year , if any.</td>
</tr>
<tr>
<td>A / 6C</td>
<td>Recommended Spare Parts for 2 years during DLP with a unit price for each spare part (for reference only), cost to be included in Schedule No. - A1</td>
</tr>
<tr>
<td>A / 7A</td>
<td>Adjustment Price for addition of landing in the particular vertical rise of elevator</td>
</tr>
<tr>
<td>A / 7B</td>
<td>Adjustment Price for Providing Regenerative Braking System with VVVF Drive.</td>
</tr>
<tr>
<td>A / 7C</td>
<td>Adjustment Price for “Through Door Arrangement Elevators</td>
</tr>
<tr>
<td>A / 7D</td>
<td>Additional Price for “Floating – Pit / Hanging Pit” Elevators.</td>
</tr>
<tr>
<td>A / 7E</td>
<td>Adjustment Price for in using Roller Guide Shoes in place of Sliding Guide Shoes.</td>
</tr>
<tr>
<td>A / 7F</td>
<td>Adjustment of Price for change of Car Rear Panel from Stainless Steel to Glass</td>
</tr>
<tr>
<td>A / 7G</td>
<td>Adjustment of Price for Conversion from 13 Passenger Elevator to 26 Passenger Elevator</td>
</tr>
</tbody>
</table>

2.2. The Schedules do not generally give a full description of the plant and equipment to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer’s Requirements to ascertain the full scope of requirements included in each item prior to filling in the rates and prices. The Contractor shall carry out all the work necessary to meet the Employer’s Requirements.

2.3. If Bidders are unclear of any item, they shall seek clarification in accordance with the Instructions to Bidders prior to submitting their tender.

2.4. **Contents of the Schedule of Prices**

2.4.1. **Schedule No. A1:** Design, Manufacture, Supply, Installation Services including integrated
testing, commissioning of Heavy Duty Machine Room Less Elevator and Maintenance During 02 Years DLP.

This Schedule shall cover all work necessary to include but not be limited to:

preparation, submission, and all subsequent revisions, changes required and re-submittals as required by the Employer's Requirements until “Notice of No Objection” or “Notice of No Objection subject to ....” has been issued by the “Engineer” for:

(A) **Design, Manufacture and Supply of elevator.**

- documents, drawings, design calculations;
- Submission of RAM Report Based on the Design Calculation. (RAM Report is to be validated as per employers requirement)
- establishing and carrying out of manufacture/procurement;
- operation of quality assurance programme at places of manufacture;
- conduct type tests, prototype tests, factory acceptance tests, tests before shipment;
- inspection, packing, crating, insurance, shipping to Port of entry India, including insurances, bank guarantees, and transfer from factory to port and all storage costs at factory and port;

(B) **Port Handling, Port Clearance, Local Transportation to Jaipur / Rajasthan, Insurance, Storage in approved Warehousing.**

- Heavy Duty machine Room Less Elevator with all ancillary equipment and components including spares and tools to be supplied from outside India;
  - Port Handling;
  - Clearance of imports;
  - Temporary storage.
- Heavy Duty machine Room Less Elevator with all ancillary equipment and components including spares and tools to be supplied;
  - loading and transportation to Jaipur of imported plant and equipment;
  - Loading and transportation of indigenously manufactured plant and equipment, ex-works to Jaipur / Rajasthan.
- unloading and storage of all Heavy Duty machine Room Less Elevator together with all ancillary equipment including mandatory spares and tools to be supplied for each Section in secure warehousing under cover which meets the requirements of the “Engineer”.
- loading at storage in Jaipur / Rajasthan or any other locations and transportation to site, off-loading and moving to point of installation;

(C) **Installation Services, Testing, Commissioning including integrated testing and commissioning**

- preparation for installation/erection (including provision of temporary services as required)
  - mounting all in accordance with the Employer’s Requirements;
  - erection, aligning;
  - fasteners and securing devices, adjusting as necessary;
  - installation of power and monitoring devices;
  - provision and use of civil and building materials and products
making good and clearing the location on completion
- testing and putting to work of all plant and equipment, sub-systems, and systems;
  - integrated testing and commissioning plan;
  - tools, instruments, tackles and documents required;
  - attendance upon the “Engineer”;
  - testing, retesting, fault finding, adjustments and reworking as necessary;
  - submittal of all test reports and other documents as required by the “Engineer”
  - under the Contract;
- attendance upon statutory authorities inspections and tests, completion of all modifications to meet authorities approval and arranging approval from such authorities;

(D) Maintenance of installed Heavy Duty machine Room Less Elevator for each Section, during the Specified Defect Liability Periods.
- This item shall cover all work necessary to include but not be limited to:
  - employment of approved staff;
  - replacement as required by the Employer;
- inspection of installed plant and equipment relating to each elevator installed on each Section;
  - transport, labour, contractor’s equipment;
  - submittal of inspection documents as required
- maintenance of installed plant and equipment relating to each elevator installed on each Section;
  - testing, retesting, fault finding, adjustments and reworking as necessary;
  - replacement parts, materials, consumables;
- Validation of RAM report submitted during design approval stage based on actual performance obtained during the DLP in compliance with the employers requirement.
- DLP spares and Tools.

2.4.2. Schedule of Prices No. A / 2A

O&M Documentation, As-Built Drawings, Transfer of Technology and all other items required by the Tender Documents
- This item shall cover all work necessary to include but not be limited to:
  - Operation, Maintenance and Spare Parts Manuals
  - preparation, submission, and all subsequent revisions, changes as required by the “Engineer”;
- As-Built Drawings
  - preparation, submission, all subsequent revisions, changes required and re-submittals as necessary until accepted by the “Engineer”;
- Transfer of Technology to designated recipients;

2.4.3. Schedule No. A / 2B

Training of Employer’s Staff in different disciplines overseas and in India in accordance with the Employer’s Requirements.
- This item shall cover all work necessary to include but not be limited to:
  - preparation, submittal and all subsequent revisions as required by the “Engineer”
of:

- training manuals, curricula, etc.,
- provision and maintenance of training facilities;
- employment of approved training staff;

2.4.4. **Schedule No. A / 3A**: Price for Recommended Consumable Spares

2.4.5. **Schedule No. A / 3B**: Price for Unit Exchange Spares

2.4.6. **Schedule No. A / 3C**: Prices for Mandatory / Contract Spares & Tools

2.4.7. **Schedule No. A4**: Prices for Comprehensive Annual Maintenance Charges for 3 years beyond Defect Liability Period

2.4.8. **Schedule No. A5**: Prices for unqualified withdrawal of conditions, qualifications, deviations, etc. separately for each condition, qualification, deviation, etc.

   The Bidder shall item wise the price for the unqualified withdrawal of any condition, qualification, deviation, etc. he may have included in his Financial Package. The Bidder shall clearly show the Line Number, the Section Number and the Schedule Number that is affected by the price of withdrawal.

2.4.9. **Schedule No. A / 6A**: Recommended Spare for 3 years beyond DLP

   Recommended Spare Parts for 3 years after whole of the works is taken over, with a unit price for each spare part

   - The supply of spare parts for the equipment, sub-systems, and systems provided under the Contract over a three year period after issue of the Performance Certificate.
   - All spare parts, tools or equipment, considered necessary by the Contractor;
   - Fully priced schedule of unit rates;

2.4.10. **Schedule No. A / 6B**: Recommended Spare for 10 years beyond DLP

   Recommended Spare Parts for 10 years after whole of the works is taken over, with a unit price for each spare part with rate of escalation per year over base year, if any.

2.4.11. **Schedule No. A / 6C**: Commissioning and DLP spares

   - Spare Parts for 2 years during DLP with a unit price for each spare part (for reference purpose only). The Cost is to be included in Schedule No. - A1, by the Bidder and hence the amount quoted here will not be added separately.

2.4.12. **Schedule No. A / 7A**: Adjustment Price for addition of landing in the particular vertical

2.4.13. **Schedule No. A / 7B**: Adjustment Price for Providing Regenerative Braking System with VVVF Drive

2.4.14. **Schedule No. A / 7C**: Adjustment Price for “Through Door Arrangement Elevators

2.4.15. **Schedule No. A / 7D**: Additional Price for “Floating – Pit / Hanging Pit” Elevators.


2.4.17. **Schedule No. A / 7F**: Adjustment of Price for change of Car Rear Panel from Stainless Steel to Glass

2.4.18. **Schedule No. A / 7G**: Adjustment of Price for Conversion from 13 Passenger Elevator to 26 Passenger Elevator
The Bidder shall note that the Employer will take no liability for anything the Bidder states in this Schedule, and this document is completed entirely at the risk and responsibility of the Bidder.

(c) **TERMS OF PAYMENT**

3.1 In accordance with the provisions of SCC Clause 7 of the Employer will pay the Contractor in the following manner and at the following times on the basis of the Prices given in the Schedule of Prices. Retention money will be deducted from the payments due in accordance with the Conditions of Contract.

3.2 Payments will be made to the Contractor in the currency or currencies indicated for each respective Schedule item. Notwithstanding anything stated herein the “Engineer” retains the right to withhold payment on any pay item due for payment when the service to be performed is not performed, or is not carried out to the “Engineer’s” satisfaction.

3.3 **Schedule of Prices No. A1:- Design, Manufacture, Supply Installation Testing and Commissioning of Heavy Duty machine Room Less Elevator**

The amount entered shall be the total price to be paid for the design, manufacture, Supply Installation Testing and Commissioning of Elevators, including Integrated Testing and Commissioning and/or procurement of all Elevators together with all ancillary equipment and components to be supplied.

The stage payment under this Schedule will be released as per the following milestones.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Milestone No</th>
<th>Description</th>
<th>%age of Unit Rate*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Milestone No -1</td>
<td>Design, Manufacturing and Supply of the Elevator</td>
<td>70%</td>
</tr>
<tr>
<td>2</td>
<td>Milestone No -2</td>
<td>Port Handling, Port Clearance, Local Transportation, etc.</td>
<td>10%</td>
</tr>
<tr>
<td>3</td>
<td>Milestone No -3</td>
<td>Installation, Testing and Commissioning</td>
<td>10%</td>
</tr>
<tr>
<td>4</td>
<td>Milestone No -4</td>
<td>Issue of Taking over Certificate</td>
<td>5%</td>
</tr>
<tr>
<td>5</td>
<td>Milestone No -5</td>
<td>Maintenance during Defect Liability Period</td>
<td>5%#</td>
</tr>
</tbody>
</table>

# As explained above, Balance amount will be released in the last payment of Milestone – 5.

A. 70% of Schedule of Price-A1(Milestone-1) of the price for each elevator shall be payable when

(a) a “Notice of No Objection” or “Notice of No Objection subject to …..” has been issued by the “Engineer” in respect of the design and other documents (RAM report etc) for each elevator. Compensation shall include for the preparation, submission, and all subsequent revisions, changes required and re-submittals as necessary during the design phase as required by the “Engineer” for documents, drawings, design calculations, test procedures.

(b) after delivery to the “Engineer” of evidence of despatch documents in favour of the Employer and delivery of:

- Bill of Lading;
- Certificate of type tests;
- Certification of Factory Acceptance tests;
- Provision of Safe Custody Bank Guarantee (Required only if request for milestone certificate is submitted to JMRC before material reaches on - shore, else Indemnity Bond is sufficient);
- Proof of Marine insurance;
for each shipment or consignment in case of off-shore supply

OR

In case of Ex-Works India, after evidence of loading on to the mode of transport to be used to convey the plant and equipment from the works to storage in Jaipur or any part of Rajasthan and upon endorsement of the dispatch documents in favour of the Employer and delivery to the “Engineer” of:

- Proof of Dispatch;
- Certificate of Type Tests;
- Certification of Factory Acceptance tests;
- Provision of Indemnity Bond;
- Proof of Inland Transport Insurance;

for each shipment or consignment.

Compensation under Milestone -1 shall include for the establishing and carrying out of manufacture/procurement; operation of quality assurance programme at places of manufacture; carrying out of type tests, prototype tests, factory acceptance tests, tests before shipment; inspection, packing, crating, shipping to Port of entry India, including insurances, bank guarantees, and transfer from offshore factory to port and all storage costs at factory and port etc.

B. 10% of Schedule of Price - A1 (Milestone-2) of the price for each elevator shall be payable for Port Handling, Port Clearance, Local Transportation to Jaipur or any part of Rajasthan, Storage in approved Warehousing, loading at storage points or warehouses and transportation to site, offloading and moving to the point of installation.

Payment shall be made for each elevator for delivery to point of installation in Jaipur or any part of Rajasthan on inspection and acceptance by the “Engineer”.

Compensation under Milestone -2 shall include for the all custom clearance activities including all formalities, liaising with the custom authority / custom house agents as well as transportation of goods to the site in Jaipur or any part of Rajasthan.

C. 10% of Schedule of Price - A1 (Milestone-3) of the price for each elevator shall be paid for Installation Services, Testing, Commissioning including integrated testing and commissioning.

D. 5% of Schedule of Price - A1 (Milestone-4) of the price for each elevator shall be paid after issue of taking over certificate by the Employer.

5% of Schedule of Price - A1 (Milestone-5) of the price for each elevator shall be paid for Maintenance of elevator during DLP including DLP spares and tools.

The amount shall be the total price to be paid for Inspection and Maintenance of each elevator in each Section after Taking-Over by the Employer, during the specified Periods.

The amount shall be full compensation for all direct and incidental costs relating to the Works in this Schedule, for each Section for a period of two years from the date of the Taking-Over Certificate for all the elevators in that Section.

Payment shall be made on a quarterly basis upon receipt of inspection and maintenance reports endorsed by the Employer to the performance claimed by the Contractor.

Final payment and Performance certificate will be issued upon only after compliance of employers requirement.

3.4 Schedule of Prices No. A / 2A:- O&M Documentation, Transfer of Technology and all other items required by the Tender Documents.
The amount entered shall be the total price to be paid for O&M Documentation, Transfer of Technology and all other items required by the Tender Documents.

Shall be full compensation for all direct and incidental costs relating to the Works in ScheduleA / 2A: Payment shall be for:

- Operation, Maintenance Manuals, including preparation, submission, and all subsequent revisions, changes as required by the “Engineer”;
- As-Built Drawings including preparation, submission, all subsequent revisions, changes required and re-submittals as necessary until accepted by the “Engineer”;
- Interactive Training Manuals including preparation, submission, all subsequent revisions, changes required and re-submittals as necessary until accepted by the “Engineer”;
- Transfer of Technology to designated recipients;

On the basis of:

Items1:- 100% payment on delivery to and acceptance by the Employer of the Manuals and as built drawings for the relevant section.

Items 2 :- 100% payment on evidence to the “Engineer” of completion of the transfer of technology for the relevant section.

No payment shall be made for all other requirements set out in the Tender Documents not expressly stated above, and shall be deemed to be included in other prices.

3.5 Schedule No. A / 2B:- Training of Employer’s Staff

The amount entered shall be the total price to be paid for Training of Employer’s Staff in different disciplines overseas and in India in accordance with the Employer’s Requirements.

Shall be full compensation for all direct and incidental costs relating to the Works in ScheduleA / 2B: Payment shall be for: 

- all direct and incidental costs for training of Employer’s staff including the preparation, submittal and all subsequent revisions as required by the “Engineer” of training manuals, curricula, etc., provision and maintenance of training facilities; employment of approved training staff, and all associated costs and travel costs;
- Troubleshooting and Maintenance Training of approved Employer staff Payment shall be made on the basis that 100% payment shall be made for the items included in this Schedule when completed to the satisfaction of the “Engineer”.

3.6 Schedule No. A / 3A, Schedule No. A / 3B & Schedule No. A / 3C:- Supply of Spares & Tools

100% payment on delivery to and acceptance by the Employer of the Spares & Tools as per employers requirement.
Bill of Quantity

Tender Total (Part – A)

Schedules of Prices A1 to A7 inclusive
**DESIGN, MANUFACTURE, SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF HEAVY DUTY MACHINE ROOM LESS ELEVATOR FOR JAIPUR METRO RAIL PROJECT (Part – A)**

(THIS DOCUMENT IS TO BE PREPARED AND COMPLETED BY THE BIDDER)

## TENDER TOTAL SUMMARY

<table>
<thead>
<tr>
<th>Schedule No</th>
<th>Description</th>
<th>INR</th>
<th>*FC</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Design, Manufacture Supply Installation, Testing, and Commissioning including Maintenance of Heavy Duty machine Room Less Elevator during DLP Period</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A / 2A</td>
<td>O &amp; M Documentation, Transfer of Technology and all other items as per Tender Documents.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A / 2B</td>
<td>Training of Employer’s Staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A / 3A</td>
<td>Price for recommended Consumable Spares</td>
<td></td>
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<td>Price for Unit Exchange Spares</td>
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<td></td>
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<tr>
<td>A / 3C</td>
<td>Prices for Mandatory/ Contract Spares &amp; Tools</td>
<td></td>
<td></td>
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<tr>
<td>A4</td>
<td>Prices for Annual Comprehensive Maintenance Charges for 3 years beyond Defect Liability Period</td>
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<td>Adjustment Price for “Through Door Arrangement Elevators”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A / 7D</td>
<td>Additional Price for “Floating – Pit / Hanging Pit” Elevators.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TENDER TOTAL**

In words: INR ________________________________ and *FC __________________________

*Please Specify Currency

Witness: Signature : …………………………………

Signature  …………………………………  Date: ………………………………………

Date: …………………………………  Name: ………………………………………

Name: …………………………………  For and on behalf of: ………………………

Address: …………………………………  Address:……………………………………

Witness: Signature : …………………………………

Signature  …………………………………  Date: ………………………………………

Date: …………………………………  Name: ………………………………………

Name: …………………………………  For and on behalf of: ………………………

Address: …………………………………  Address:……………………………………
## Schedule of Prices

### Schedule No. A1

Design, Manufacture, Supply, Installation Services including Integrated Testing, Commissioning of Heavy Duty Machine Room Less Elevator and Maintenance During 02 Years Defects Liability Period

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description (Height of Travel and Band range of vertical rise)</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Base Price</th>
<th>Breakup of Taxes &amp; Duties</th>
<th>Total Unit Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CD</td>
<td>ED</td>
<td>other</td>
</tr>
<tr>
<td>1.</td>
<td>3.0 metre (2.5 &gt; h ≤ 3.5)</td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>13 Passenger, Stainless Steel Door</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13 Passenger, Glass Door (Landing + Car)</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4.0 metre (3.5 &gt; h ≤ 4.5)</td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>13 Passenger, Stainless Steel Door</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13 Passenger, Glass Door (Landing + Car)</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>5.0 metre (4.5 &gt; h ≤ 5.5)</td>
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<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>13 Passenger, Stainless Steel Door</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13 Passenger, Glass Door (Landing + Car)</td>
<td>0</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>6.0 metre (5.5 &gt; h ≤ 6.5)</td>
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<td></td>
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<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>13 Passenger, Stainless Steel Door</td>
<td>0</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>13 Passenger, Glass Door (Landing + Car)</td>
<td>0</td>
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<tr>
<td>5</td>
<td>7.0 metre (6.5 &gt; h ≤ 7.5)</td>
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<td></td>
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<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>13 Passenger, Stainless Steel Door</td>
<td>0</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13 Passenger, Glass Door (Landing + Car)</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>8.0 metre (7.5 &gt; h ≤ 8.5)</td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>13 Passenger, Stainless Steel Door</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13 Passenger, Glass Door (Landing + Car)</td>
<td>0</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>7</td>
<td>9.0 metre (8.5 &gt; h ≤ 9.5)</td>
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<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
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<tr>
<td></td>
<td>13 Passenger, Stainless Steel Door</td>
<td>0</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>13 Passenger, Glass Door (Landing + Car)</td>
<td>0</td>
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<tr>
<td>8</td>
<td>10.0 metre (9.5 &gt; h ≤ 10.5)</td>
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<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>13 Passenger, Stainless Steel Door</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13 Passenger, Glass Door (Landing + Car)</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>9</td>
<td>11.0 metre (10.5 &gt; h ≤ 11.5)</td>
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<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>13 Passenger, Stainless Steel Door</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>13 Passenger, Glass Door (Landing + Car)</td>
<td>0</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Height Range</td>
<td>13 Passenger, Stainless Steel Door</td>
<td>13 Passenger, Glass Door (Landing + Car)</td>
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<td></td>
</tr>
<tr>
<td>12.0 metre (11.5 &gt; h ≤ 12.5)</td>
<td>13 Passenger, Stainless Steel Door</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.0 metre (12.5 &gt; h ≤ 13.5)</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.0 metre (13.5 &gt; h ≤ 14.5)</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.0 metre (14.5 &gt; h ≤ 15.5)</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.0 metre (15.5 &gt; h ≤ 16.5)</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.0 metre (16.5 &gt; h ≤ 17.5)</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.0 metre (17.5 &gt; h ≤ 18.5)</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.0 metre (18.5 &gt; h ≤ 19.5)</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.0 metre (19.5 &gt; h ≤ 20.5)</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.0 metre (20.5 &gt; h ≤ 21.5)</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.0 metre (21.5 &gt; h ≤ 22.5)</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total No Elevators**

6

* Please Specify Currency.
Note:-

1) Bidder shall quote prices against each item even if Quantity indicated is NIL.

2) Please note that the lifts with rise band 18.0 meters or more, shall be with speed 1.5 meters / second and those below it will be with speed 1.0 meters / second

3) All above elevators are of two landings only. The rate for dummy or emergency landing (if needed according to relevant Standards) shall be included in the above rates.

4) In case more than TWO landings (other than dummy or emergency landing) are applicable for a particular rise of elevator, then rate of additional landing (s) will be payable as per the rate quoted in Schedule of Price A / 7A.

5) The above rates also includes Port handling, Port clearance, Local Transportation, insurance and other incidental Services..

6) The above price shall be inclusive of maintenance during two years Defect Liability Period.

7) The payment shall be made as per the milestone achieved

8) The prices offered shall include the cost of minor adjustments in the Elevators design, necessitated as per the actual site data conditions.

9) Taxes shall be included during evaluation, bidder may further bifurcate column F in different applicable Taxes.

10) The Bidders should enclose the details of items to be imported
Schedule of Prices

Schedule No. A / 2A

O&M Documentation, Transfer of Technology and all other obligations as per Tender Documents.

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Lump Sum Base Price</th>
<th>Breakup of Taxes &amp; Duties</th>
<th>Total Base Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CD</td>
<td>ED</td>
<td>Other</td>
<td>Service Tax</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(INR)</td>
<td>(*FC)</td>
<td>(INR)</td>
<td>(INR)</td>
</tr>
<tr>
<td>1</td>
<td>O&amp;M Documentation, As-built drawings, etc. (Five Sets for Each Corridor)</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>2</td>
<td>Transfer of Technology Other Obligations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Total (Carried Forward To Tender Total Summary))</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Please Specify Currency

NOTE:- Taxes shall be included during evaluation. Bidder may further bifurcate column “F” in different applicable Taxes.
## Schedule of Prices

**Schedule No. A / 2B**

**Training of Employer’s Staff**

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Lump Sum Base Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total base Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CD</td>
<td>ED</td>
<td>other</td>
<td>Service Tax</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(INR)</td>
<td>(*FC)</td>
<td>(INR)</td>
<td>(INR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>1</td>
<td>Training of Employer’s Staff. Trainers Man days (as per clause 19.3 of TS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>*Submission of Training manuals, Interactive CD etc. to meet Employer’s Requirement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Total <em>(carried forward to Tender Total Summary)</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Please Specify Currency*

**NOTE:-**

1) Taxes shall be included during evaluation. Bidder may further bifurcate column "E" in different applicable Taxes.

2) The travel, boarding and lodging expenses for the training of Employer’s staff shall be borne by the Employer.

3) The training manual, Interactive CD etc. shall be submitted five sets (5 sets).
## Schedule of Prices
(Refer Appendix E of the Technical Specification)

### Schedule No. A / 3A
Price of Recommended Consumable Spares

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Base Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total Unit Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CD</td>
<td>ED</td>
<td>Other</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td>H=B+D+E+F+G</td>
</tr>
</tbody>
</table>

**TOTAL (Carried Forward To Tender Total)**

*Please Specify Currency.*

**Note:**

1) List is to be provided by the bidder in line with the Clause 1.1.1 of Appendix -E (spares policy) of TS.
2) Bidder needs to submit the un-priced list in the Schedule of Price - A / 3A of True copy of the BOQ (with price left blank) with the technical package.
3) Priced list shall be provided in Schedule of Price - A / 3A of Bill of Quantity (Section IV) with the financial package only.
4) Total quoted Amount of this Schedule will be considered for tender evaluation while assessing the L-1 bidder.
5) Taxes shall be included during evaluation. Bidder may further bifurcate column “F” in different applicable Taxes.
<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Quantity</th>
<th>Country of Origin</th>
<th>Unit Base Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CD</td>
<td>ED</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>1</td>
<td>Complete Motor Assembly</td>
<td>1 No. of each category</td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>2</td>
<td>Complete Door Assembly</td>
<td>1 No. of each category</td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>3</td>
<td>MAP</td>
<td>2</td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>4</td>
<td>SEP</td>
<td>2</td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>5</td>
<td>Guide Rail</td>
<td>2 Set</td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>6</td>
<td>V3F drive assembly with Regenerative braking</td>
<td>1 No.</td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>7</td>
<td>V3F drive assembly without Regenerative braking</td>
<td>1 No.</td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>TOTAL (Carried Forward to Tender Total)</td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
</tbody>
</table>

* Please Specify Currency.

**Note:-**

1) List is to be provided by the bidder in line with the clause 1.1.2 of Appendix -E (spares policy) of TS.
2) Bidder need to submit the un-priced list in the Schedule of Price - A / 3B of True copy of the BOQ (with price left blank) with the technical package.
3) Priced list shall be provided in Schedule of Price - A / 3B of Bill of Quantity (Section VI) with the financial package only.
4) Total quoted Amount of this Schedule will be considered for tender evaluation while assessing the L-1 bidder.
5) Taxes shall be included during evaluation. Bidder may further bifurcate column "F" in different applicable Taxes.
## Schedule of Prices
(Refer Appendix E of the Technical Specification)

### Schedule No. A / 3C
Price of Mandatory Spare Parts and Tools

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Base Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total Unit Price</th>
<th>Total Amount</th>
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<tbody>
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<td>CD</td>
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<td>Other</td>
<td>Service Tax</td>
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</tbody>
</table>

H = B + D + E + F + G
I = H * A
J = C * A

TOTAL (carried forward to Tender Total)

* Please Specify Currency.

**Note:-**
1) List is to be provided by the bidder in line with the clause 1.1.4 of Appendix - E (spares policy) of TS.
2) For the detailed list refer Appendix E of Technical Specification.
3) The list is indicative and not exhaustive. The bidder may indicate substitute / alternative against the above listed items, any additional spares and tools in compliance to Chapter 13 of GS and Chapter 18 of TS, if required the same may be indicated by the Firm in their Technical Offer.
4) The Employer reserves the right to revise the items & the Quantity in the list based on the experience / performance during the Defect Liability Period, at No extra cost.
5) Bidder need to submit the un-priced list in the Schedule of Price - A / 3C of True copy of the BOQ (with price left blank) with the technical package.
6) Priced list shall be provided in Schedule of Price - A / 3C of Bill of Quantity (Section IV) with the financial package only.
7) Total quoted Amount of this Schedule will be considered for tender evaluation while assessing the L-1 bidder.
8) Taxes shall be included during evaluation. Bidder may further bifurcate column “F” in different applicable Taxes.
### Schedule of Prices

**Schedule No. A4**

**Prices for Annual Maintenance Charges for 3 years beyond Defect Liability Period.**

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit Base Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total Unit Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CD</td>
<td>ED</td>
<td>Service Tax</td>
</tr>
<tr>
<td></td>
<td>Elevators</td>
<td></td>
<td></td>
<td>(INR)</td>
<td>(INR)</td>
<td>(INR)</td>
</tr>
<tr>
<td>1</td>
<td>Annual Maintenance Charges for 03 Years beyond Defect Liability Period</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Year 1</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Year 2</td>
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<td></td>
<td>Year 3</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Total (Carried Forward to Tender Total)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Notes:**

1) Employer may award the Comprehensive AMC to the successful Bidder for 3 years beyond DLP at these rates.
2) The cost of spare parts required for maintenance during AMC period beyond DLP will be deemed to be inclusive in the prices for AMC indicated in this Schedule. Nothing extra will be paid for such spare parts.
3) This Schedule will be considered for tender evaluation while assessing the L-1 bidder.
4) Payment for AMC will be made on quarterly basis on completion of maintenance obligations by the Contractor.
5) Scope of maintenance work will be as per Chapter 17 of TS and Appendix G of TS (Maintenance Requirement).
6) Taxes shall be included during evaluation.
7) Service tax shall be inclusive in the above price.
8) Employer reserves the right to enter into a separate CAMC contract for further 15 Years, beyond 3 year CAMC, considering the Price quoted for Year-3 above as Po subject to Escalation / Price Adjustment based on IEEMA formula provided in Annexure-1 to Appendix G of TS.
9) This option of comprehensive annual maintenance contract will be exercised by Employer continuously (not intermittently) starting from 1st Year of DLP to above said Year - 3.
Dear Sir,

Our prices given in Schedules A1 to A7 are subject to the following deviations, conditions, qualifications etc. These deviations, conditions, qualifications etc. are exhaustive. Except for these deviations, conditions, qualifications etc., the entire work shall be performed as per the Tender Documents. We are also furnishing below the cost of unconditional withdrawal for the deviations, conditions, qualification, etc. proposed by us. We confirm that we shall withdraw the deviations, conditions, qualifications etc. at the cost of withdrawal indicated in this Schedule failing which our Tender may be cancelled and the Tender Guarantee forfeited.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Deviations/Conditions/Qualifications etc.</th>
<th>Cost of unconditional withdrawal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>INR</td>
</tr>
</tbody>
</table>

* Please Specify Currency.

(To be included in the Technical Package without Price and in financial package with Price)

Note:-

1. We hereby confirm that the pricing for unconditional withdrawn of above deviations 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. No additional Deviations/Conditions/Qualifications, etc has been included with Financial Offer. *(This note is to be included in case of Technical Package only and not in Financial Package)*

Date..................  (Signature) ........................................
Place ..............  (Printed Name) ........................................
               (Designation) ........................................
               (Common Seal) ........................................
Schedule of Prices
(Refer Appendix E of the Technical Specification)

Schedule No. A / 6A
Recommended Spare Parts for 3 years beyond Defect Liability Period

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Base Price on CIF bases</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(INR)</td>
<td>(*FC )</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
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</tbody>
</table>

TOTAL

* Please Specify Currency.

NOTE:-

1) Price shall be quoted on CIF bases, excluding Taxes and Duties.

2) List is to be provided by the contractor in line with the clause 1.1.5 of Appendix - E (spares policy) of TS.

3) The list is indicative and not exhaustive. The bidder may indicate substitute / alternative against the above listed items, any additional spares in compliance to Chapter 13 of GS and Chapter 18 of TS, if required the same may be indicated by the Firm in their Technical Offer.

4) Bidder need to submit the un-priced list in the Schedule of Price - A / 6A of True copy of the BOQ (with price left blank) with the technical package.

5) Priced list shall be provided in Schedule of Price - A / 6A of Bill of Quantity (Section IV) with the financial package only.

6) This Schedule will not be considered for tender evaluation while assessing the L-1 bidder.
**Schedule of Prices**  
(Refer Appendix E of the Technical Specification)

**Schedule No. A / 6B**  
Recommended Spare Parts for 10 years beyond Defect Liability Period

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Price at the Base Year......</th>
<th>Rate of Escalation per year over the base</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(INR)</td>
<td>(*FC )</td>
</tr>
</tbody>
</table>

**TOTAL**

* Please Specify Currency.

**NOTE :-**

1) List is to be provided by the contractor in line with the clause 1.1.6 of Appendix - E (spares policy) of TS.

2) The list is indicative and not exhaustive. The bidder may indicate substitute / alternative against the above listed items, any additional spares in compliance to Chapter 13 of GS and TS Clause 18.2.2, if required the same may be indicated by the Firm in their Technical Offer.

3) Bidder need to submit the un-priced list in the Schedule of Price - A / 6B of True copy of the BOQ (with price left blank) with the technical package.

4) Priced list shall be provided in Schedule of Price - A / 6B of Bill of Quantity (Section IV) with the financial package only.

5) This Schedule will not be considered for tender evaluation while assessing the L-1 bidder.
# Schedule of Prices

(Refer Appendix E of the Technical Specification)

**Schedule No. A 6 / C**

Recommended Spare Parts for 2 years during DLP with a unit price for each spare part

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Base Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total Unit Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CD</td>
<td>ED</td>
<td>Other</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td>H=B+ D+E+F+G</td>
</tr>
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<td></td>
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</tr>
</tbody>
</table>

TOTAL

* Please Specify Currency.

**NOTE:-**

1) List is to be provided by the contractor in line with the clause 1.1.3 of Appendix - E (spares policy) of TS.
2) The list is indicative and not exhaustive. The bidder may indicate substitute / alternative against the above listed items, any additional spares in compliance to Chapter 13 of GS and Clause 4.2, Clause 17.1.2 and chapter 18 of TS, if required the same may be indicated by the Firm in their Technical Offer.
3) If any additional spares are required during the DLP period the same will be arranged by the Contractor, without any Extra Payments.
4) This will not absolve the firm of the responsibility to fulfil the DLP obligations as per relevant clauses of TS.
5) Bidder need to submit the un-priced list in the Schedule of Price A / 6 C of True copy of the BOQ (with price left blank) with the technical package.
6) Priced list shall be submitted with the financial package only.
7) The price of the DLP spares shall be included in the Schedule of Price A1 of Bill of quantity (Section IV). This list is for reference purpose only, and will not be considered for evaluation purpose.
8) Bidder may further bifurcate column “F” in different applicable Taxes.
**Schedule of Prices**

**Schedule No. A / 7A**

Adjustment Price for addition of landing in the particular vertical rise of elevator.

(i.e. per landing rate).

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Base Breakup of Taxes &amp; duties</th>
<th>Total Unit Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CD, ED, Other, Tax</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A, B, C, D, E, F, G</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>13-Passenger Stainless Steel Door</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supply Price</td>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Installation Price</td>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>13-Passenger Glass Door (landing +Car)</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supply Price</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Installation Price</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>26-Passenger Stainless Steel Door</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supply Price</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Installation Price</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>26-Passenger Glass Door (landing +Car)</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supply Price</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Installation Price</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total ( to be carried forward to Tender Total)</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

* **Please Specify Currency**

NOTE:-

1. This Schedule will be considered for tender evaluation while assessing the L-1 bidder.

2. Taxes shall be included during evaluation, bidder may further bifurcate column “F” in different applicable Taxes.
### Schedule of Prices

**Schedule No. A / 7B**

Adjustment Price for Providing Regenerative Braking System with VVVF Drive.

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Base Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total Unit Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CD</td>
<td>ED</td>
<td>Other</td>
</tr>
<tr>
<td>1</td>
<td>13 Passenger Lift</td>
<td>0</td>
<td>0</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>2</td>
<td>26 Passenger Lift</td>
<td>0</td>
<td>0</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>Total (Carried Forward To Tender Total)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Please Specify Currency**

**NOTE:-**

1. The Price for Providing Regenerative Braking System with VVVF Drive is not included in Schedule No. A1.
2. This Schedule will not be considered for tender evaluation while assessing the L-1 bidder.
3. Taxes shall be included during evaluation, bidder may further bifurcate column “F” in different applicable Taxes.
## Schedule of Prices

### Adjustment Price for “Through Door Arrangement Elevators”

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total Price</th>
<th>Unit</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CD</td>
<td>ED</td>
<td>other</td>
<td>Service Tax</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>1</td>
<td>13 Passenger Capacity (SS Doors)</td>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>13 Passenger Capacity (Glass Doors)</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>26 Passenger Capacity (SS Doors)</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>26 Passenger Capacity (Glass Doors)</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total ( to be carried forward to Tender Total)</td>
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</table>

*Please Specify Currency*

**NOTE:-**

1. This Schedule will be considered for tender evaluation while assessing the L-1 bidder.
2. Taxes shall be included during evaluation, bidder may further bifurcate column “F” in different applicable Taxes.
## Schedule of Prices

**Schedule No. A / 7D**

### Additional Price for “Floating – Pit / Hanging Pit” Elevators

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

### Breakup of Taxes & duties

<table>
<thead>
<tr>
<th>CD</th>
<th>ED</th>
<th>Other</th>
<th>Service Tax</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Total Price</th>
<th>Unit</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

* Please Specify Currency

**NOTE:**

1. This Schedule will not be considered for tender evaluation while assessing the L-1 bidder.
2. Taxes shall be indicated in the relevant column, bidder may further bifurcate column “F” in different applicable Taxes.
## Schedule of Prices

**Schedule No. A / 7E**


<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total Price</th>
<th>Unit</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
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<td>CD</td>
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<td>ED</td>
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<td></td>
<td></td>
<td></td>
<td>other</td>
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<td></td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td>Service Tax</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H=B+D+E+F+G</td>
<td>I=H*A</td>
<td>J=C*A</td>
<td></td>
</tr>
</tbody>
</table>

* Please Specify Currency

**NOTE:**

1. This Schedule will not be considered for tender evaluation while assessing the L-1 bidder.
2. Taxes shall be indicated in the relevant column, bidder may further bifurcate column “F” in different applicable Taxes.
## Schedule of Prices

**Schedule No. A / 7F**

**Adjustment of Price for change of Car Rear Panel from Stainless Steel to Glass**

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total Unit Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CD</td>
<td>ED</td>
<td>other</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>1)</td>
<td>13 Passenger Car Rear Panel from Stainless Steel to Non Fire Rated Glass.</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2)</td>
<td>13 Passenger Car Rear Panel from Stainless Steel to Fire Rated Glass.</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3)</td>
<td>26 Passenger Car Rear Panel from Stainless Steel to Non Fire Rated Glass.</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4)</td>
<td>26 Passenger Car Rear Panel from Stainless Steel to Fire Rated Glass.</td>
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<td>Total ( to be carried forward to Tender Total)</td>
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* Please Specify Currency

**NOTE:**

1. This Schedule will not be considered for tender evaluation while assessing the L-1 bidder.
2. Taxes shall be indicated in the relevant column, bidder may further bifurcate column "F" in different applicable Taxes.
Schedule of Prices

Schedule No. A / 7G

Adjustment of Price for Conversion from 13 Passenger Elevator to 26 Passenger Elevator

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
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<td>J = C*A</td>
<td></td>
</tr>
</tbody>
</table>

1. 13-Passenger to 26 Passenger Stainless Steel Door (2 Landings + Car)
   a. Supply Price 0
   b. Installation Price 0

2. 13-Passenger to 26 Passenger Glass Door (2 Landings + Car)
   a. Supply Price 0
   b. Installation Price 0

Total (to be carried forward to Tender Total)

* Please Specify Currency

NOTE:-

1. This Schedule will not be considered for tender evaluation while assessing the L-1 bidder.
2. Taxes shall be indicated in the relevant column, bidder may further bifurcate column “F” in different applicable Taxes.
3. The above price for conversion of Elevator capacity shall be independent of rise of elevator, considering that it will require the change in the rating of equipment resulting in, increase in supply & installation costs e.g. Change in motor rating, drive capacity, Car size, Lighting fixtures, Fans, Number of Ropes, Counterweight, etc.
1. GENERAL REQUIREMENTS

1.1 The Bidder’s attention is drawn to the General Conditions of Contract, Special Conditions of Contract and Employer’s Requirements. This Preamble will serve as a definitive guide to the terms of payment.

The Bidder shall note that this is a fixed priced contract

1.2 This Contract is a Design, Manufacture, Supply, Installation, Testing and Commissioning (including Integrated Testing and Commissioning) and maintenance for escalators During 02 (Two) Years Defect Liability Period for Jaipur Metro Rail Project, including but not limited to:

- Plans and programmes, test procedures, interface co-ordination meetings and documents; drawings, design calculations, and schedules safety, and quality plans, etc;
- offshore manufacture/procurement; operation of quality assurance programme at places of manufacture; carrying out of type tests, prototype tests, factory acceptance tests, tests before shipment; and the associated provision of necessary test equipment, tools and materials; inspection, packing, crating, storage and transit to Port of entry India;
- manufacture/procurement in India; operation of quality assurance programme at places of manufacture; carrying out of type tests, prototype tests, factory acceptance tests, tests before shipment; and the associated provision of necessary test equipment, tools and materials; inspection, packing, crating, Port Handling and Clearance for offshore products, including temporary storage;
- loading and transportation of imported and ex-works India to approved storage in Jaipur / Rajasthan;
- installation/erection (including provision of temporary services as required) and mounting all in accordance with the specifications, erection, aligning, fasteners and securing devices, adjusting as necessary, installation of power and monitoring devices;
- testing and putting to work of all plant and equipment, sub-systems, and systems, testing, retesting, fault finding, adjustments and reworking as necessary, submittal of all test reports;
- attendance upon statutory authorities inspections and tests, completion of all modifications to meet authorities approval and arranging approval from such authorities;
- maintenance of escalators by the Contractor during the specified period.
- inspection and maintenance of installed plant and equipment;
- O&M Documentation, Transfer of Technology and other obligations;
- Operation, Maintenance and Spare Parts management, Manuals, including preparation;
- As-Built Drawings including preparation, submission, all subsequent revisions, changes required and re-submittals as necessary;
- Validation of RAM data as per the actual performance obtained during DLP as per employers requirement.
- supplying all tools, special tools, and special test instruments and equipment;
- training of Employer’s Staff in different disciplines overseas and in India

1.3 Taxes, Levies, Duties, Cess, etc.
While quoting the rates, the Bidder is advised to take into consideration provision of Clause 6 of SCC.

(a) Contract A: - For CIF supply of all offshore equipment and materials including spares and tools (for the foreign currency portion only).

(b) Contract B: - For Ex-Works supply of all equipment and materials of Indian origin and for providing all services i.e. port handling and clearance for the imported good, further loading and inland transportation for delivery at site, unloading, storage, handling at site, installation, Testing and commissioning including integrated testing and commissioning in respect of all the equipment supplied under both the contracts and any other services specified in the Contract Documents.

Both Contract will Contain a cross-fall breach clause specifying that breach of one contract will constitute breach of the other.

The form of Contract agreement shall be as per the format provided in Contract Form (Section 9) of this Contract.

1.4 Following Corridors / Sections are covered under this Package:-

Corridor: - CHANDPOLE to BADI CHOPAR

1.5 Units and Currency

The Bidder shall fill in each column with unit rate or lump sum, whichever the case may be, for each Schedule item of the various Schedules, provided that he should consider it a reimbursable item, on the basis of the Tender Documents and pre-tender meeting and site visits.

The price shall be quoted in INR and / OR any fully convertible currency of up to three foreign currencies:-

i) Plant, Equipment, spare parts & Tools to be supplied from abroad shall be quoted any fully convertible currency of up to three foreign currencies:-

ii) Plant, Equipment, Spare Parts & Tools to be supplied from within India shall be quoted in Indian Rupees.

iii) Port handling, Port clearance, local transportation, insurance and other local costs incidental to the delivery of plant and equipment shall be quoted in Indian Rupees.

iv) Installation and maintenances services, provision of Operation and Maintenance manuals, Training, Transfer of Technology shall be quoted in INR (Indian Rupees). any fully convertible currency of up to three foreign currencies:-

1.6 Rates and Sums to be for Complete Work

Bidders shall be deemed to have read the Employer’s Requirements and other parts of the Tender Documents to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The Schedules of Prices do not describe the Works completely in all respects and reference must be made to the Conditions of Contract and the Employer’s Requirements on the detailed scope. No claim shall be considered in respect of any omission or alleged omission in the Schedule of Prices of any cost required to bring the Works to completion.

Notwithstanding any limits that may be implied by wording of the individual items and/or explanations in the Preamble, the rates and sums, which the Bidder enters in the Schedule of Prices, shall be for the work finished complete in every respect.

The Bidder shall be deemed to have taken full account of all requirements, liabilities, obligations and risks, whether expressed or implied, and to have priced the items accordingly. The items in the
Schedule of Prices are the only items against which payment will be made. The cost of any item of work not specifically described in the Schedule of Prices but required for the execution of the Contract shall be allowed for in the unit rates for the items in the Schedule of Prices. The entered rates and prices shall be deemed to be inclusive of labour, material, equipment, overheads, profits and all other direct and incidental costs of whatever nature and risks of every kind necessary to design, manufacture, deliver, install, test and commission (including Integrated Testing and Commissioning) complete, and remedying any defects in the whole of the Works in accordance with the Contract and fulfillment of Bidder’s obligations under the Contract and shall bear a proper relationship to the cost of carrying out the work described.

In case of (Quantity) Variation order for Elevators as per SCC Clause – 32, for the Variation Escalator the Schedule of Prices - B1 will be applicable as per Employer’s requirements and will be specified in the Variation Order.

1.7 Allowances in rates

Full allowance shall be made in the rates and sums against the various items in the Schedule of Prices and Quantities for all costs involved in performing the Works except to the extent that work is specifically described and paid for in the Schedule of Prices. The list below is not exhaustive and the Bidders are expected to take all costs involved while quoting the rates that will not be subject to variation on any account.

i) all setting out and survey work;

ii) payment of all patent rights and royalties;

iii) safety precautions and all measures to prevent damage and suppress fire and other hazards;

iv) the protection and safety of JMRC trains and services;

v) supplying, maintaining and removing on completion the Contractor’s own accommodation, offices, depots, stores, workshops, transport, welfare services and other facilities including telephones and facsimile machines and all charges in connection therewith;

vi) the supply, inspection and testing of materials and of the Works as specified including the provision and use of equipment and arrangements for the “Engineer” and others;

vii) maintaining public access within operating stations;

viii) providing transporting to the Site, setting to work, operating (including all fuel and consumable stores), maintaining and removing from the Site upon completion all Construction Plant and Contractor’s Equipment necessary for the execution of the Works and including the cost of all tests and other requirements in respect of such plant and equipment;

ix) working adjacent to or across existing services and installations;

x) complying with the requirements of the Employer in regard to Safety and Health, and Quality Assurance;

xi) co-ordination and interference to the Works by the works of Designated Contractors and others employed by employer being legitimate users of the facilities on or in the vicinity of the Site;

xii) remedying of defects and shrinkage, and works of amendment, reconstruction, replacement of other faults, fair wear and tear excepted, during Defects Liability Periods;

xiii) protection to be implemented against Electro-magnetic effects;

xiv) insurance, including all risks in supply, erection, storage, transit, third party, Workmen’s compensation and the like;
1.8 Unit Rates

Bidder shall note that prices shall be quoted against each item in the Schedule of price even if Quantity indicated is NIL against them. The quoted price against these items should be comparable with the rates quoted against the items where quantities have been specified. These rates will not be made part of the evaluation process. The final accepted prices of these items can be utilized by the Employer at the time of Variation (if required) even if the present Quantity is NIL. Items against which, no rate or sum is entered by the Bidder, whether quantities are stated or not, shall be regarded as covered by other rates in the Schedule of Prices.

1.9 Tender Pricing

(a) Bidders shall quote for the entire work on a “single responsibility” basis such that the total tender price covers all Contractor’s obligations mentioned in or to be reasonably inferred from the Tender Documents in respect of the design, manufacture, including procurement and subcontracting (if any), delivery, construction, installation, completion of the whole of Works. This includes all requirements under the Contractor’s responsibilities for testing and commissioning of the works including integrated testing and commissioning, the acquisition of all permits, approvals and licenses, etc.; the operation, maintenance and training services and such other items and services as are specified in the tender documents. 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. The Bidder shall take regard of the actual site conditions and the items entered in the various Schedules. The Bidder shall price his tender accordingly and the unit prices entered against a line item shall be the full and only price paid for all work performed against that item except as described in the Tender Documents.

(b) Bidders are required to quote the price for the commercial, contractual and technical obligations outlined in the tender documents. If a Bidder wishes to make deviations or wants to put conditions, qualifications, etc., such deviations, conditions, qualifications etc. shall be listed in a Schedule No. B5 forming part of BOQ. The Bidder shall also provide in this Schedule the additional price, if any, for the unconditional withdrawal of the deviations, qualifications, conditions etc. This additional price for the unconditional withdrawal has to be given separately for each deviation, qualification, condition, etc. Any deviation / qualification / condition that is not priced for unconditional withdrawal shall not be considered.

The Bidder shall price the Schedules of Prices in Indian Rupees, and US Dollar / Euro or any combination of these currencies.

2. CONTENTS OF THE SCHEDULE OF PRICES

2.1. The Pricing Document for Base tender is divided into separate Schedules of Prices as follows:

<table>
<thead>
<tr>
<th>Schedule No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B / 2A</td>
<td>O&amp;M Documentation, Transfer of Technology and all other obligations as per Tender Documents.</td>
</tr>
<tr>
<td>B / 2B</td>
<td>Training of Employer’s Staff</td>
</tr>
<tr>
<td>B / 3A</td>
<td>Price for recommended Consumable Spares.</td>
</tr>
<tr>
<td>B / 3B</td>
<td>Price for Unit Exchange Spares</td>
</tr>
</tbody>
</table>
Schedule No. B / 3C  Prices for Mandatory/ Contract Spares & Tools
Schedule No. B4  Prices for Annual Comprehensive Maintenance Charges for 3 years beyond Defect Liability Period.
Schedule No. B5  Prices for the unconditional withdrawal of deviations, conditions, qualifications, etc. separately for each deviation, condition, qualification etc.
Schedule No. B / 6A  Recommended Spare Parts for 3 years after whole of the works is taken over, with a unit price for each spare part.
Schedule No. B / 6B  Recommended Spare Parts for 10 years after whole of the works is taken over, with a unit price for each spare part with rate of escalation per year over base year, if any.
Schedule No. B / 6C  Recommended Spare Parts for 2 years during DLP with a unit price for each spare part (for reference only). Cost to be included in Schedule No- B1
Schedule No. B / 7A  Adjustment Price for provision of one intermediate support for the escalator in the rise band above 7.5 meter.
Schedule No. B / 7B  Unit Price for the provision of Stainless Steel decking extension.

2.2. The Schedules do not generally give a full description of the plant and equipment to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer’s Requirements to ascertain the full scope of requirements included in each item prior to filling in the rates and prices. The Contractor shall carry out all the work necessary to meet the Employer’s Requirements.

2.3. If Bidders are unclear of any item, they shall seek clarification in accordance with the Instructions to Bidders prior to submitting their tender.

2.4. Contents of the Schedule of Prices

2.4.1. Schedule No. B1:- Design, Manufacture, Supply, Installation Services including integrated testing, commissioning of Escalators and maintenance during 2 year DLP

This Schedule shall cover all work necessary to include but not be limited to:

preparation, submission, and all subsequent revisions, changes required and re-submittals as required by the Employer’s Requirements until “Notice of No Objection” or “Notice of No Objection subject to …..” has been issued by the “Engineer” for:

(a) Design, Manufacture and Supply of escalator.

   o documents, drawings, design calculations;
   o submission of RAM Report Based on the Design Calculation. (RAM Report is to be validated as per employers requirement)
   o establishing and carrying out of manufacture/procurement;
   o operation of quality assurance programme at places of manufacture;
   o conduct type tests, prototype tests, factory acceptance tests, tests before shipment;
   o inspection, packing, crating, insurance, shipping to Port of entry India, including insurances, bank guarantees, and transfer from factory to port and all storage costs at factory and port;

(b) Port Handling, Port Clearance, Local Transportation to Jaipur, insurance, Storage in approved Warehousing.

   • escalators with all ancillary equipment and components including spares and tools to be supplied from outside India;
• Port Handling;
  • Clearance of imports;
  • Temporary storage.

• escalators with all ancillary equipment and components including spares and tools to be supplied;
  • loading and transportation to Jaipur of imported plant and equipment;
  • Loading and transportation of indigenously manufactured plant and equipment, ex-works to Jaipur.

• unloading and storage of all escalators together with all ancillary equipment including mandatory spares and tools to be supplied for each Section in secure warehousing under cover which meets the requirements of the “Engineer”.

• loading at storage in Jaipur and transportation to site, off-loading and moving to point of installation;

(c) **Installation Services, Testing, Commissioning including integrated testing and commissioning**

• preparation for installation/erection (including provision of temporary services as required)
  • mounting all in accordance with the Employer’s Requirements;
  • erection, aligning;
  • fasteners and securing devices, adjusting as necessary;
  • installation of power and monitoring devices;
  • provision and use of civil and building materials and products
  • making good and clearing the location on completion

• testing and putting to work of all plant and equipment, sub-systems, and systems;
  • integrated testing and commissioning plan;
  • tools, instruments, tackles and documents required;
  • attendance upon the “Engineer”;
  • testing, retesting, fault finding, adjustments and reworking as necessary;
  • submittal of all test reports and other documents as required by the “Engineer” under the Contract;

• attendance upon statutory authorities inspections and tests, completion of all modifications to meet authorities approval and arranging approval from such authorities;

(d) **Maintenance of installed Escalators for each Section, during the Specified Defect Liability Periods.**

• This item shall cover all work necessary to include but not be limited to:
  • employment of approved staff;
  • replacement as required by the Employer;

• inspection of installed plant and equipment relating to each escalator installed on each Section;
  • transport, labour, contractor’s equipment;
  • submittal of inspection documents as required

• maintenance of installed plant and equipment relating to each escalator installed on each Section;
  • testing, retesting, fault finding, adjustments and reworking as necessary;
o replacement parts, materials, consumables;

- Validation of RAM report submitted during design approval stage based on actual performance obtained during the DLP in compliance with the employers requirement.
- DLP spares and Tools.

2.4.2. **Schedule of Prices No. B / 2A**

**O&M Documentation, As-Built Drawings, Transfer of Technology and all other items required by the Tender Documents**

- This item shall cover all work necessary to include but not be limited to:
  o Operation, Maintenance and Spare Parts Manuals
  o preparation, submission, and all subsequent revisions, changes as required by the “Engineer”;  
- As-Built Drawings
  o preparation, submission, all subsequent revisions, changes required and re-submittals as necessary until accepted by the “Engineer”;
- Transfer of Technology to designated recipients;

2.4.3. **Schedule No. B / 2B**

**Training of Employer’s Staff in different disciplines overseas and in India in accordance with the Employer’s Requirements.**

- This item shall cover all work necessary to include but not be limited to:
  o preparation, submittal and all subsequent revisions as required by the “Engineer” of:
  o training manuals, curricula, etc.,
  o provision and maintenance of training facilities; o
  o employment of approved training staff;

2.4.4. **Schedule No. B / 3A :- Price for recommended Consumable Spares**

2.4.5. **Schedule No. B / 3B :- Price for Unit Exchange Spares**

2.4.6. **Schedule No. B / 3C :- Prices for Mandatory / Contract Spares & Tools**

2.4.7. **Schedule No. B4 :- Prices for Comprehensive Annual Maintenance Charges for 3 years beyond Defect Liability Period.**

2.4.8. **Schedule No. B5 :- Prices for unqualified withdrawal of conditions, qualifications, deviations, etc. separately for each condition, qualification, deviation, etc.**

The Bidder shall itemise the price for the unqualified withdrawal of any condition, qualification, deviation, etc. he may have included in his Financial Package. The Bidder shall clearly show the Line Number, the Section Number and the Schedule Number that is affected by the price of withdrawal.

2.4.9. **Schedule No. B / 6A :- Recommended Spare for 3 years beyond DLP**

Recommended Spare Parts for 3 years after whole of the works is taken over, with a unit price for each spare part

The supply of spare parts for the equipment, sub-systems, and systems provided under the Contract over a three year period after issue of the Performance Certificate.

- all spare parts, tools or equipment, considered necessary by the Contractor;
- fully priced schedule of unit rates;
2.4.10. **Schedule No. B / 6B:- Recommended Spare for 10 years beyond DLP**

Recommended Spare Parts for 10 years after whole of the works is taken over, with a unit price for each spare part with rate of escalation per year over base year, if any.

2.4.11. **Schedule No. B / 6C :- Commissioning and DLP spares**

Spare Parts for 2 years during DLP with a unit price for each spare part (for reference purpose only). The Cost is to be included in Schedule No. - B1, by the Bidder and hence the amount quoted here will not be added separately.

2.4.12. **Schedule No B / 7A :- Price adjustment for Intermediate Support**

Adjustment Price for provision of one intermediate support for the escalator in the rise above 7.5 meter.

2.4.13. **Schedule No B / 7B :- Price for provision of SS decking extension**

Unit Price for provision of stainless Sheet Steel decking extension.

The price includes for the Supply, fabrication and installation of the stainless Steel decking as per employers requirement.

The Bidder shall note that the Employer will take no liability for anything the Bidder states in this Schedule, and this document is completed entirely at the risk and responsibility of the Bidder.

3. **TERMS OF PAYMENT**

3.1 In accordance with the provisions of SCC Clause 7 of the Employer will pay the Contractor in the following manner and at the following times on the basis of the Prices given in the Schedule of Prices. Retention money will be deducted from the payments due in accordance with the Conditions of Contract.

3.2 Payments will be made to the Contractor in the currency or currencies indicated for each respective Schedule item. Notwithstanding anything stated herein the “Engineer” retains the right to withhold payment on any pay item due for payment when the service to be performed is not performed, or is not carried out to the “Engineer’s” satisfaction.

3.3 **Schedule of Prices No. B1:- Design, Manufacture, Supply Installation Testing and Commissioning of Escalators**

The amount entered shall be the total price to be paid for the design, manufacture, Supply , Installation Testing and ,Commissioning of Escalators, Including Integrated Testing and Commissioning and/or procurement of all escalators together with all ancillary equipment and components to be supplied.

The stage payment under this Schedule will be released as per the following milestones.

<table>
<thead>
<tr>
<th>SN</th>
<th>Milestone No.</th>
<th>Description</th>
<th>Percentage of Unit Rate*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Milestone No. - 1</td>
<td>Design, Manufacturing and Supply of the Escalator</td>
<td>70%</td>
</tr>
<tr>
<td>2</td>
<td>Milestone No. - 2</td>
<td>Port Handling, Port Clearance, Local Transportation, etc.</td>
<td>10%</td>
</tr>
<tr>
<td>3</td>
<td>Milestone No. - 3</td>
<td>Installation, Testing and Commissioning</td>
<td>10%</td>
</tr>
<tr>
<td>4</td>
<td>Milestone No. - 4</td>
<td>Issue of Taking over Certificate</td>
<td>5%</td>
</tr>
<tr>
<td>5</td>
<td>Milestone No. - 5</td>
<td>Maintenance during Defect Liability Period</td>
<td>5%</td>
</tr>
</tbody>
</table>

A. 70% of Schedule of Price-B1 (Milestone-1) of the price for each escalator shall be payable when

(a) a “Notice of No Objection” or “Notice of No Objection subject to …..” has been issued by the “Engineer” in respect of the design and other documents (RAM report etc) for each escalator. Compensation shall include for the preparation, submission, and all subsequent revisions,
changes required and re-submittals as necessary during the design phase as required by the “Engineer” for documents, drawings, design calculations, test procedures.

(b) after delivery to the “Engineer” of evidence of despatch documents in favour of the Employer and delivery of:

- Bill of Lading;
- Certificate of type tests;
- Certification of Factory Acceptance tests;
- Provision of Safe Custody Bank Guarantee (Required only if request for milestone certificate is submitted to JMRCL before material reaches on-shore, else Indemnity Bond is sufficient);
- Proof of Marine insurance;

for each shipment or consignment in case of off-shore supply.

OR

In case of Ex-Works India, after evidence of loading on to the mode of transport to be used to convey the plant and equipment from the works to storage in Jaipur and upon endorsement of the dispatch documents in favour of the Employer and delivery to the “Engineer” of:

- Proof of dispatch;
- Certificate of type tests;
- Certification of Factory Acceptance tests;
- Provision of Indemnity Bond;
- Proof of inland transport insurance;

for each shipment or consignment.

Compensation under Milestone-1 shall include for the establishing and carrying out of manufacture/procurement; operation of quality assurance programme at places of manufacture; carrying out of type tests, prototype tests, factory acceptance tests, tests before shipment; inspection, packing, crating, shipping to Port of entry India, including insurances, bank guarantees, and transfer from offshore factory to port and all storage costs at factory and port etc.

B. 10% of Schedule of Price - B1 (Milestone-2) of the price for each escalator shall be payable for Port Handling, Port Clearance, Local Transportation to Jaipur / Rajasthan, Storage in approved Warehousing, loading at storage points or warehouses and transportation to site, offloading and moving to the point of installation.

Payment shall be made for each escalator for delivery to point of installation in Jaipur on inspection and acceptance by the “Engineer”.

Compensation under Milestone-2 shall include for the all custom clearance activities including all formalities, liaising with the custom authority / custom house agents as well as transportation of goods to the site in Jaipur.

C. 10% of Schedule of Price - B1 (Milestone-3) of the price for each escalator shall be paid for Installation Services, Testing, Commissioning including integrated testing and commissioning.

D. 5% of Schedule of Price - B1 (Milestone-4) of the price for each escalator shall be paid after issue of taking over certificate by the Employer.
E. 5% of Schedule of Price - B1 (Milestone-5) of the price for each escalator shall be paid for Maintenance of Escalators during DLP including DLP spares and tools.

The amount shall be the total price to be paid for Inspection and Maintenance of each Escalator in each Section after Taking-Over by the Employer, during the specified Periods.

The amount shall be full compensation for all direct and incidental costs relating to the Works in this Schedule, for each Section for a period of two years from the date of the Taking-Over Certificate for all the escalators in that Section.

Payment shall be made on a quarterly basis upon receipt of inspection and maintenance reports endorsed by the Employer to the performance claimed by the Contractor.

Final payment and Performance certificate will be issued upon only after compliance of employers requirement.

3.4 Schedule of Prices No. B / 2A – O&M Documentation, Transfer of Technology and all other items required by the Tender Documents.

The amount entered shall be the total price to be paid for O&M Documentation, Transfer of Technology and all other items required by the Tender Documents.

 Shall be full compensation for all direct and incidental costs relating to the Works in Schedule 2A:

Payment shall be for:

- Operation, Maintenance Manuals, including preparation, submission, and all subsequent revisions, changes as required by the “Engineer”;
- As-Built Drawings including preparation, submission, all subsequent revisions, changes required and re-submittals as necessary until accepted by the “Engineer”;
- Interactive Training Manuals including preparation, submission, all subsequent revisions, changes required and re-submittals as necessary until accepted by the “Engineer”;
- Transfer of Technology to designated recipients;

On the basis of:

1. Items 1: 100% payment on delivery to and acceptance by the Employer of the Manuals and as built drawings for the relevant section.

2. Items 2: 100% payment on evidence to the “Engineer” of completion of the transfer of technology for the relevant section.

No payment shall be made for all other requirements set out in the Tender Documents not expressly stated above, and shall be deemed to be included in other prices.

3.5 Schedule No. B / 2B – Training of Employer’s Staff

The amount entered shall be the total price to be paid for Training of Employer’s Staff in different disciplines overseas and in India in accordance with the Employer’s Requirements.

Shall be full compensation for all direct and incidental costs relating to the Works in Schedule B / 2B:

Payment shall be for:

- all direct and incidental costs for training of Employer’s staff including the preparation, submittal and all subsequent revisions as required by the “Engineer” of training manuals, curricula, etc., provision and maintenance of training facilities; employment of approved training staff, and all associated costs and travel costs;
- Troubleshooting and Maintenance Training of approved Employer staff

Payment shall be made on the basis that 100% payment shall be made for the items included in this Schedule when completed to the satisfaction of the “Engineer”.

100% payment on delivery to and acceptance by the Employer of the Spares & tools as per employers requirement.
### Schedule of Prices

**Schedule No. B1**

Design, Manufacture, Supply, Installation Services including Integrated Testing, Commissioning of Escalators and Maintenance during 02 Years Defects Liability Period

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description (Height of Travel and Band range of vertical rise)</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Base Price (INR)</th>
<th>Breakup of Taxes &amp; Duties</th>
<th>Total Unit Price (INR)</th>
<th>Total Amount (*FC)</th>
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<td>2.</td>
<td>4.0 metre (3.5 &gt; h ≤ 4.5 )</td>
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<td>3.</td>
<td>5.0 metre (4.5 &gt; h ≤ 5.5)</td>
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<td>4.</td>
<td>6.0 metre (5.5 &gt; h ≤ 6.5)</td>
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<td>5.</td>
<td>7.0 metre (6.5 &gt; h ≤ 7.5)</td>
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<td>8.0 metre (7.5 &gt; h ≤ 8.5)</td>
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<td>9.0 metre (8.5 &gt; h ≤ 9.5)</td>
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<td>8.</td>
<td>10.0 metre (9.5 &gt; h ≤ 10.5)</td>
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<td>9.</td>
<td>11.0 metre (10.5 &gt; h ≤ 11.5)</td>
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<td>10. 12.0 metre (11.5 &gt; h ≤ 12.5)</td>
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<td>11. 13.0 metre (12.5 &gt; h ≤ 13.5)</td>
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<td>12. 14.0 metre (13.5 &gt; h ≤ 14.5)</td>
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<tr>
<td>13. 15.0 metre (14.5 &gt; h ≤ 15.5)</td>
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<td><strong>Total No Escalators</strong></td>
<td><strong>18</strong></td>
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</tbody>
</table>

* Please Specify Currency.

**Notes:**

1. Bidder shall quote prices against each item even if Quantity indicated is NIL.
2. All Stainless steel type escalators shall be of Fully Outdoor Category.
3. The above rates also include Port handling, Port clearance, Local Transportation, Insurance and other Incidental Services.
4. The above price shall be inclusive of maintenance during two year Defect Liability Period.
5. The payment shall be made as per the milestone achieved.
6. The prices offered shall include the cost of minor adjustments in the Escalator design, necessitated as per the actual site data/conditions.
7. Taxes shall be included during evaluation, bidder may further bifurcate column “F” in different applicable Taxes.
8. Custom Duty (CD), Excise Duty (ED), Service Tax and other Taxes shall be filled in relevant Column.
# Schedule of Prices

Schedule No. B / 2A

O&M Documentation, Transfer of Technology and all other obligations as per Tender Documents.

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Lump Sum Base Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total base Price</th>
<th>Total Amount</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CD</td>
<td>ED</td>
<td>Other</td>
<td>Service tax</td>
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<td>(INR)</td>
<td>(*FC)</td>
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<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>1</td>
<td>O &amp; M Documentation, As-built drawings, etc. (Five sets for each Corridor)</td>
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<tr>
<td>2</td>
<td>Transfer of Technology Other Obligations (Total (Carried Forward To Tender Total Summary))</td>
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</table>

* Please Specify Currency

**NOTE:-**

1. Taxes shall be included during evaluation. Bidder may further bifurcate column “E” in different applicable Taxes.
2. Custom Duty (CD), Excise Duty (ED), Service Tax and Other taxes shall be filled in relevant Column.
## Schedule of Prices

**Schedule No. B / 2B**

**Training of Employer’s Staff**

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Lump Sum Base Price</th>
<th>Breakup of Taxes &amp; Duties</th>
<th>Total base Price</th>
<th>Total Amount</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>A (INR)</td>
<td>CD (*FC)</td>
<td>(INR)</td>
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<td>B (*FC)</td>
<td>ED</td>
<td>E (INR)</td>
<td>(*FC)</td>
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<td>C</td>
<td>Other</td>
<td>F</td>
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<tr>
<td>1</td>
<td>Training of Employer’s Staff. Trainers Man days (as per clause 19.3 of TS)</td>
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<td>2</td>
<td>*Submission of Training manuals, Interactive CD etc. to meet Employer’s Requirement</td>
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<td>3</td>
<td>Total (carried forward to Tender Total Summary)</td>
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*Please Specify Currency*

**NOTE:**

1. Taxes shall be included during evaluation. Bidder may further bifurcate column "E" in different applicable Taxes.
2. The travel, boarding and lodging expenses for the training of Employer’s staff shall be borne by the Employer.
3. *The training manual, Interactive CD etc. shall be submitted five sets (5 sets).*
### Schedule of Prices
(Refer Appendix E of the Technical Specification)

**Schedule No. B / 3A**

**Price of Recommended Consumable Spares**

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Base Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total Unit Price</th>
<th>Total Amount</th>
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<td>CD ED Other Service Tax</td>
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<td>TOTAL (Carried Forward To Tender Total)</td>
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* Please Specify Currency.

**Note:**

1) List is to be provided by the bidder in line with the clause 1.1.1 of Appendix - E (spares policy) of TS.

2) Bidder needs to submit the un-priced list in the Schedule of Price - B / 3A of True copy of the BOQ (with price left blank) with the technical package.

3) Priced list shall be provided in Schedule of Price - B / 3A of Bill of Quantity with the financial package only.

4) Total quoted Amount of this Schedule will be considered for tender evaluation while assessing the L-1 bidder.

5) Taxes shall be included during evaluation. Bidder may further bifurcate column "F" in different applicable Taxes.
## Schedule of Prices

(Refer Appendix E of the Technical Specification)

### Schedule No. B / 3B

**Price of Unit Exchange Spares**

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<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Base Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total Unit Price</th>
<th>Total Amount</th>
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<td></td>
<td>CD</td>
<td>ED</td>
<td>Other</td>
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<tr>
<td>1</td>
<td>Complete Motor Gear Assembly</td>
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<td>1 No. of each category</td>
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<td>A</td>
<td>B</td>
<td>C</td>
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<td>2</td>
<td>Complete Chain Drive Assembly</td>
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<td>1 No. of each category</td>
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<td>3</td>
<td>Complete Escalator Control Panel</td>
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<td>1 No</td>
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<tr>
<td><strong>TOTAL (carried forward to Tender Total)</strong></td>
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*Please specify currency*

**Note:**

1) List is to be provided by the bidder in line with the clause 1.1.2 of Appendix -E (spares policy) of TS.
2) Bidder need to submit the un-priced list in the Schedule of Price - B / 3B of True copy of the BOQ (with price left blank) with the technical package.
3) Priced list shall be provided in Schedule of Price - B / 3B of Bill of Quantity with the financial package only.
4) Total quoted Amount of this Schedule will be considered for tender evaluation while assessing the L-1 bidder.
5) Taxes shall be included during evaluation. Bidder may further bifurcate column “F” in different applicable Taxes.
## Schedule of Prices
(Refer Appendix E of the Technical Specification)

### Schedule No. B / 3C

**Price of Mandatory Spare Parts and Tools**

<table>
<thead>
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<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Base Price</th>
<th>Breakup of Taxes &amp; duties</th>
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<td>E</td>
<td>F</td>
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<td>I = H * A</td>
<td>J = C * A</td>
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<td>TOTAL</td>
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* Please Specify Currency.

**Note:-**

1) List is to be provided by the bidder in line with the clause 1.1.4 of Appendix - E (spares policy) of TS.
2) For the detailed list refer Appendix E of Technical Specification
3) The list is indicative and not exhaustive. The bidder may indicate substitute / alternative against the above listed items, any additional spares and tools in compliance to Chapter 13 of GS and Chapter 18 of TS, if required the same may be indicated by the Firm in their Technical Offer.
4) The Employer reserves the right to revise the items & the Quantity in the list based on the experience / performance during the Defect Liability Period, at No extra cost.
5) bidder need to submit the un-priced list in the Schedule of Price - B / 3C of True copy of the BOQ (with price left blank) with the technical package.
6) Priced list shall be provided in Schedule of Price - B / 3C of Bill of Quantity with the financial package only.
7) Total quoted Amount of this Schedule will be considered for tender evaluation while assessing the L-1 bidder.
8) Taxes shall be included during evaluation. Bidder may further bifurcate column "F" in different applicable Taxes.
## Schedule of Prices
**Schedule No. B4**

**Prices for Annual Maintenance Charges for 3 years beyond Defect Liability Period.**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit Base Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total Unit Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CD</td>
<td>ED</td>
<td>Service Tax</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(INR)</td>
<td>(INR)</td>
<td>(INR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>Y1 (Year-1)</td>
<td>Y2</td>
</tr>
<tr>
<td>1</td>
<td>Annual Maintenance Charges for 3 years beyond Defect Liability Period</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL (carried forward to Tender Total)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:-**

1) Employer may award the Comprehensive AMC to the successful Bidder for 3 years beyond DLP at these rates.
2) The cost of spare parts required for maintenance during AMC period beyond DLP will be deemed to be inclusive in the prices for AMC indicated in this Schedule. Nothing extra will be paid for such spare parts.
3) This Schedule will be considered for tender evaluation while assessing the L-1 bidder.
4) Payment for AMC will be made on quarterly basis on completion of maintenance obligations by the Contractor.
5) Scope of maintenance work will be as per Chapter 17 of TS and Appendix G of TS (Maintenance Requirement).
6) Taxes shall be included during evaluation.
7) Service tax shall be inclusive in the above price.
8) Employer reserves the right to enter into a separate CAMC contract for further 15 Years, beyond 3 year CAMC, considering the Price quoted for Year-3 above as Po subject to Escalation / Price Adjustment based on IEEMA formula provided in Annexure - 1 to Appendix G of TS.
9) This option of comprehensive annual maintenance contract will be exercised by Employer continuously (not intermittently) starting from 1st Year of DLP to above said Year - 3.
To…………………………

Dear Sir,

Our prices given in Schedules B1 to B 7 are subject to the following deviations, conditions, qualifications etc. These deviations, conditions, qualifications etc. are exhaustive. Except for these deviations, conditions, qualifications, etc., the entire work shall be performed as per the Tender Documents. We are also furnishing below the cost of unconditional withdrawal for the deviations, conditions, qualification, etc. proposed by us. We confirm that we shall withdraw the deviations, conditions, qualifications etc. at the cost of Withdrawal indicated in this Schedule failing which our Tender may be cancelled and the Tender Guarantee forfeited.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Deviations/Conditions/Qualifications etc.</th>
<th>Cost of unconditional withdrawal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>INR *FC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total (Carried forward to Tender Total)</td>
<td></td>
</tr>
</tbody>
</table>

* Please Specify Currency.

(To be included in the Technical Package without Price and in financial package with Price)

Note:-

1. We hereby confirm that the pricing for unconditional withdrawn of above deviations 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. No additional Deviations/Conditions/Qualifications, etc has been included with Financial Offer. (This note is to be included in case of Technical Package only and not in Financial Package)

Date……………..
Place………….

(Signature) ……………………………..
(Printed Name) ………………………..
(Designation) ……………………………

(Common Seal) ……………………….

BOQ-57
**Schedule of Prices**
(Refer Appendix E of the Technical Specification)

**Schedule No. B / 6A**

Recommended Spare Parts for 3 years beyond Defect Liability Period

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Base Price on CIF bases</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>B (INR)</td>
<td>D = B*A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C (*FC)</td>
<td>E = C*A</td>
</tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Please Specify Currency.

**NOTE:-**

1) Price shall be quoted on CIF bases, excluding Taxes and Duties.
2) List is to be provided by the contractor in line with the clause 1.1.5 of Appendix - E (spares policy) of TS.
3) The list is indicative and not exhaustive. The bidder may indicate substitute / alternative against the above listed items, any additional spares in compliance to Chapter 13 of GS and Chapter 18 of TS, if required the same may be indicated by the Firm in their Technical Offer.
4) Bidder need to submit the un-priced list in the Schedule of Price - B / 6A of True copy of the BOQ (with price left blank) with the technical package.
5) Priced list shall be provided in Schedule of Price - B / 6A of Bill of Quantity with the financial package only.
6) This Schedule will not be considered for tender evaluation while assessing the L-1 bidder.
Recommended Spare Parts for 10 years beyond Defect Liability Period

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Price at the Base Year (INR)</th>
<th>Rate of Escalation per year over the base year (*FC)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL

* Please Specify Currency.

NOTE :-
1) List is to be provided by the contractor in line with the clause 1.1.6 of Appendix - E (spares policy) of TS.
2) The list is indicative and not exhaustive. The bidder may indicate substitute / alternative against the above listed items, any additional spares in compliance to Chapter 13 of GS and TS Clause 18.2.2, if required the same may be indicated by the Firm in their Technical Offer.
3) Bidder need to submit the un-priced list in the Schedule of Price - B / 6B of True copy of the BOQ (with price left blank) with the technical package.
4) Priced list shall be provided in Schedule of Price - B / 6B of Bill of Quantity with the financial package only.
5) This Schedule will not be considered for tender evaluation while assessing the L-1 bidder.
## Schedule of Prices
(Refer Appendix E of the Technical Specification)

**Schedule No. B / 6C**

Recommended Spare Parts for 2 years during DLP with a unit price for each spare part

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit</th>
<th>Base Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total Unit Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CD</td>
<td>ED</td>
<td>other</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td>H=B+D+E+F+G</td>
<td>I=A</td>
</tr>
</tbody>
</table>

*Please Specify Currency.*

**NOTE:-**

1) List is to be provided by the contractor in line with the Clause 1.1.3 of Appendix - E (spares policy) of TS.
2) The list is indicative and not exhaustive. The bidder may indicate substitute / alternative against the above listed items, any additional spares in compliance to Chapter 13 of GS and Clause 4.2, Clause 17.1.2 and chapter 18 TS, if required the same may be indicated by the Firm in their Technical Offer.
3) If any additional spares are required during the DLP period the same will be arranged by the Contractor, without any Extra Payments.
4) This will not absolve the firm of the responsibility to fulfil the DLP obligations as per relevant clauses of TS.
5) Bidder need to submit the un-priced list in the Schedule of Price B / 6C of True copy of the BOQ (with price left blank) with the technical package.
6) Priced list shall be submitted with the financial package only.
7) The price of the DLP spares shall be included in the Schedule of Price B1 of Bill of quantity. This list is for reference purpose only, and will not be considered for evaluation purpose.
8) Bidder may further bifurcate column "F" in different applicable Taxes.
## Schedule of Prices

**Schedule No. B / 7A**

**Adjustment Price for provision of intermediate support for the escalator**

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Base Price</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total Unit Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Reduction in price of escalator in lieu of providing One additional intermediate support (in addition to the item 1 above ) for the escalator having rise i.e. 9500 mm &lt; Rise ≤ 15500 mm as ordered by the employer.</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL (carried forward to Tender Total)

*Please Specify Currency*

**Note:-**

1) This Schedule will be not considered for tender evaluation while assessing the L-1 bidder.
2) Taxes shall be included during evaluation, bidder may further bifurcate column “F” in different applicable Taxes.
3) The employer reserves the right to operate / not operate any / all part of the above work during the contract period.
**Schedule of Prices**

**Schedule No. B / 7B**

Unit Price for the provision of Stainless Steel decking extension.

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Description</th>
<th>Country of Origin</th>
<th>Quantity</th>
<th>Unit Price for per m²</th>
<th>Breakup of Taxes &amp; duties</th>
<th>Total Unit Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>In Sq. Meter</strong></td>
<td><strong>CD</strong></td>
<td><strong>ED</strong></td>
<td><strong>Others</strong></td>
</tr>
<tr>
<td><strong>A</strong></td>
<td>Supply, fabrication and installation of Stainless Steel of grade 304 for decking extension</td>
<td></td>
<td></td>
<td><strong>(INR)</strong></td>
<td><strong>(INR)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Supply, fabrication and installation of Stainless Steel of grade 304 for decking extension</td>
<td></td>
<td>70</td>
<td><strong>(INR)</strong></td>
<td><strong>(INR)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL (Carried Forward To Tender Total)</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>(INR)</strong></td>
<td><strong>(INR)</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Please Specify Currency

**Note:**

1. The decking extension with Stainless steel (Grade 304) from the Escalator to side walls shall be provided by the firm as per TS Clause – 5.3.10 Payment for decking extension will be done as per unit rates quoted above.
2. Payment will be made on actual measurement basis of the finished decking extension installed at site.
3. This Schedule will be considered for tender evaluation while assessing the L-1 bidder.
4. Taxes shall be included during evaluation, bidder may further bifurcate column “F” in different applicable Taxes.


## Schedule of Prices

<table>
<thead>
<tr>
<th>Schedule No.</th>
<th>Description</th>
<th>INR</th>
<th>*FC</th>
</tr>
</thead>
</table>

### Part – A

- **A1** Design, Manufacture Supply Installation, Testing, and Commissioning including Maintenance of Heavy Duty machine Room Less Elevator during DLP Period
- **A / 2A** O & M Documentation, Transfer of Technology and all other items as per Tender Documents.
- **A / 2B** Training of Employer’s Staff
- **A / 3A** Price for recommended Consumable Spares.
- **A / 3B** Price for Unit Exchange Spares
- **A / 3C** Prices for Mandatory/Contract Spares & Tools
- **A / 4** Prices for Annual Comprehensive Maintenance Charges for 3 years beyond Defect Liability Period.
- **A / 5** Prices for the unconditional withdrawal of deviations, conditions, qualifications, etc. separately for each deviation, condition, qualification etc.
- **A / 7A** Adjustment Price for addition of landing in the particular vertical rise of elevator.
- **A / 7B** Adjustment of Price for Providing Regenerative Braking System with VVVF Drive.
- **A / 7C** Adjustment Price for “Through Door Arrangement Elevators
- **A / 7D** Additional Price for “Floating – Pit / Hanging Pit” Elevators.

### Tender Total Part – A

### Part – B

- **B1** Design, Manufacture Supply Installation, Testing, and Commissioning including Maintenance of Escalators during DLP Period
- **B / 2A** O & M Documentation, Transfer of Technology and all other items as per Tender Documents.
- **B / 2B** Training of Employer’s Staff
- **B / 3A** Price for recommended Consumable Spares.
- **B / 3B** Price for Unit Exchange Spares
- **B / 3C** Prices for Mandatory/Contract Spares & Tools
- **B / 4** Prices for Annual Comprehensive Maintenance Charges for 3 years beyond Defect Liability Period.
- **B / 5** Prices for the unconditional withdrawal of deviations, conditions, qualifications, etc. separately for each deviation, condition, qualification etc.
- **B / 7B** Adjustment Price for Price for provision of SS decking extension

### Tender Total Part B

### Grand Total (Part A + Part B)
Procurement of Plant Design, Supply and Installation

JAIPUR METRO RAIL CORPORATION LIMITED

BIDDING DOCUMENT

for

Procurement

of

NCB No.-JP/EW/1B/E3


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

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1. Scope of Supply of Plant and Services

(As per Volume II of Section 6)
2. Specifications

(As per Volume -II of Section -6)
3. Drawings

(Not Applicable)
4. Supplementary Information
5. Certificates
5.1 Form of Completion Certificate

Contract: [insert name of contract and contract identification details.]

Date: ..................................
Certificate No.: ..................................

To: [insert name and address of contractor.]

Dear Ladies and/or Gentlemen,

Pursuant to GCC Clause 24 (Completion of the Facilities) of the General Conditions of the Contract entered into between yourselves and the Employer dated [insert date], relating to the [brief description of the Facilities], we hereby notify you that the following part(s) of the Facilities was (were) complete on the date specified below, and that, in accordance with the terms of the Contract, the Employer hereby takes over the said part(s) of the Facilities, together with the responsibility for care and custody and the risk of loss thereof on the date mentioned below.

1. Description of the Facilities or part thereof: [description]

2. Date of Completion: [date]

3. Value of work done [date]

However, you are required to complete the outstanding items listed in the attachment hereto as soon as practicable.

This letter does not relieve you of your obligation to complete the execution of the Facilities in accordance with the Contract nor of your obligations during the Defect Liability Period.

Very truly yours,

[Signature]

Project Manager
5.2 Form of Operational Acceptance Certificate

Contract: [. . . . insert name of contract and contract identification details. . . .]

Date: ................................
Certificate No.: ................................

To: [. . . . insert name and address of contractor. . . .]

Pursuant to GCCSubclause 25.3 (Operational Acceptance) of the General Conditions of the Contract entered into between yourselves and the Employer dated [. . . date . . .], relating to the [. . . brief description of the facilities. . .], we hereby notify you that the Functional Guarantees of the following part(s) of the Facilities were satisfactorily attained on the date specified below.

1. Description of the Facilities or part thereof: [. . . description . . .]

2. Date of Operational Acceptance: [. . . date . . .]

This letter does not relieve you of your obligation to complete the execution of the Facilities in accordance with the Contract nor of your obligations during the Defect Liability Period.

Very truly yours,

[. . . .Signature . . . .]

Project Manager
6. Change Orders

6.1 Change Order Procedure
   6.1.1 General
   6.1.2 Change Order Log
   6.1.3 References for Changes

6.2 Change Order Forms
   6.2.1 Request for Change Proposal
   6.2.2 Estimate for Change Proposal
   6.2.3 Acceptance of Estimate
   6.2.4 Change Proposal
   6.2.5 Change Order
   6.2.6 Pending Agreement Change Order
   6.2.7 Application for Change Proposal
6.1. **Change Order Procedure**

6.1.1 **General**

This section provides samples of procedures and forms for implementing changes in the Facilities during the performance of the Contract in accordance with GCC Clause 39 (Change in the Facilities) of the General Conditions.

6.1.2 **Change Order Log**

The Contractor shall keep an up-to-date Change Order Log to show the current status of Requests for Change and Changes authorized or pending. Entries of the Changes in the Change Order Log shall be made to ensure that the log is up-to-date. The Contractor shall attach a copy of the current Change Order Log in the monthly progress report to be submitted to the Employer.

6.1.3 **References for Changes**

1. Request for Change as referred to in GCC Clause 39 shall be serially numbered CR-X-nnn.

2. Estimate for Change Proposal as referred to in GCC Clause 39 shall be serially numbered CN-X-nnn.

3. Acceptance of Estimate as referred to in GCC Clause 39 shall be serially numbered CA-X-nnn.


5. Change Order as referred to in GCC Clause 39 shall be serially numbered CO-X-nnn.

Note:

(a) Requests for Change issued from the Employer’s Home Office and the Site representatives of the Employer shall have the following respective references:

| Home Office | CR-H-nnn |
| Site | CR-S-nnn |

(b) The above number “nnn” is the same for Request for Change, Estimate for Change Proposal, Acceptance of Estimate, Change Proposal and Change Order.
6.2 Change Order Forms

6.2.1 Request for Change Proposal Form

[Employer's letterhead]

To: [Contractor's name and address] Date:

Attention: [Name and title]

Contract Name: [Contract name]
Contract Number: [Contract number]

Dear Ladies and/or Gentlemen:

With reference to the captioned Contract, you are requested to prepare and submit a Change Proposal for the Change noted below in accordance with the following instructions within [number] days of the date of this letter [or on or before (date)].

1. Title of Change: [Title]
2. Change Request No./Rev.: [Number]
3. Originator of Change:
   Employer: [Name]
   Contractor (by Application for Change Proposal No. [Number Refer to Annex 6.2.7])
4. Brief Description of Change: [Description]
5. Facilities and/or Item No. of equipment related to the requested Change: [Description]
6. Reference drawings and/or technical documents for the request of Change:
   Drawing No./Document No. Description
7. Detailed conditions or special requirements on the requested Change: [Description]
8. General Terms and Conditions:
   (a) Please submit your estimate showing what effect the requested Change will have on the Contract Price.
   (b) Your estimate shall include your claim for the additional time, if any, for completing the requested Change.
   (c) If you have any opinion that is critical to the adoption of the requested Change in connection with the conformability to the other provisions of the Contract or the safety of the Plant or Facilities, please inform us in your proposal of revised provisions.
   (d) Any increase or decrease in the work of the Contractor relating to the services of its personnel shall be calculated.
   (e) You shall not proceed with the execution of the work for the requested Change until we have accepted and confirmed the amount and nature in writing.

[Employer's name]
Signature
Name of signatory
Title of signatory
6.2.2 Estimate for Change Proposal Form

[Contractor's letterhead]

To: [Employer’s name and address]  
Date:

Attention: [Name and title]

Contract Name: [Contract name]  
Contract Number: [Contract number]

Dear Ladies and/or Gentlemen:

With reference to your Request for Change Proposal, we are pleased to notify you of the approximate cost to prepare the below-referenced Change Proposal in accordance with GCCSubclause 39.2.1 of the General Conditions. We acknowledge that your agreement to the cost of preparing the Change Proposal, in accordance with GCCSubclause 39.2.2, is required before estimating the cost for change work.

1. Title of Change: [Title]
2. Change Request No./Rev.: [Number]
3. Brief Description of Change: [Description]
4. Scheduled Impact of Change: [Description]
5. Cost for Preparation of Change Proposal: [insert costs, which shall be in the currencies of the contract]
   (a) Engineering (Amount)
      (i) Engineer _______ hours (hrs) x _____ rate/hr = _______
      (ii) Draftsperson _______ hrs x _______ rate/hr = _______
           Sub-total _______ hrs
           Total Engineering Cost _______
   (b) Other Cost _______
      Total Cost (a) + (b) _______

[Contractor’s name]  
[Signature]  
[Name of signatory]  
[Title of signatory]
6.2.3 Acceptance of Estimate Form

[Employer's letterhead]

To: [Contractor's name and address]             Date:

Attention: [Name and title]

Contract Name: [Contract name]
Contract Number: [Contract number]

Dear Ladies and/or Gentlemen:

We hereby accept your Estimate for Change Proposal and agree that you should proceed with the preparation of the Change Proposal.

1. Title of Change: [Title]
2. Change Request No./Rev.: [Request number/revision]
3. Estimate for Change Proposal No./Rev.: [Proposal number/revision]
4. Acceptance of Estimate No./Rev.: [Estimate number/revision]
5. Brief Description of Change: [Description]
6. Other Terms and Conditions: In the event that we decide not to order the Change accepted, you shall be entitled to compensation for the cost of preparing the Change Proposal described in your Estimate for Change Proposal mentioned in para. 3 above in accordance with GCC Clause 39 of the General Conditions.

[Employer's name]
[Signature]
[Name of signatory]
[Title of signatory]
6.2.4 Change Proposal Form

[Contractor's letterhead]

To: [Employer's name and address]  
Date:

Attention: [Name and title]

Contract Name: [Contract name]  
Contract Number: [Contract number]

Dear Ladies and/or Gentlemen:

In response to your Request for Change Proposal No. [Number], we hereby submit our proposal as follows:

1. Title of Change: [Name]
2. Change Proposal No./Rev.: [Proposal number/revision]
3. Originator of Change: Employer: [Name] / Contractor: [Name]
4. Brief Description of Change: [Description]
5. Reasons for Change: [Reason]
6. Facilities and/or Item No. of Equipment related to the requested Change: [Facilities]
7. Reference drawings and/or technical documents for the requested Change: [Drawing/Document No./Description]
8. Estimate of increase/decrease to the Contract Price resulting from the Change Proposal:

   Amount [insert amounts in the currencies of the Contract]
   (a) Direct material __________________________
   (b) Major construction equipment ________________
   (c) Direct field labour (Total hrs) ________________
   (d) Subcontracts ______________________________
   (e) Indirect material and labour ____________________
   (f) Site supervision ______________________________
   (g) Head office technical staff salaries
       Process engineer ______ hrs @ ______ rate/hr ____________________
       Project engineer ______ hrs @ ______ rate/hr ____________________
       Equipment engineer ______ hrs @ ______ rate/hr ____________________
       Procurement ______ hrs @ ______ rate/hr ____________________
       Draftsperson ______ hrs @ ______ rate/hr ____________________
       Total ______ hrs ____________________


(h) Extraordinary costs (computer, travel, etc.)

(i) Fee for general administration, % of Items

(j) Taxes and customs duties

Total lump sum cost of Change Proposal [Sum of items (a) to (j)]

Cost to prepare Estimate for Change Proposal [Amount payable if Change is not accepted]

9. Additional time for Completion required due to Change Proposal

10. Effect on the Functional Guarantees

11. Effect on the other terms and conditions of the Contract

12. Validity of this Proposal: within [Number] days after receipt of this Proposal by the Employer

13. Other terms and conditions of this Change Proposal:

   (a) You are requested to notify us of your acceptance, comments or rejection of this detailed Change Proposal within [Number] days from your receipt of this Proposal.

   (b) The amount of any increase and/or decrease shall be taken into account in the adjustment of the Contract Price.

   (c) Contractor’s cost for preparation of this Change Proposal: [Insert amount. This cost shall be reimbursed by the employer in case of employer’s withdrawal or rejection of this Change Proposal without default of the contractor in accordance with GCC Clause 39 of the General Conditions . . . .]

[Contractor’s name]
[Signature]
[Name of signatory]
[Title of signatory]
6.2.5 Change Order Form

[Employer's letterhead]

To: [Contractor's name and address] Date:

Attention: [Name and title]

Contract Name: [Contract name]
Contract Number: [Contract number]

Dear Ladies and/or Gentlemen:

We approve the Change Order for the work specified in the Change Proposal (No. [number]), and agree to adjust the Contract Price, Time for Completion, and/or other conditions of the Contract in accordance with GCC Clause 39 of the General Conditions.

1. Title of Change: [Name]
2. Change Request No./Rev.: [Request number/revision]
3. Change Order No./Rev.: [Order number/revision]
4. Originator of Change: Employer: [Name] / Contractor: [Name]
5. Authorized Price:
   Ref. No.: [Number] Date: [Date]
   Foreign currency portion [Amount] plus Local currency portion [Amount]
6. Adjustment of Time for Completion
   None Increase [Number] days Decrease [Number] days
7. Other effects, if any

Authorized by: ___________________________ Date: ____________
Employer

Accepted by: ___________________________ Date: ____________
Contractor
6.2.6 Pending Agreement Change Order Form

[Employer's letterhead]

To: [Contractor's name and address] Date:

Attention: [Name and title]

Contract Name: [Contract name]
Contract Number: [Contract number]

Dear Ladies and/or Gentlemen:

We instruct you to carry out the work in the Change Order detailed below in accordance with GCC Clause 39 of the General Conditions.

1. Title of Change: [Name]
2. Employer’s Request for Change Proposal No./Rev.: [number/revision] dated: [date]
3. Contractor’s Change Proposal No./Rev.: [number/revision] dated: [date]
4. Brief Description of Change: [Description]
5. Facilities and/or Item No. of equipment related to the requested Change: [Facilities]
6. Reference Drawings and/or technical documents for the requested Change:
   [Drawing/Document No./Description]
7. Adjustment of Time for Completion:
8. Other change in the Contract terms:
9. Other terms and conditions:

[Employer’s name]
[Signature]
[Name of signatory]
[Title of signatory]
6.2.7 Application for Change Proposal Form

[Contractor's letterhead]

To: [Employer's name and address]  
Date:

Attention: [Name and title]

Contract Name: [Contract name]  
Contract Number: [Contract number]

Dear Ladies and/or Gentlemen:

We hereby propose that the work mentioned below be treated as a Change in the Facilities.

1. Title of Change: [Name]
2. Application for Change Proposal No./Rev.: [Number/revision] dated: [Date]
3. Brief Description of Change: [Description]
4. Reasons for Change:
5. Order of Magnitude Estimation (amount in the currencies of the Contract): [Amount]
6. Scheduled Impact of Change:
7. Effect on Functional Guarantees, if any:
8. Appendix:

[Contractor's name]  
[Signature]  
[Name of signatory]  
[Title of signatory]
# 7. Personnel Requirements

Using Form PER-1 and PER-2 in Section 4 (Bidding Forms), the Bidder must demonstrate that it has personnel who meet the following requirements:

<table>
<thead>
<tr>
<th>S. No</th>
<th>SECTOR</th>
<th>QUALIFICATION</th>
<th>EXPERIENCE LEVEL</th>
<th>NUMBERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Chief Project Manager (Team Leader)</td>
<td>Graduate in Electrical/ Mechanical Engineering.</td>
<td>Minimum 6 Years experience in projects of similar nature and minimum total experience of 8 years</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Project Manager</td>
<td>Diploma in Electrical/ Mechanical Engineering.</td>
<td>Having 4 Years experience in projects of similar nature and minimum total experience of 6 years</td>
<td>2 (1 each for Elevator and Escalator Work)</td>
</tr>
<tr>
<td>3.</td>
<td>Design Engineers, Production Engineers, Elevator Specialist, Escalator Specialist, Mechanical Engineers</td>
<td>Diploma in Electrical/ Mechanical Engineering.</td>
<td>Having 3 Years experience in projects of similar nature and minimum total experience of 5 years</td>
<td>2 (1 each for Elevator and Escalator Work)</td>
</tr>
<tr>
<td>4.</td>
<td>Installation Specialist</td>
<td>Graduate in Electrical/ Mechanical Engineering.</td>
<td>Having 3 Years experience in projects of similar nature and minimum total experience of 5 years</td>
<td>2 (1 each for Elevator and Escalator Work)</td>
</tr>
<tr>
<td>5.</td>
<td>Safety Staff</td>
<td>As per SHE Manual</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S. No</th>
<th>DESIGNATION</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Chief Project Manager</td>
<td>1</td>
</tr>
<tr>
<td>b</td>
<td>Project Manager</td>
<td>2 (1 each for Elevator and Escalator Work)</td>
</tr>
<tr>
<td>d</td>
<td>Design Engineer</td>
<td>2 (1 each for Elevator and Escalator Work)</td>
</tr>
<tr>
<td>e</td>
<td>Production Engineer</td>
<td>2 (1 each for Elevator and Escalator Work)</td>
</tr>
<tr>
<td>f</td>
<td>Elevator Specialist</td>
<td>1</td>
</tr>
<tr>
<td>g</td>
<td>Escalator Specialist</td>
<td>1</td>
</tr>
<tr>
<td>h</td>
<td>Mechanical Engineer</td>
<td>2 (1 each for Elevator and Escalator Work)</td>
</tr>
<tr>
<td>i</td>
<td>Installation Specialist</td>
<td>2 (1 each for Elevator and Escalator Work)</td>
</tr>
<tr>
<td>j</td>
<td>SHE Organization</td>
<td>As Per Conditions of SHE MANUAL</td>
</tr>
<tr>
<td>k</td>
<td>Civil &amp; Structural Engineer</td>
<td>1</td>
</tr>
</tbody>
</table>

(a) **Chief Project Manager**— Engineering Graduate having minimum 8 years of total experience out of which 6 years should be in projects of similar nature.

(b) **Project Manager** – Engineering Diploma having minimum 6 years of total experience out of which 4
years should be in projects of similar nature.

(c) **Design Engineer, Production Engineer, Elevator Specialist, Escalator Specialist and Mechanical Engineer** – Engineering Diploma having minimum 5 years of total experience out of which 3 years should be in project of similar nature.

(d) **Installation Specialist** – Engineering Diploma having minimum 5 years of total experience out of which 3 years should be in projects of similar nature.

(e) **SHE Organization** – As per the qualification and experience given in SHE manual

(f) **Civil & Structural Engineer** – Engineering Diploma having minimum 5 years of total experience out of which 2 years should be in projects of similar nature.

In case JMRC judges that the continuation of any person of the bidder including its subcontractor (s) is not in the interest of the project, a written notice will be given to the bidder who will promptly remove the person within a week. JMRC can withdraw the approval of such persons if continuation of the person is judged by the JMRC.

**NOTE** – Please submit the CV of above Key Personals (up to resident engineers) in the format prescribed in PER-2.

**STAMP & SIGNATURE OF AUTHORIZED SIGNATORY**
8. Equipment Requirements

Using Form EQU in Section 4 (Bidding Forms), the Bidder must demonstrate that it has the key equipment listed below:

<table>
<thead>
<tr>
<th>No.</th>
<th>Equipment Type and Characteristics</th>
<th>Minimum Number Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bidder to specify the available machineries, tools, plants and testing equipments that will be available by them during execution of the works.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
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<tr>
<td>3</td>
<td></td>
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<tr>
<td>4</td>
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<tr>
<td>5</td>
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</tbody>
</table>
9. Schedule of Key Dates

All number refer to weeks from date of Issue of LOA

SCHEDULE OF KEY DATES

<table>
<thead>
<tr>
<th>Key Dates</th>
<th>Description</th>
<th>Key Date in Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>KD-1</td>
<td>Submission of Preliminary Design</td>
<td>6</td>
</tr>
<tr>
<td>KD-2</td>
<td>Submission Definitive Design</td>
<td>18</td>
</tr>
<tr>
<td>KD-3</td>
<td>Delivery of Major Equipment to site</td>
<td>36</td>
</tr>
<tr>
<td>KD-4</td>
<td>Installation and Testing &amp; Commissioning of Equipments</td>
<td>56</td>
</tr>
<tr>
<td>KD-5</td>
<td>Integrated Testing and Taking over</td>
<td>60</td>
</tr>
</tbody>
</table>

Note:

a) All the key dates are from the date of issue of LOA.

b) For the part week, full week will be considered for this purpose.

c) The site shall be made available progressively and if some part is not made available then the extension of time shall be allowed only to the work/KD of that particular part.
## 10. Statements of Deviations

<table>
<thead>
<tr>
<th>Chapter Number</th>
<th>Clause Number</th>
<th>Details of Deviations</th>
<th>Remarks explaining reasons for deviations and why it may be considered by the employer</th>
<th>Confirming that price of withdrawal of each deviation/s is given in Financial Package (Yes/No)</th>
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<tbody>
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</table>

1. We hereby confirm that the pricing for unconditional withdrawal of the above deviations 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, our offer is fully and truly compliant.

**STAMP & SIGNATURE OF AUTHORIZED SIGNATORY**

Note:
Where there is no deviation, the statement should be returned duly signed with an endorsement indicating 'No Deviations'. In case, Performa of deviations is not submitted or submitted as blank, it will be construed that the bidder has not proposed any deviations from bid documents and will provide all equipment as per specifications.
Pricing of Unqualified Withdrawal of Conditions, Qualifications, Deviations, etc

(To be submitted with financial bid only)

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition, Qualification, Deviation, etc</th>
<th>Key date affected by each condition, qualification, deviation, etc.</th>
<th>Increase or Decrease for unqualified withdrawal of each condition, qualification, deviation etc</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>foreign Currency</td>
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<td></td>
<td></td>
<td></td>
<td>Indian Rupees</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>

Note: In connecting this appendix, the Bidder shall show every key date that will be affected by each condition, qualification, deviation, etc., included in his Financial Package for the unqualified withdrawal of that condition, qualification, deviation, etc.

1. We hereby confirm that the pricing for unconditional withdrawal of the above deviations 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 Statement of Deviation our offer is fully and truly compliant.

**STAMP & SIGNATURE OF AUTHORIZED SIGNATORY**
11. Electrical Contractor License

(To be enclosed for Bidder or the Licensed Electrical Subcontractor)
12. Outline Quality Plan

1. Bidder shall submit an Outline Quality Plan illustrating the intended means of compliance with the Employer’s Requirements and setting out in summary form an adequate basis for the development of the more detailed document required as per SCC. The Outline Quality Plan shall contain sufficient information to demonstrate clearly the proposed method of achieving the Bidder’s quality objectives with regard to the Employer’s Requirements.

2. Bidder shall establish and maintain a Quality Assurance System in design and construction procedures and the interfaces between them. This Quality Assurance system shall be applied without prejudice to, or without in any way limiting, any Quality Assurance Systems that the Bidder already maintains.

3. The Bidder shall submit as part of his Bid an Outline Quality Plan which shall contain sufficient information to demonstrate clearly the Bidder’s proposals for achieving effective and efficient Quality Assurance System. The Outline Quality Plan should include an outline of the procedures and regulations to be developed and the mechanism by which they will be implemented for ensuring Quality as required.

4. Bidder may be requested by the Employer to amplify, explain or develop its Outline Quality Plan prior to the date of acceptance of its Bid and to provide more detail with a view to reaching provisional acceptance of such a plan.
13. Outline Safety, Health and Environment (SHE) Plan

1. Bidder shall submit with its Bid an Outline Safety, Health and Environment Plan which shall contain sufficient information to demonstrate clearly the Bidder’s proposals for achieving effective and efficient safety, health & environment procedures. The Outline Safety, Health and Environment Plan should include an outline of the safety procedures and regulations to be developed and the mechanism by which they will be implemented for ensuring safety as required by the Employer’s Requirements.

2. The Outline Safety, Health and Environment Plan shall be headed with a formal statement of policy in relation to safety, health & environment and shall be sufficiently informative to define the Bidder’s safety plans and set out in summary an adequate basis for the development of the Site Safety, Health and Environment Plan to be submitted in accordance with the Employer’s Requirements.

3. Bidder may be requested by the Employer in writing to amplify, explain or develop its Outline Safety, Health and Environment Plan prior to the date of acceptance of the Bid and to provide more details with a view to reaching provisional acceptance of such a plan.
14. Detail of foreign currency

(Bidder should submit the details regarding the type of foreign currency used in the Bill of Quantities with the technical proposal)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of Currency</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
15. PROPOSAL FOR EQUIPMENT / SYSTEMS

PROPOSAL for Plant (Comprises of Part - A (Elevators) and Part - B (Escalators)}

Proposal for Equipment / Systems (to be filled for all categories) (Part A)
(For each individual Machine Room Less Elevators of rise from 4 meters to 22 meters)

<p>| 1 | Machine | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|---|---------|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| A. | Main Driving Motor |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (i) | Make and Type |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (ii) | Type of Enclosure |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (iii) | Voltage between Terminals |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (iv) | Current in Amps at Rated Outputs |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (v) | Rated output in HP |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (vi) | Class of Rating |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (vii) | Speed in rpm at rated output |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (viii) | Type, size and make of Bearings |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (ix) | Class of Insulation |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (x) | Temperature rise in full load |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| B | Brake |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (i) | Make and Type |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (ii) | Type |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (iii) | Width &amp; Diameter of Break Wheel |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (iv) | Method of Adjustment |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (v) | Provision for Manual Release |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 2 | Car |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (i) | Dimensions (Internal) |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (ii) | Weight (approx.) |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (iii) | Contract Load |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (iv) | Maximum speed |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(v)</td>
<td>Acceleration</td>
</tr>
<tr>
<td>(vi)</td>
<td>Retardation</td>
</tr>
<tr>
<td>(vii)</td>
<td>Method of Suspension</td>
</tr>
<tr>
<td>(viii)</td>
<td>Time for Travel between Floors</td>
</tr>
<tr>
<td>(ix)</td>
<td>Type of Safety Gear</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td><strong>Control Equipment</strong></td>
</tr>
<tr>
<td><strong>A.</strong></td>
<td><strong>Control Systems</strong></td>
</tr>
<tr>
<td>(i)</td>
<td>System of Control &amp; Working DC Voltage for Control</td>
</tr>
<tr>
<td>(ii)</td>
<td>Type of Gate Lock</td>
</tr>
<tr>
<td>(iii)</td>
<td>Any special Features</td>
</tr>
<tr>
<td><strong>B.</strong></td>
<td><strong>Self-Levelling System</strong></td>
</tr>
<tr>
<td>(i)</td>
<td>Type of Car Levelling Device</td>
</tr>
<tr>
<td>(ii)</td>
<td>Any special Features</td>
</tr>
<tr>
<td><strong>C.</strong></td>
<td><strong>Limit Switches</strong></td>
</tr>
<tr>
<td>(i)</td>
<td>Type</td>
</tr>
<tr>
<td>(ii)</td>
<td>Any special Features</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td><strong>Suspension Ropes / Coated Steel Belts</strong></td>
</tr>
<tr>
<td>(i)</td>
<td>No. of Ropes / Belts</td>
</tr>
<tr>
<td>(ii)</td>
<td>Size and No. of Strands in Each Rope/Belts</td>
</tr>
<tr>
<td>(iii)</td>
<td>Factor of Safety</td>
</tr>
<tr>
<td>(iv)</td>
<td>Method of Attachment to the Car</td>
</tr>
<tr>
<td>(v)</td>
<td>Method of Attachment to the Counter Weight</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td><strong>Counter Weight</strong></td>
</tr>
<tr>
<td>(i)</td>
<td>No. of Sections</td>
</tr>
</tbody>
</table>
(ii) Weight of Each Section

(iii) Type of Guide Shoes

(iv) Method of Load Equalisation of Ropes

6 Painting

Full Particulars Should be given

7 Special Inclusion (If Any)

STAMP & SIGNATURE OF AUTHORIZED SIGNATORY
Proposal for Plant / Equipment / Systems(vendors) (Part A)  

(TENDERS TECHNICAL PROPOSALS)

On Bidders Letter head

We, the (Bidder / Joint Venture of) M/s…………………………………………………………..…………………………………………………………..(Name of Leader of Joint Venture / Name of Bidder) and M/s………………………………………………………………………………..(Name of other member/s of Joint Venture), hereby confirm and certified that:

1) We have understood the Scope of Work defined in the Tender Documents and will execute the work within the stipulated Key Dates, provided in Appendix – B of PS and Key Dates (KD3 to KD5) will be complied with subject to grant of Access to Site as per General Conditions of Contract (GCC).

2) All the interfaces as defined in the Appendix-A of PS or elsewhere in the tender document to execute the work will be done by us and at Design stage, we will submit Interface Management Plan giving details of Interfaces involved with relevant Designated Contractor and obtain approval of “Engineer”.

3) We will submit Plan for Installation, Testing and Commissioning of each sub –system and final Integration plan of the system during design stage and seek approval of Engineer.

4) We will arrange all the required training facilities & proposed training programme required as per the terms and conditions of Contract.

5) We will arrange all the required Transport and lifting / access arrangements required for the heavy equipment.

6) We have updated the list of spares including Lead-time, Price, etc as provided in the Appendix – E of Particular Specifications.

7) We shall provide adequate signage and graphics as being statutory requirements, for the safe and proper utilization of each equipment, in adequate number exhibited at required locations.

8) The system will be designed taking into consideration the climate conditions of Jaipur (i.e. higher ambient temperatures, dusty conditions, and high seasonal humidity, etc) and incorporate adequate measures to ensure that the performance of our proposed system remain unaffected due to such conditions.

9) Our offered Elevators shall be capable of operating satisfactorily and smoothly at a rate of 180 motors starts per hour or above for a period of not less than 20 hours per day, seven days early, within the environment conditions as stated in the General Specification and at the location where the elevators are to be installed. These elevators shall be designed for minimum 10,00,000 (Ten lakh) operation per year and with the minimum failures as defined in PS.
10) We will develop the design based on the specification stipulated in the Tender Document and on proven and reliable Engineering Practices. During design stage, the design detail shall be submitted with technical data and calculations to the Employer for review and approval.

Our offered / proposed system / sub-systems as per requirements at (9) has been in use and have established their performance reliability on following MRTS during past 10 years:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of MRTS</th>
<th>No. of Years in use. (for minimum 2 years)</th>
<th>Remarks (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
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<td>2.</td>
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</tbody>
</table>

The performance certificates from the client / user of the system are enclosed/ will be submitted with the Design Submission.

11) Our offered system will meet the reliability, availability and maintainability as defined in the Employer Requirement, which will be established & demonstrated during the Design Stage.

12) Our offered system/ sub-system achieves the minimum service life given below and failure rate of the components shall not exceed 5%. [as per Clause 8.1.1 of PS].

<table>
<thead>
<tr>
<th>Item</th>
<th>Service Life (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i). Safety gear rope / coated steel belt</td>
<td>8</td>
</tr>
<tr>
<td>(ii). Governor</td>
<td>20</td>
</tr>
<tr>
<td>(iii). Anti Creep Device</td>
<td>20</td>
</tr>
<tr>
<td>(iv). Hoisting chain / hoisting rope</td>
<td>8</td>
</tr>
<tr>
<td>(v). Contractors / relays</td>
<td>10</td>
</tr>
<tr>
<td>(vi). Traction machine / motor</td>
<td>20</td>
</tr>
</tbody>
</table>

The Service life of other equipments / Parts shall be defined in the design submission.

13) We shall establish and maintain documented procedures using ISO 9001 to control and verify the design of system and all its components.

14) We confirm that the Elevators will comply with the Chapter 6 of Particular Specifications (Section VII B) pertaining to Operating and Safety Devices.

15) We shall provide built – in diagnostics and remote monitoring functions as per Clause – 6.20 of the Particular specifications (Section VII B).

16) The work shall be carried out in accordance with the following governing specifications and other statutory rules / codes specified in Particular Specifications (Section VII B):–

- IS 14665: All parts (latest version)
- IS 15330: Installation and maintenance of lifts for handicapped person – Code of Practise
- IS 7759: Specification for lift doors locking devices and controls
- IS 1860: Code of practice for Installation, Operation and Maintenance of Electric passenger
and Goods lifts.

- EN81
- BS5655: Safety rules for Construction and Installation of Electric lifts.
- “Guidelines and space standard for Barrier free Built Environment for Disables And Elderly Persons” published by C.P.W.D. (Central Public Works Department) India.
- BS 729
- IEC 228 and IEC 502
- Fire safety requirements generally as per NFPA – 130.
- Earth system shall conform to IS 3043: 1987.
- EMC requirements as per EN 50081–1, EN 50082–2, EN 12015 and EN 12016.
- For Glass and glazing will comply with BS 952 Part 1, BS 5750, BS 5713, BS6206 and BS 6262.
- Central Electricity Authority Regulations 2010 with latest amendments.
- Indian Electricity Act 2003 with latest amendments.
- Rules and Regulations prescribed by local authorities as applicable.
- Relevant, Indian Standards, IEC Standards, British Standards, and other National/International standards as applicable.

17) The proposed Elevators will comply with following minimum factors of Safety:

(i) Belt/ Rope – 12
(ii) Car frame – At least 5
(iii) Car platforms – At least 5

18) Our offered Elevators will meet the following specification as required by the JMRC

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Speed</td>
<td>1 m/sec</td>
</tr>
<tr>
<td>Carrying Capacity (rates load) for 13 persons</td>
<td>1000kg</td>
</tr>
<tr>
<td>Minimal internal dimension for elevator car of 13 persons</td>
<td>1600mm x 1400 mm</td>
</tr>
<tr>
<td>False ceiling height of car</td>
<td>not less than 2300mm</td>
</tr>
<tr>
<td>Car and landing entrance clear opening width for 13 persons</td>
<td>Not less than 1000mm</td>
</tr>
<tr>
<td>Height of Car and landing entrance</td>
<td>Not less than 2100mm</td>
</tr>
<tr>
<td>Leveling accuracy with finished floor level</td>
<td>+ 5mm</td>
</tr>
<tr>
<td>The elevator for 13 person will be accommodated in the available shaft of</td>
<td>1900mm (depth) x 2500mm (width) with</td>
</tr>
<tr>
<td>dimension</td>
<td>any variation in tune of +250mm</td>
</tr>
</tbody>
</table>
### Employer's Requirements

- Door shall be of center opening type
- Elevator shall be configured so that it is possible to handle a Physically Challenged persons.
- Running clearance between elevator car threshold and landing door sill not less than 15mm but not more than 30mm
- The motor shall be capable of not less than 180 starts per hour without excessive temperature rise
- Motor used shall be designed for 110% of rated load
- The Electro-magnetic brake shall be of the spring applied and electrically released type
- The brake shall be capable of stopping and holding the Elevator car in its downward travel to rest with 125% of its rated load from the maximum governor tripping speed
- No wood or other combustible materials shall be used for any part of the Elevator car including car door and emergency trap door. PVC & Asbestos shall be not be used in any component.
- The enclosure shall be insulated to prevent the transmission of noise and vibration from the car frame
- The toe guard for elevators shall be made of galvanized sheet steel of not less than 1.5mm thick and painted and shall be adequately braced at the back. The depth of the toe guard shall be sufficient to prevent any object from being trapped between the underside of the car platform and the landing during re-levelling operation (with a minimum of 700 mm)
- Each Elevator car shall be adequately ventilated to a minimum standard of 20 air changes per hour. The fans shall be located above the suspended ceiling or recessed in the car ceiling as appropriate. The noise from the fan measured at a distance of 1 meter away within the Elevator car shall not exceed 50dBA (+5%).
- The fire rating of the glass for car door shall be complying with the requirement as per National Building code.
- The fire rating of the glass for landing door shall be minimum 1 hour.
- On “Without Attendant” mode, if no command is registered or due to some abnormality in Lift Safety circuit, after the expiry of a preset time interval of 10-30 seconds (Adjustable) the door shall re-open once for 30 seconds (Adjustable) so as the commuter can come out and then close.
- The Landing door will be provided with locking and interlocking device to prevent the operation of elevator unless all landing doors are closed and locked and Locking device will have at least IP 20 protection.
- MCB box will have IP-54 protection.
- In case Maintenance Access Panel (MAP) is exposed to open area, its enclosure shall be IP 55, Pilfer proof
- All hoistway and car top safety switches and Car Junction box shall be rated to IP Class 55 (minimum).
- All field wiring shall be multi-strand copper conductor type. No joints shall be permitted in any cables or wires in any location.
• The outer sheath of flexible trailing cables shall be of waterproof and flame retardant material. A total of 10 or 10% of the total number of wires used which ever is more and 2 spare shield cables shall be provided per Elevator.

• A battery back-up device to home the Elevators to the landing in the event of power failure shall be provided. This shall be able to move the elevators with any load from no load to full load at reduced speed to the landing and open the doors. In this case landing accuracy shall be less than +/- 10.0 mm.

• ARD start time can be adjusted from 0 to 30 sec depending upon resumption of emergency supply from alternative source / DG sets.

• The capacity of the battery when fully charged, shall be capable of operating the Elevator at rated load from one landing to another for a minimum of 3 trips without further charging. To ensure the same new battery shall be capable to perform the test for 6 trips without intermediate charging at the time commissioning.

• Noise levels resulting from the operation of the elevator, including direct sound transmission, breakout noise and re-radiation of structure borne noise shall not exceed 55dB(A) (fast response) at 1.5m from the elevator shaft and 1.5m above the floor. Machinery noise level under normal operating conditions shall not exceed 70 dB(A) at 1m from the equipment in free field and the total noise level in a moving elevator car shall not exceed 55dB(A) with ventilation fan operating.

19) The proposed Elevators will comply with all the Mechanical, Electrical and Safety requirements as specified in the Tender documents.

20) The above undertaking is indicative, to convey that the offer is Technically compliant with the requirements of the Tender. But it will not absolve us of the necessity to comply with the specific requirements of the clauses except those separately brought out as Deviations in the Deviation Statement and agreed to by the Employer.

21) All the deviations (if any) have been specified in the Deviation statements and priced in the financial offer. No additional Deviations/Conditions / Qualifications, etc have been included in the Offer.

STAMP & SIGNATURE OF AUTHORIZED SIGNATORY
Proposal for Equipment / Systems *(Part – B)*

(To be filled for all Categories)

**Table 1**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Item / Description</th>
<th>Technical Design feature of the proposed equipment</th>
<th>Deviation if any from PS and reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Manufacturer name and make</td>
<td></td>
<td></td>
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<tr>
<td>1.2</td>
<td>Model no. &amp; overall dimensions</td>
<td></td>
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<tr>
<td>1.3</td>
<td>Distance between balustrades</td>
<td></td>
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<td>1.4</td>
<td>Step width (tread width)</td>
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<td>1.5</td>
<td>Capacity (Passengers / hour)</td>
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<td>1.6</td>
<td>Travel / Rise</td>
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<td>1.7</td>
<td>Linear speed</td>
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<td>1.8</td>
<td>Angle of inclination</td>
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<tr>
<td>1.9</td>
<td>power supply</td>
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<td>1.10</td>
<td>Noise level</td>
<td></td>
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<tr>
<td>1.11</td>
<td>Top landing width</td>
<td></td>
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<tr>
<td>1.12</td>
<td>Number of horizontal steps</td>
<td></td>
<td></td>
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<tr>
<td>i. Upper part</td>
<td></td>
<td></td>
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<tr>
<td>ii. Lower Part</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1.13</td>
<td>Type d drive unit (chain / worm)</td>
<td></td>
<td></td>
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<tr>
<td>1.14</td>
<td>Designed drive efficiency</td>
<td></td>
<td></td>
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<tr>
<td>2.0</td>
<td>Supporting of Truss</td>
<td></td>
<td></td>
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<tr>
<td>i. Type of truss</td>
<td></td>
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<tr>
<td>ii. Material of truss</td>
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<td>iii. Construction details of truss</td>
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<tr>
<td>3.0</td>
<td>Travelling Handrails</td>
<td></td>
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<tr>
<td>i. Details of Handrails</td>
<td></td>
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<tr>
<td>ii. Covering</td>
<td></td>
<td></td>
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<tr>
<td>iii. Safety Guards</td>
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<tr>
<td>4.0</td>
<td>Step arrangement</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I. Material
   ii. Width
   iii. Depth
   iv. Rise

5.0 Lubrication
   i. Type
   ii. Model

6.0 Decoration
   i. Interior panels
   ii. Exterior panels

7.0 Safety Devices and Controls
   i. Details of each safety device and controls shall be supplied by the Bidder along with tender
   ii. Principle of operation of each device with a diagrammatic sketch
   iii. An isometric view of the escalator showing the location of each safety device.

8.0 Special Inclusions (if any)

STAMP & SIGNATURE OF AUTHORIZED SIGNATORY
### Table 2 (Part - B)
Escalator Outline Data – Dimensions and Loading Details
(To be filled by the Bidder for all Categories)

<table>
<thead>
<tr>
<th>S.N No</th>
<th>Item / Description</th>
<th>4m</th>
<th>5m</th>
<th>6m</th>
<th>7m</th>
<th>8m</th>
<th>9m</th>
<th>10m</th>
<th>11m</th>
<th>12m</th>
<th>16m</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Vertical rise max.</td>
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<td>2.</td>
<td>Vertical rise min.</td>
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<td>3.</td>
<td>Transition Radius Upper (mm)</td>
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<td>4.</td>
<td>Transition Radius Lower (mm)</td>
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<td>5.</td>
<td>Overall width (mm)</td>
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<td>6.</td>
<td>Distance between supports (mm)</td>
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<td>7.</td>
<td>Upper head length(mm)</td>
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<td>8.</td>
<td>Lower head length(mm)</td>
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<tr>
<td>9.</td>
<td>Horizontal difference between EWPs</td>
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<tr>
<td>10.</td>
<td>Distance between upper WP to Newel end(mm)</td>
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<tr>
<td>11.</td>
<td>Distance between lower WP to Newel end(mm)</td>
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<tr>
<td>12.</td>
<td>Handrail height at upper landing (mm)</td>
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<tr>
<td>13.</td>
<td>Handrail height at lower landing (mm)</td>
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<tr>
<td>14.</td>
<td>Handrail height at above landing (mm)</td>
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<td>15.</td>
<td>Truss depth at upper end (mm)</td>
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<tr>
<td>16.</td>
<td>Truss depth at lower end (mm)</td>
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<td>17.</td>
<td>Pit depth (mm)</td>
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<td>18.</td>
<td>Pit length (mm)</td>
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<td>19.</td>
<td>Pit width (mm)</td>
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<td></td>
<td>Description</td>
<td>Units</td>
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<td>20.</td>
<td>Drain recess depth (mm)</td>
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<tr>
<td>21.</td>
<td>Drain recess length (mm)</td>
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<tr>
<td>22.</td>
<td>No. of Intermediate supports required</td>
<td></td>
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<tr>
<td>23.</td>
<td>Reaction at upper support kN.</td>
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<tr>
<td>24.</td>
<td>Reaction at lower support kN.</td>
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<td>25.</td>
<td>Reaction at each intermediate support kN.</td>
<td></td>
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</tbody>
</table>

**STAMP & SIGNATURE OF AUTHORIZED SIGNATORY**
Proposal for equipments / systems(vendors) (Part – B)

(TENDERS TECHNICAL PROPOSALS)

On Bidders Letter head

We, the (Bidder / Joint Venture of) M/s…………………………………………………………
………………………………..(Name of Leader of Joint Venture / Name of Bidder) and M/s………………
…………………………………..…………………….. (Name of other member/s of Joint
Venture), hereby confirm and certified that:

1) We have understood the Scope of Work defined in the Tender Documents and will execute the
work within the stipulated Key Dates, provided in appendix – B of PS and Key Dates (KD3 to
KD5) will be complied with subject to grant of Access to Site as per General Conditions of
Contract (GC).

2) All the interfaces as defined in the Appendix-A of PS or elsewhere in the tender document to
execute the work will be done by us and at Design stage, we will submit Interface Management
Plan giving details of Interfaces involved with relevant Designated Contractor and obtain approval
of “Engineer”.

3) We will submit Plan for Installation, Testing and Commissioning of each sub-system and final
Integration plan of the system during design stage and seek approval of Engineer.

4) We will arrange all the required training facilities & proposed training programme required as per
the terms and conditions of Contract.

5) We will arrange all the required Transport and lifting / access arrangements required for the
heavy equipment.

6) We have updated the list of spares including Lead-time, Price, etc as provided in the Appendix –
E of Particular Specifications.

7) We shall provide adequate signage and graphics as being statutory requirements, for the safe
and proper utilization of each equipment, in adequate number exhibited at required locations.

8) The system will be designed taking into consideration the climate conditions of Jaipur Region (i.e.
higher ambient temperatures, dusty conditions, and high seasonal humidity, etc) and incorporate
adequate measures to ensure that the performance of our proposed system remain unaffected
due to such conditions.

9) Our offered Escalator shall have heavy duty with proven design of energy Efficient VVVF drive,
reversible type and capable of operating safely, smoothly and continuously in both directions
for a period of not less than 20 hours a day, seven (7) days a week with a alternating
passenger load reaching 100% of Contract Load (120kg per step, including all horizontal
steps) for two hour and 50% of Contract Load for the following hour within the environmental
conditions as stated in the General Specification and at the location where the escalators are
to be installed. The proposed escalators will be of proven, tested and sustainable product for MRTS applications.

10) We will develop the design based on the specification stipulated in the Tender Document and on proven and reliable Engineering Practices. During design stage, the design detail shall be submitted with technical data and calculations to the Employer for review and approval.

Our offered / proposed system / sub-systems as per requirements at (9) has been in use and have established their performance reliability on following MRTS during past 10 years:-

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of MRTS</th>
<th>No. of Years in use. (for minimum 2 years)</th>
<th>Remarks (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The performance certificates from the client / user of the system are enclosed/ will be submitted with the Design Submission.

11) Our offered system will meet the reliability, availability and maintainability as defined in the Employer Requirement, which will be established & demonstrated during the Design Stage.

12) Our offered system/ sub-system achieves the minimum service life given below and failure rate of the components shall not exceed 5%. [as per Clause 8.1.1 of PS].

<table>
<thead>
<tr>
<th>Item</th>
<th>Service Life (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Design life of System</td>
<td>30</td>
</tr>
<tr>
<td>(ii) Steps</td>
<td>15</td>
</tr>
<tr>
<td>(iii) Relays, timers and control gear</td>
<td>8</td>
</tr>
<tr>
<td>(ii) Handrail drive system</td>
<td>15</td>
</tr>
<tr>
<td>(v) Step chains and step axles</td>
<td>15</td>
</tr>
<tr>
<td>(vi) Tension carriage assembly</td>
<td>15</td>
</tr>
<tr>
<td>(vii) Main drive assembly</td>
<td>15</td>
</tr>
<tr>
<td>(viii) Emergency break assembly</td>
<td>15</td>
</tr>
<tr>
<td>(ix) Step and Chain rollers</td>
<td>8</td>
</tr>
<tr>
<td>(x) Handrail</td>
<td>4</td>
</tr>
<tr>
<td>(xi) Ball or roller bearing</td>
<td>110,000 operating hours</td>
</tr>
</tbody>
</table>

The Service life of other equipments / Parts shall be defined in the design submission.

13) We shall establish and maintain documented procedures using ISO 9001 to control and verify the design of system and all its components.

14) We confirm that the Escalators will comply with the Clause 5.8 of Particular Specifications pertaining to Operating and Safety Devices.
15) We shall provide built – in diagnostics and remote monitoring functions as per Clause – 5.10 of the Particular specifications.

16) The work shall be carried out in accordance with the following governing specifications and other statutory rules / codes specified in Particular Specifications:-

- EN 115
- IS 4591
- Fire safety requirements generally as per NFPA - 130.
- Earth system shall conform to IS 3043: 1987.
- EMC requirements as per EN 50081 -1, EN 50082 - 2, EN 12015 and EN 12016.
- For Glass and glazing will comply with BS952 Part 1, BS 5713, BS 6206 and BS6206 and BS6262.
- Central Electricity Authority Regulations 2010. With latest amendments.
- Central Electricity Authority Regulations 2010 with latest amendments.
- Indian Electricity Act 2003 with latest amendments.
- Rules and Regulations prescribed by local authorities as applicable.
- Relevant, Indian Standards, IEC Standards, British Standards, and other National/International standards as applicable.

17) The proposed Escalators will comply with following minimum factors of Safety :-

(iv) Step roller tracks and steps – 8
(v) Driving Machinery - 8 for steel and bronze components; 10 for cast iron parts.
(vi) Chains - 8.
(vii) Trusses and Any other item (if not specified in PS) As per EN 115 (as applicable for Public Service Escalators).

Our offered Escalators will meet the following specification as required by the JMRC

<table>
<thead>
<tr>
<th>Specification</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width of step</td>
<td>1000mm</td>
</tr>
<tr>
<td>No of flat step at both upper and lower landing</td>
<td>4 nos.</td>
</tr>
<tr>
<td>Service Speed</td>
<td>0.65 m/sec &amp; 0.5 m/sec Both</td>
</tr>
<tr>
<td>Maintenance / Idling / crawling speed</td>
<td>0.2 m/sec</td>
</tr>
<tr>
<td>All the keys for Controller and control panel shall be common for all escalators</td>
<td></td>
</tr>
<tr>
<td>Float switch / flooding Sensor in Lower pit to stop the escalator if the pit is floated.</td>
<td></td>
</tr>
<tr>
<td>PVC &amp; Asbestos shall not be used in any component</td>
<td></td>
</tr>
<tr>
<td>In all Escalators it shall be possible to reverse its direction of travel. After reversal of direction, the escalator shall run smoothly in the desired direction without Adjustment and under rated load condition (Refer Clause 5.2.19).</td>
<td></td>
</tr>
</tbody>
</table>
• All parts, elements, sub assemblies and assemblies shall be totally interchangeable between escalators (Refer Clause 5.2.20).

18) The Energy saving features in Escalators will be provided to achieve minimum 30 % Energy Saving when the Escalator is operating at No load. Switching of Escalator back to normal speed will be smooth (i.e. without any jerk to the Escalators)

19) The proposed Escalators will comply with all the Mechanical, Electrical and Safety requirements as specified in the Tender documents.

20) The above undertaking is indicative, to convey that the offer is Technically compliant with the requirements of the Tender. But it will not absolve us of the necessity to comply with the specific requirements of the clauses except those separately brought out as Deviations in the Deviation Statement and agreed to by the Employer.

21) All the deviations (if any) have been specified in the Deviation statements and priced in the financial offer. No additional Deviations/Conditions / Qualifications, etc have been included in the Offer.

STAMP & SIGNATURE OF AUTHORIZED SIGNATORY
Procurement of Plant
Design, Supply and Installation
JAIPUR METRO RAIL CORPORATION LIMITED
BIDDING DOCUMENT
for
Procurement
of
NCB No.-JP/EW/1B/E3


PART-II REQUIREMENTS

Section 6 - Employer’s Requirements (ERQ)

Volume – I General Specifications

JAIPUR METRO RAIL CORPORATION LTD.
Khanij Bhawan, Tilak Marg,
C- Scheme, Jaipur (Rajasthan) PIN-302005
Country: India
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<tr>
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<td>5</td>
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<td>Metering</td>
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<td>22.19</td>
<td>Inability to Supply</td>
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<td>23</td>
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<td>1</td>
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</table>

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CHAPTER 1

1. GENERAL

1.1 Application of the General Specification (GS)

1.1.1 The provisions contained in the Technical Specification (TS) 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.

1.2 Abbreviations

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

<table>
<thead>
<tr>
<th>Abbreviation (ACB)</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACB</td>
<td>Air Circuit Breaker</td>
</tr>
<tr>
<td>AMS</td>
<td>Auxiliary Main Sub Station</td>
</tr>
<tr>
<td>ASS</td>
<td>Auxiliary Sub Station</td>
</tr>
<tr>
<td>BCC</td>
<td>Backup Control Centre</td>
</tr>
<tr>
<td>BCU</td>
<td>Bay Control Unit</td>
</tr>
<tr>
<td>BS</td>
<td>British Standard</td>
</tr>
<tr>
<td>BEC</td>
<td>Buried Earth Conductor</td>
</tr>
<tr>
<td>BMS</td>
<td>Building Management System</td>
</tr>
<tr>
<td>CADD</td>
<td>Computer Aided Design and Drafting</td>
</tr>
<tr>
<td>CAR</td>
<td>Corrective Action Request</td>
</tr>
<tr>
<td>CMV</td>
<td>Catenary Maintenance Vehicle</td>
</tr>
<tr>
<td>CNP</td>
<td>Construction Noise Permits</td>
</tr>
<tr>
<td>COTS</td>
<td>Commercial Off the Shelf</td>
</tr>
<tr>
<td>CPM</td>
<td>Critical Path Method</td>
</tr>
<tr>
<td>CV</td>
<td>Curriculum Vitae</td>
</tr>
<tr>
<td>DG</td>
<td>Diesel Generator</td>
</tr>
<tr>
<td>DLP</td>
<td>Defects Liability Period</td>
</tr>
<tr>
<td>DMRC</td>
<td>Delhi Metro Rail Corporation</td>
</tr>
<tr>
<td>JMRC</td>
<td>Jaipur Metro Rail Corporation</td>
</tr>
<tr>
<td>ECS</td>
<td>Environment Control System</td>
</tr>
<tr>
<td>E&amp;M</td>
<td>Electrical &amp; Mechanical</td>
</tr>
<tr>
<td>EMC</td>
<td>Electromagnetic Compatibility</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>EMIP</td>
<td>Environmental Mitigation Implementation Plan</td>
</tr>
<tr>
<td>EMP</td>
<td>Environmental Management Plan</td>
</tr>
<tr>
<td>EMSD</td>
<td>Electrical and Mechanical Services Department</td>
</tr>
<tr>
<td>EMU</td>
<td>Electric Multiple Unit</td>
</tr>
<tr>
<td>EN</td>
<td>Euro-Norm (European Standards)</td>
</tr>
<tr>
<td>EPD</td>
<td>Environmental Protection Department</td>
</tr>
<tr>
<td>ETI</td>
<td>Employer’s Training Instructors</td>
</tr>
<tr>
<td>FAI</td>
<td>First Article Inspection</td>
</tr>
<tr>
<td>FAT</td>
<td>Factory Acceptance Test(s)</td>
</tr>
<tr>
<td>GCC</td>
<td>General Conditions of Contract</td>
</tr>
<tr>
<td>GS</td>
<td>General Specification (this document)</td>
</tr>
<tr>
<td>HV</td>
<td>High Voltage</td>
</tr>
<tr>
<td>IEC</td>
<td>International Electro-technical Commission</td>
</tr>
<tr>
<td>IEE</td>
<td>The Institution of Electrical Engineers</td>
</tr>
<tr>
<td>IED</td>
<td>Intelligent Electronic Device</td>
</tr>
<tr>
<td>IP</td>
<td>Ingress Protection</td>
</tr>
<tr>
<td>IS</td>
<td>Indian Standards</td>
</tr>
<tr>
<td>ISO</td>
<td>International Standards Organisation</td>
</tr>
<tr>
<td>ITB</td>
<td>Instructions To Bidders</td>
</tr>
<tr>
<td>ITU</td>
<td>International Telecommunications Union</td>
</tr>
<tr>
<td>LV</td>
<td>Low Voltage</td>
</tr>
<tr>
<td>MCB</td>
<td>Miniature Circuit Breaker</td>
</tr>
<tr>
<td>MMI/ HMI</td>
<td>Man/Human -Machine Interface</td>
</tr>
<tr>
<td>MTR</td>
<td>Mass Transit Railway</td>
</tr>
<tr>
<td>NSR</td>
<td>Noise Sensitive Receivers</td>
</tr>
<tr>
<td>OCC</td>
<td>Operations Control Centre</td>
</tr>
<tr>
<td>OPC</td>
<td>Overhead Protection Cable</td>
</tr>
<tr>
<td>OSR</td>
<td>Operational Safety Report</td>
</tr>
<tr>
<td>OSR(S)</td>
<td>Operational Safety Report (Software)</td>
</tr>
<tr>
<td>OHE</td>
<td>Overhead Equipment (Flexible Catenary)</td>
</tr>
<tr>
<td>P3</td>
<td>Primavera Project Planner</td>
</tr>
<tr>
<td>PLC</td>
<td>Programmable Logic Controller</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>PS/TS</td>
<td>Particular Specification</td>
</tr>
</tbody>
</table>
1.2.1 Further abbreviations may be defined within the body of the GS or TS 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.

1.2.2 Abbreviations of units of measurement used in the GS shall have the meanings as defined under the SI system of units.

1.3 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 shall be provided at the time of award.

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.
“Day” means calendar day unless expressly stated otherwise.

“Defined Area” means an area within which Works Trains will be operated and the Employer’s defined area working safety rules will apply.

“Factory Acceptance Tests” means the tests to be performed at the Contractor’s factories prior to delivery to the Site to verify compliance with the Specification and quality standards.

“Installation Tests” means the tests to be performed to verify the conformity of completion of an installation/assembly to the design documents previously reviewed without objection by the Employers Representative prior to the start of Commissioning. Installation Tests do not form part of the Tests on Completion to be performed by the Contractor in order to achieve Employer’s Taking Over of the Works or any Section however they must be successfully completed before the Tests on Completion can commence.

“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 TS.

“Partial Acceptance Tests” means the functional tests to be performed on components and parts of systems to meet the specified criteria. Partial Acceptance Tests 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.

“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.

“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.

“Quality Hold Point” means a point in time when a notice of no objection by the Employer’s Representative is required.

‘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.

“Specification (the)” means the aggregate sum of the documents and any amendments thereto, issued to bidders by JMRRC as part of the bid process before the final date for submission of bids. This shall include but not be limited to; Employer’s

Requirements, Employer’s bid Drawings, Preliminary Operating Plan and Clarification of bid Documents issued in accordance with the ITB but shall not include the ITB itself or any minutes of meetings.
15. “Specification (this)” means the particular document within which the reference is made.

16. “System Acceptance Tests” means those tests that demonstrate the performance of the installation/equipment to the specified requirements as detailed in the PS. SATs 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.

17. “Integrated Testing and Commissioning” means those tests that demonstrate the integration of the complete transport system meeting the requirements of the Specification in an operating environment. Integrated Testing and Commissioning form part of the Tests on Completion to be performed by the Contractor in order to achieve Employer’s Taking Over of the Works or any Section.

18. “Validation” means the process of confirmation by examination and provision of objective evidence that the application produced achieves the particular requirements specified.

19. “Verification” means the process of confirmation by examination and provision of objective evidence that the specified requirements have been incorporated.

1.4 Glossary of Terms

1.4.1 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.

1.4.2 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.

1.5 Submission for Review

1.5.1 Reference in the GS and TS 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.

1.5.2 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 TS.

1.5.3 Submissions for review shall be made in accordance with the dates (relative to the Works Programme) stated in the GS and/or the TS, 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.
1.6 Standards, Codes of Practice

1.6.1 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 TS, 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.

1.6.2 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.

1.6.3 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 TS or, where no Standard is identified, the Contractor shall make a proposal which shall be subject to review by the Employer’s Representative.

1.7 Employer’s Drawings

1.7.1 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.

1.7.2 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.

1.7.3 The Contractor shall note that any drawings included but marked “For information only” do not form part of the Contract.

1.7.4 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.

1.8 Specifications in Metric and Imperial Units

1.8.1 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.

1.8.2 Conversion of metric units to imperial units and of imperial units to metric units shall be in accordance with the Standard International Practice.

1.9 System Safety

1.9.1 Safety philosophy

1.9.1.1 Safety of passengers, staff and the general public is paramount for railway operation. Prime consideration shall be given to all issues that can have an effect on safety.

1.9.1.2 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.
1.9.2 Safety Management

The Contractor shall implement the Contract Systems Safety Management Requirements, as referenced in the Project Safety Manual and elsewhere in the Specification, in consultation with the Employer’s Representative.

1.9.3 Prescriptive Safety Criteria

1.9.3.1 The Contractor shall identify and list all applicable statutory and regulatory requirements and codes of practice relevant to the Works and to work within the constraints and limitations imposed by the requirements and codes.

1.9.3.2 The safety of the Contractor’s supplied systems and equipment shall be developed by the Contractor in accordance with the requirements contained in clause 3.4.5 below and the TS.

1.10 Not used

1.11 Suitability for Purpose

Jaipur Metro Rail Corporation (JMRC) shall be operating high-density passenger trains with high volume of traffic in the proposed corridors commensurate with the stage opening of the sections.

1.11.1 Interference and Compatibility

The Contractor shall ensure that all Works and Contractor’s Equipment operate in a satisfactory manner without causing interference to other equipment and services including parties external to the Employer. The Contractor shall also ensure that the Permanent Works are physically and technically compatible with associated plant and in particular with that of other Contractors.

1.11.2 Planning for introduction to service

The Permanent Works shall be constructed in such a manner that they can be installed, tested and commissioned without adversely affecting the operation or safety of the Project. The Permanent Works shall be constructed so that, where appropriate, considering the operating procedures adopted by the Employer, they can be brought into operational use during non-traffic hours and if necessary during a single night following maintenance, repair or overhaul during the life of the Permanent Works, equipment and systems.

1.12 Climatic Condition / Operating Environment

1.12.1 General

1.12.1.1 The following information on climatic conditions in Jaipur shall be taken into account by the Contractor when constructing 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 TS.

(2) Clause 1.12.2 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.

(5) The indicative information on climatic conditions in Jaipur is derived from the India Meteorological Department publication.

(6) The data covers the period 1901 to 2010.

1.12.2 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 C.

<table>
<thead>
<tr>
<th>CLASS</th>
<th>LOCATION of EQUIPMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Air Conditioned Offices, Computer and Equipment Rooms</td>
</tr>
<tr>
<td>B</td>
<td>Ventilated Equipment Rooms in buildings at the surface or at the underground station or structures.</td>
</tr>
<tr>
<td>C</td>
<td>Outdoors</td>
</tr>
</tbody>
</table>

Table 1-2 Classes of Environment

The following are the minimum 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.

1.12.3 Requirements for Class A

- Minimum Temperature - 5°C
- Ambient Temperature - 24±2°C
- 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.

1.12.4 Requirements for Class B

- Ambient Temperature - 35°C
- Maximum Temperature - 50°C
- Relative Humidity - Nominal 70%, Maximum 100% (Non Condensing)
- Air Quality - Polluted and dusty - \( \text{SO}_2 \): 80-120mg/m\(^3\) Suspended Particulate Matter: 360-540mg/ m\(^3\)
- Electrical Noise - Impulse 1kV, 1.2/50 rise/decay, 500Ω source impedance, 0.5 J source energy. Radio & High frequency as Class A.
1.12.5 Requirements for Class C

1.12.5.1 Temperature
All equipment shall be tested in accordance with the given figured allowing a margin of at least 10% greater and 2°C less than the limits recorded. All equipment shall work within the enclosures proposed with the specified environment outside the enclosure; particular attention shall be paid to the possibility of solar gain as referred to in clause 0 below.

1.12.5.3 Wind Pressure
The system is to give satisfactory service for a wind pressure up to 150 kgf/m²

1.12.5.4 Sunshine
Monthly average sunshine hours can be obtained by placing a specific request to Meteorological Department.

1.12.5.5 Relative Humidity
Daily maximum and minimum average values during winter, summer and rainy season.

<table>
<thead>
<tr>
<th></th>
<th>Max</th>
<th>Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter</td>
<td>72%</td>
<td>28%</td>
</tr>
<tr>
<td>Summer</td>
<td>48%</td>
<td>16%</td>
</tr>
<tr>
<td>Rainy</td>
<td>77%</td>
<td>35%</td>
</tr>
</tbody>
</table>

1.12.6 Electromagnetic Compatibility (EMC)
Electronic equipment in a railway environment shall be immunised against the usual electromagnetic influences to be expected from the rail operations. For this, the following EMC classification in accordance to IEC 801 or similar, for the equipment rooms shall be achieved:

1.12.6.1 Electrostatic discharge
The electronic equipment rooms shall be constructed in accordance to class 2 of IEC 801-2 or similar.

1.12.6.2 Electromagnetic fields
The electronic equipment rooms shall be constructed in accordance to class 2 of IEC 801-3 or similar.

1.12.6.3 Fast transient interference (Burst)
The electronic equipment rooms shall be constructed in accordance to class 2 of IEC 801-4 or similar.

1.12.6.4 High energy transient interference
The electronic equipment rooms shall be constructed in accordance to class 2 of IEC 801-5 or similar.
1.12.6.5 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.

1.12.6.6 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 µT
AC fields: 1 A/m or 1.2 µT

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.

1.13 Survey and Site Investigations

1.13.1 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.

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

1.13.3 The Contractor shall carry out all further site investigations necessary for the construction of the Permanent Works and to enable the determination of the methods of construction and the nature, extent and design of Temporary Works.

1.13.4 The Contractor shall investigate environmental factors also to determine suitable methods of manufacture and installation, both for Temporary and Permanent Works. In particular the Contractor shall ensure that the dusty environment of Jaipur has no detrimental effect to the functionality, reliability or long term maintainability of the Permanent Works.

* End of Chapter *
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.

2.2.2 Access Dates and Key Dates 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.

2.2.4 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.

2.2.5 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 2.17 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 bid period.

2.4.1 Submission Dates

2.4.1.1 Not Used

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 in full versions of the Works Programme within the time scales 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 Contractors 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 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 in order that the CPM networks developed can be freely analysed.

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 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 Documents showing all items where review by the Employer’s Representative is required;

(3) Intentionally left blank ;

(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) intentionally left blank;

(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;
testing and commissioning activities which demonstrate an understanding of the interfaces and requirements of Chapter 9 below; and

(12) Training and Transfer of Technology.

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) Procurement and manufacturing programme;

(2) Installation Programme;

(3) Testing and Commissioning Programme; and

(4) Training and Transfer of Technology Programme

2.4.2.5 The submission of the full version of the Works Programme shall include the, 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 In addition, the contractor shall submit any other programmes as required by the employer’s Representative from time to time.

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

(1) all programmes shall be computerised Critical Path Method (CPM) networks developed using the Precedence Diagramming Method (PDM), and 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;

(3) unless consent is otherwise obtained from the Employer’s Representative, all programmes shall be accompanied by a Programme Analysis Report as described in clause 2.19 below;

(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 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 installation;

(b) number of items of Contractor’s Equipment;

(c) number of drawings and other deliverables;

(d) principle quantities of components or parts;
principle quantities of bulk materials inclusive of cabling, pipe, ductwork and equipment items, etc.

2.4.3 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 in which the activity is included, from information provided in the BOQ. Key Dates and Access Dates 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 Submission Programme

2.5.1 The Contractor shall, within 30 days of the Commencement Date of the Works, submit a Submission Programme covering all proposed submissions to the Employer’s Representative.

2.5.2 The Submissions Programme shall include the proposals for vendor approvals and 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, 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.

2.6 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 Procurement and Manufacturing Programme that shall be an integrated part of the overall Works Programme.

2.6.2 The 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 above. The procurement and Manufacturing Programme shall include the proposals for vendor approval. The contractor is required to submit proposals for vendor approvals for all equipments, assemblies, sub-assemblies spare parts, M&P and any other item required for the project. Inter alia the details should include design, manufacturing and testing facilities available with the vendor. Quality Assurance Plans adopted by the vendor and its sub-vendors shall also be submitted for employer’s review. The contractor is also, required to submit the details of turnover of the vendor for last 5 years and turnover in respect of the equipment proposed to be supplied by the vendor. In case of off shore vendors the contractor is required to submit details regarding facilities available in India and the experience in transfer of technology of the vendor proposed. The proposal should also include training and other technical support to be provided by the vendor. In case of off shore vendors, the proposed scope of technology transfer shall also be included. The Contractor should ensure that the equipments/systems proposed for elevated/at-grade/ underground sections shall be, as far as possible, similar to the ones approved for Phase-I/ Phase-II lines. In case
this is not possible the proposed equipment/system should have been used for at least 5 years on any metro system.

2.6.3 The Contractor shall submit a weighted bar chart of the Contractor’s, 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 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. Employer’s Representative’s inspection, delivery schedules;

4. Deleted

5. Deleted

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, 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 3.5.1 below.

2.6.9 Deleted

2.6.10 Deleted

2.6.11 Deleted

2.7 Installation Programme

2.7.1 The Installation Programme shall be submitted as stated in the TS 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 include detailed activities describing all aspects of the installation of the Works, to meet all Milestones and Key Dates given in the Contract. It shall be clearly linked to the Procurement and Manufacturing Programme and Testing and Commissioning Programme to form an integrated part of the Works Programme.

2.7.3 The Installation Programme shall be fully supported by the Construction and Installation Management Plan as specified in clause 3.6 below.
2.7.4 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.

2.7.5 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.

2.7.6 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.

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

2.7.8 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 coordinate 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 Access dates identified in the; 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.

2.8 Testing and Commissioning Programme

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

2.8.2 The Contractor shall submit the Testing and Commissioning Programme that shall fulfil all the on-Site testing and commissioning requirements of clause 9.3.2.2 below. The Testing and Commissioning Programme shall clearly demonstrate the logic and highlight the topics listed in the On-Site Testing and Commissioning Plan in clause 9.3.2.2 below.

2.8.3 The Testing and Commissioning 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.

2.8.4 The Testing and Commissioning Programme shall demonstrate the logical dependencies between the individual tests of the Works, and shall also show the interfaces and dependencies with all of the Project Contractors’ tests required to commission the Works and support the Commissioning Plan.
2.9 Training and Transfer of Technology Programme

2.9.1 The Contractor shall, within 180 days of the Commencement Date of the Works, submit for review by the Employer’s Representative, a Training and Transfer of Technology Programme covering all proposed formal training courses, delivery of training equipment and accesses by the Employer’s personnel for informal ‘hands on’ technology transfer. The Training and Transfer of Technology Programme shall also detail specific Transfer of Technology features as required by the Specification and proposed by the Contractor.

2.9.2 The Training and Transfer of Technology Programme shall be developed to the Training and Transfer of Technology Plan as required under clause 3.7.4 below.

2.9.3 The Training and Transfer of Technology Programme shall be sufficiently detailed that the Employer can ensure the availability of staff for all the courses required under clause 10.1.6 below.

2.9.4 The Training and Transfer of Technology Programme shall include the requirements of Chapter 10 below, including the Training and Transfer of Technology activities of all sub-contractors and suppliers.

2.10 Not used

2.11 Not used

2.12 Not used

2.13 Track Related Installation Programme (TRIP)

2.13.1 The Employer and the Employer’s Representative shall, upon taking over the Permanent Works for works train running, maintain a co-ordination between the various contractors wishing to work in the section.

2.13.2 The Contractor and each other contractor will submit his requirements in a form similar to that required in the T/C in clause 2.12 above. The Site Co-ordination Team referred to in clause 9.5 below will maintain the TRIP and resolve conflicts between contractors by discussion at the weekly Works Train meeting to which the Contractor may send a representative.

2.13.3 The TRIP and associated safe working documentation issued by the Site Co-ordination Team shall be accepted by all contractors as limiting their areas of working. Any work carried out in contradiction to that allowed by the TRIP will be considered to be a breach of the site safety arrangements.

2.14 Programme Submissions

2.14.1 The Contractor shall submit all programmes described in this Chapter in conjunction with the Management Plans described in Chapter 3 below to the Employer’s Representative for review.

2.15 Programme Review

2.15.1 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.
2.15.2 In the case of further re-submittals, the resubmission time shall also be 14 days.

2.16 Works Programme Revisions

2.16.1 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 the 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.

2.16.2 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.

2.17 Monthly Progress Report

2.17.1 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.

2.17.2 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 Appendix 1 of this Specification.

2.17.3 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.

2.17.4 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.

2.18 Programme Analysis Report

2.18.1 Deleted

2.18.2 Deleted

2.19 Key Date and Access Date Report

2.19.1 The Key Date and Access Date 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 Access Dates that were planned to be achieved in the reporting period or earlier but have not been achieved;
(2) all Key Dates and Access Dates that have been achieved in the reporting period;

(3) all Key Dates and Access Dates that are planned to be achieved in the next reporting period; and

(4) any future Key Dates and Access Dates that appear unlikely to be achieved on time.

2.19.2 The Key Date and Access Date Report shall identify, for all relevant Key Dates and Access Dates, 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.

2.19.3 The Key Date and Access Date 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.

2.20 Not used

2.21 Progress Meetings

2.21.1 The Employer/Engineer 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.

2.21.2 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.

2.21.3 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.

2.22 Quarterly Review Meetings

2.22.1 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 not less than 28 days before they are to be held.

2.22.2 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 Senior official 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).

2.22.3 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.

* END OF CHAPTER *CHAPTER 3
3. MANAGEMENT PLANS AND SUBMISSIONS

3.1 General

3.1.1 In order to organise the various submissions required by the Employer’s Representative, and to ensure the Contractor’s understanding 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.

3.1.2 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.

Unless otherwise stated in the PS, all plans and documents shall be submitted in preliminary form within 60 days of the Commencement Date of the Works followed by detailed plans within 60 days of the preliminary submission. Further submissions shall be made:

(1) when required in accordance with the Works Programme;

(2) whenever the development of the Contractor’s planning allows the plan to be developed further;

(3) in response to comments made by the Employer’s Representative in accordance with clause 4.3.6 below;

(4) whenever any change occurs that invalidates the information contained in the previously submitted and reviewed document, within 14 days of the occurrence of such change; and

(5) when requested by the Employer’s Representative from time to time.

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

**Procurement and Manufacturing Plan**
- Factory Testing Plan
- Procurement, Manufacturing and Delivery Plan

**Construction and Installation Management Plan**
- Construction and Installation Plan
- Health and Safety Documentation
- Not used

Completion Management Plan
- Commissioning Plan
- Operation and Maintenance Manuals Plan
- Training and Transfer of Technology 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 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 the control of receipt and issue of all Works related correspondence so as to ensure traceability;

(3) the procedures for the 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 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.

3.3.2 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 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 90 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 submit 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 Configuration management of all hardware and software shall be in accordance with ISO 10007.

3.4.4 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.

3.4.5 Safety Plans

3.4.5.1 Site Safety Plan

3.4.5.1.1 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.

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

3.4.5.2 RAMS Plan

3.4.5.2.1 The Contractor shall implement a formal Reliability Plan and a formal Maintainability Plan in accordance with the TS and EN 50126 (Railway applications - The specification and demonstration of dependability, reliability, availability, maintainability and safety (RAMS)).

3.4.5.2.2 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 TS.
b) The Contractor shall submit for review by the Employer’s Representative the Contractor’s Reliability Plan and Maintainability Plan.

3.5 Procurement and Manufacturing Plan

The 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 Factory Testing Plan

3.5.1.1 Deleted

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

1. 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

2. Type Tests, Routine Tests, First Article Inspections and any other tests constituting the Factory Acceptance Tests.

3.5.1.2 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 TS.

3.5.1.3 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.

3.5.1.4 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.

3.5.1.5 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 1.12.2 above for the different environmental classifications or otherwise as required in the TS.

3.5.1.6 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 interchangeability.

3.5.1.7 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.

3.5.1.8 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. It is to be ensured that type test should not be more than 5 years old.

3.5.1.9 Deleted

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

3.5.2 Procurement, Manufacturing and Delivery Plan

3.5.2.1 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:

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.

3.5.2.2 Deleted

3.5.2.3 Deleted

3.5.2.4 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.
3.5.2.5 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, 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 subcontractor(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) Deleted

(2) Deleted

(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) Deleted
   b) Deleted
   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

(7) 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 Deleted

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 JMRC properties.

3.6.1.6 The following particulars shall be submitted to the Employer’s Representative for review within 14 days of the Commencement Date of the Works:

(i) drawings showing the layout within the Site of the Employer’s Representative’s and Contractor’s accommodation, Project signboards, access roads and major facilities required early in the Contract;

(ii) drawings showing the layout and the construction details of the Employer’s Representative’s accommodation; and

(iii) drawings showing the details to be included on Project signboards.

3.6.1.7 Drawings showing the location of stores, storage areas, work areas and other major facilities shall be submitted to the Employer’s Representative for review as early as possible, but in any case not later than 28 days before construction of the facilities.

3.6.2 Health and Safety Documentation

3.6.2.1 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.

3.6.2.2 The Contractor shall submit to the Employer’s Representative the Health and Safety Documentation for review within 30 days of the Commencement Date of the Works.

3.6.3 Not used

3.7 Deleted

3.7.1 Deleted

3.7.2 Commissioning Plan

3.7.2.1 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.

3.7.2.2 The Commissioning Plan shall consist of the following:

a. Deleted
b. On-Site Testing and Commissioning Plan

(i) **Installation Tests** 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 TS 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 TS, 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 Tests** 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 TS. The plan shall be submitted within the period of time laid down in the TS, 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 Tests** 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 TS. The plan shall be submitted within the period of time laid down in the TS, or, if none is given, not later than four months in advance of the date for the commencement of the System Acceptance Tests.

(iv) **Integrated 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 TS. The plan shall be submitted within the period of time laid down in the TS, or, if none is given, not later than four months in advance of the date for the commencement of the Integrated Testing & Commissioning.

3.7.3 **Operation and Maintenance Manuals Plan**

3.7.3.1 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.

3.7.3.2 The Contractor shall submit the Operation and Maintenance Manuals Plan by the date stated in the TS, or, if none is given, not later than nine (9) months prior to the issue of the Taking Over Certificate for the Works and according to staged commissioning of the proposed systems.

3.7.4 **Training and Transfer of Technology Plan**

3.7.4.1 The Contractor shall ensure the timely preparation of the Contractor’s Training and Transfer of Technology 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.

3.7.4.2 The Contractor shall submit the Training and Transfer of Technology Plan by the date stated in the TS, or, if none is given, not less than six (6) months prior to the issue of the Taking Over Certificate for the Works and also to suit the staged commissioning of the relevant systems.

3.7.5 **Not Used**

3.7.6 **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 issuance of the Taking Over Certificate for the Works. 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.

3.7.7 Not used

* End of Chapter *
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 as specified in BS 3429.

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:

<table>
<thead>
<tr>
<th>Document Type</th>
<th>Electronic Document Format (latest versions of)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text Documents</td>
<td>MS Word</td>
</tr>
<tr>
<td>Spread Sheets</td>
<td>MS Excel</td>
</tr>
<tr>
<td>Data Base Files</td>
<td>MS Access</td>
</tr>
<tr>
<td>Presentation Files</td>
<td>MS PowerPoint</td>
</tr>
<tr>
<td>Programmes</td>
<td>Primavera for Windows</td>
</tr>
<tr>
<td>AutoCAD Graphics</td>
<td>CorelDraw / AutoCAD</td>
</tr>
<tr>
<td>Photographic</td>
<td>Adobe Photo Shop</td>
</tr>
<tr>
<td>Desktop Publishing</td>
<td>QuarkXPress</td>
</tr>
<tr>
<td>CADD Drawings</td>
<td>Micro Station</td>
</tr>
</tbody>
</table>

Media for Electronic File Submission

All submittal shall be accompanied with a CD containing the submittal.

Internet File Formats/Standards

Deleted

4.2.1.4 Deleted

4.2.1.5 If required, two copies 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 Deleted
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 TS.

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 on vellum (signed by the contractor), one A1 copy on vellum, one paper A1 copy, six paper A3 copies and an electronic data copy of all drawings; and

(2) for documents - the unbound original, six bound copies and an electronic copy when applicable.

4.2.2.2 The A3 copies of drawings shall be produced as reduced versions of the A1 original.

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 28 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, 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.
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 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.

4.3.5.6 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.

4.3.5.7 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”
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 10 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 10 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 9001/9002:2000 “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.

The Quality Management System documentation shall include, but shall not be limited to the following:

1. quality manual;
2. quality procedures and work instructions;
3. quality plans; and
4. inspection and test plans.

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.

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. Deleted;
3. Manufacturing Quality Plan and 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.

5.2.3 Within 30 days of the Commencement Date of the Works, the Contractor shall submit for review by the Employer’s Representative:
(1) a quality manual;

(2) the quality system procedures and any associated system instructions and/or forms which he proposes to use for the Works; and

(3) Deleted

5.2.4 The Contractor shall submit separate Manufacturing Quality Plan and 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 60 days prior to the commencement of the manufacturing and 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.

5.2.5 The Contractor shall promptly supply the Employer’s Representative with two (2) controlled copies 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. In addition, the Employer’s Representative may request further copies of the quality system documents and these documents shall reach the Employer’s Representative’s office within fourteen (14) days of notification.

5.2.6 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 within 30 days of the Commencement Date of the Works.

5.2.7 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 Not used

5.5 Site Quality Plan

5.5.1 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.

5.5.2 The Contractor shall also prepare inspection and test plans to manage and control any test and inspection activities in accordance with clause 5.6.1 below.

5.6 Inspection and Test Plans, Records and Reports

5.6.1 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 5.8.1 below; and

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

5.6.2 Each report of the inspection and/or test shall be prepared in accordance with clause 9.6.6.1 below.

5.6.3 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.

5.6.4 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.

5.7 Review, Verification & Audit

5.7.1 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.

5.7.2 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.

5.7.3 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.

5.7.4 The Contractor shall submit for review by the Employer’s Representative details of the authority, qualifications and experience of personnel assigned to review, verification and to audit activities.

5.7.5 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.
5.8 Quality Control Register

5.8.1 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. summarize any actions proposed by the Contractor to overcome any non-conformity identified in clauses 5.8.1.(1), (2) & (3) above.

5.9 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.

5.10 Notification of Non-conformities

5.10.1 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.

5.10.2 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 5.10.1 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.

* End of Chapter *
CHAPTER 6

6. SOFTWARE MANAGEMENT AND CONTROL

6.1 Prescriptive Framework

All software to be developed or modified (re-engineered software) shall follow the normative requirements of EN50128 (Railway Applications: Software for Railway Control and Protection Systems). The Software shall be designed, developed and tested according to the Software Quality assurance Plan, Software Integrity Level (SIL) 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. In addition to the requirements of the Software Quality Assurance Plan, justification, which shall be reviewed without objection by the Employer’s Representative, shall be required in respect of any highly recommended EN50128 Annex A normative clauses which are not to be applied to software development and supply.

6.2 Software Framework

As defined in EN50128, all software produced or supplied for the project shall be subject to a defined quality framework. The Contractor shall use a Quality Assurance System which is compliant with CENELEC specifications, with EN29000 series and others and meet the requirements as stipulated in the PS. ISO 9000-3 is considered appropriate for Safety Integrity Level 0 or 1 software.

6.3 All Control & Monitoring Software has to be provided to the Employer in the following formats

   i) Source Code
   II) Detailed Programme With explanation of key functions, protection schemes and safety requirement.
   III) System description and layout module wise.
   IV) Troubleshooting of hardware & software including that in communication with SCADA.

6.4 System should generate non-conformity statements with classification of severity of the non-conformity. The daily reports should be updated.

6.5 This will form part of the submittals.

* End of Chapter *
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 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, false work or form work.

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 3 months 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 JMRC”.

7.4 Electronic Control Racks & Cabinets
7.4.1 Racks & Cabinets
7.4.1.1 Electronic control equipment shall be housed in racks suitably enclosed in metal cabinets.

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 Deleted

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

7.4.1.6 Unless otherwise specified in TS, indoor equipments shall have a minimum IP rating of IP54 and outdoor equipment shall have IP rating of IP65 under IEC 529.

7.4.1.7 No item of equipment, which is removable, as part of routine maintenance procedures shall be 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 Not used

7.4.2.3 All cable cores shall be terminated including all spare conductors.

7.4.2.4 Each cable core 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.

* End of Chapter *
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 Crating

8.2.1 Deleted

8.3 General Precautions

8.3.1 Spare parts shall be tropicalised in their packing for prolonged storage in accordance with BS 1133 or other equivalent International /Indian standard and shall be suitably and individually labelled to indicate:

(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.

8.3.2 Deleted

8.3.3 Deleted

8.3.4 Deleted

8.3.5 Deleted

8.3.6 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.
8.4 Packaging Procedures

8.4.1 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.

8.4.2 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.

8.5 Shipping

8.5.1 The Contractor shall notify the Employer’s Representative ten days in advance of any expected shipment date and give further notification of the actual shipment date and routing when such information is subsequently established. This shall complement the inspection requirements prior to delivery as specified herein.

8.5.2 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.

8.5.3 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.

8.5.4 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.

8.6 Delivery

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

8.6.2 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.

8.6.3 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.

8.6.4 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.

8.6.5 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.

8.6.6 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.

8.6.7 An item shall be considered delivered when all damage have been repaired and all documentation and post delivery preparation have been completed to the satisfaction of the Employer’s Representative.
End of Chapter
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 SCC, this Specification and the TS.

9.1 General

9.1.1 Deleted.

9.1.2 Deleted

9.1.3 Deleted.

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 5.4 above 5.6.

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 Tests; 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 Deleted.

9.2.6.2 Deleted

9.2.6.3 Deleted
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  Deleted

9.2.6.6  Deleted

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 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.

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  Deleted

9.2.7.7  Deleted

9.2.7.8  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 / TS.

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 3.5.1 above and PS / TS)

(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 3.5.1 above);

2. **Installation Tests**;

3. **Partial Acceptance Tests**;

4. **System Acceptance Tests**;

5. **Integrated Testing & Commissioning**; and

6. **Service Trial**.

9.3.2.2 Items (3), (4), (5) and (6) as required by the PS / TS 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. Deleted

3. the interdependency and interaction with other Contractors and their commissioning programmes; the type and extent of testing and commissioning to be undertaken and the parts of the Works to be proven by that testing; the objective of each test, what particular operating criteria the test or inspection will prove and how the success of the test will be demonstrated or measured;

4. Deleted

5. 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

6. 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 TS. 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 three copies 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 three copies 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) and return one copy to the Contractor. 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 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 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 TS 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. During this phase, an energy source shall be introduced to enable functional testing to be performed. 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 prescribed in the PS / TS are indicative only.

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 / TS. 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.
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.

The Contractor shall submit to the Employer’s Representative by the date laid down in the PS / TS (or if none is given, no later than two months before the commencement of the commissioning work whichever is earlier), 3 copies of its proposed Partial Acceptance Tests records. The records shall be appropriately sub-divided to make provision for the various parts of the systems and equipment covered by the Contract and shall cover all tests (mechanical, electrical or otherwise), positive identification of equipment, assemblies and sub-assemblies by serial number, drawing and specification reference numbers (and issue reference) and any other data to be certified by the Employer or the Employer’s Representative during the course of commissioning.

The Contractor shall during the execution of the Works prepare such reports and records of, 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.

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 3 signed copies to the Employer’s Representative.

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

System Acceptance Tests

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, however, the system must be satisfactorily tested remotely (if specified to have such capability) before the System Acceptance Tests can be considered to be completed. On satisfactory completion of the System Acceptance Tests, the tested items will be considered available for Integrated Testing & Commissioning.

The particular requirements for System Acceptance Tests are prescribed in the PS / TS are indicative only.

The Contractor shall submit to the Employer’s Representative a comprehensive System Acceptance Tests Plan including all requirements detailed in the PS / TS. 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.

System Acceptance Tests shall comprise comprehensive testing of the assembled installation to ensure that it operates in accordance with the requirements of the PS / TS.

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.
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.

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.

Immediately following the successful acceptance testing of the system, the Contractor shall complete the appropriate commissioning records in the agreed format and submit 3 signed copies to the Employer’s Representative.

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

Integrated Testing & Commissioning

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.

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

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.

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.

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.).

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.

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 3 signed copies 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 / TS.

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 / TS.

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 six (6) 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 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, including, but not limited to:
   i. Laboratory test instruments.
   ii. Special test equipment, emulators, simulators and test software, to permit full testing of System functions and performance.
   iii. Other items of the System, specified elsewhere as being part of the Contractor’s supply, even if not part of the Subsystem under test.
   iv. Consumables.

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 All test software shall be subject to formal quality assurance requirements stipulated elsewhere in the Specification.

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
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 TS 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 shall apply.

9.11 Fault Categories

9.11.1 Deleted

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 implications, if any, resulting from such failure. The report shall clearly show:

(1) the observed symptoms;
(2) the most likely cause of the failure;
(3) the fault category
(4) an analysis of any stress that may have been caused to other components of the equipment being tested as a result of the failure;
(5) whether the failure is a result of any component operating outside its range; and
(6) whether any design changes should be made to avoid further failures.
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 at the location
   (4) all similar software modules used in the project.

* End of Chapter *
CHAPTER 10

10. TRAINING & TRANSFER OF TECHNOLOGY

10.1 Training Requirements

10.1.1 The Contractor shall provide comprehensive training to the Employer’s staff 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 for the Employer 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 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) and practical (hands on) training.

10.2.2 The training shall take place in Jaipur, 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 hand over 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 Not used

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

(3) issue an appropriate certificate to each trainee who has successfully completed the course.

10.7 Transfer of Technology

10.7.1 Bidder shall submit the detailed plan of transfer of technology along with MOU with suitable Indian companies or company having proven track record and working in related areas for major systems / subsystems in accordance with clause 10.7 of GS.

10.7.2 TOT shall be essential and shall include system assembly, installation, maintenance and software modification / customisation and training of Employer’s personnel to cover the systems/subsystems as specified in Particular Specifications:

10.7.3 TOT shall essentially include the following aspects as a minimum:

- Engineering or extensions and up gradations of the system.
- Re-engineering to suit changed traffic conditions.
- Incorporation of optional facilities.
- Any other configuration/programmes required for maintenance/ up gradation of hardware/software.

10.7.4 The Transfer of Technology shall require involvement of Employer’s personnel in each of sub-systems during the contract period. The sponsored engineers shall be under the technical administrative control of the contractor. It is tentatively proposed to deploy 2 No. Employer’s personnel for this purpose.

10.7.5 The contractor shall undertake to supply or make arrangement with the original manufacturer to supply additional equipment required for replacement or expansion of the network in future.

10.7.6 The contractor shall undertake to provide, if required during the life of the equipment ordered, technical assistance in the form of additional drawings, maintenance practices and technical advice.
End of Chapter
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, eight 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, development tools, etc.

11.2.3 The documentation shall in all respects be entirely sufficient to allow any competent software programming organisation to undertake programme and/or system modifications without recourse to the Contractor. These requirements shall apply in respect of microprocessor based equipment and ‘firmware’.

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 to BS EN 60617, BS 3939 and BS 376 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 TS, or, if none is given, not later than six (6) 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 CAD 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 TS. The submission shall be in accordance with stage commissioning requirements specified in the Works Programme and shall include two 35mm microfilms and/or Compact Discs (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 TS. The final submission shall be made not later than the date set by the Employer’s Representative. The type of binder used to bind the Operation and Maintenance documentation shall be of a design, which will permit all changes and additions to the said documentation to be readily collated therein. 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.

* End of Chapter *
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 Contractor.

12.1.2 The responsibility for the provision of supervision of maintenance shall be based on the number of man-months identified during the Bid 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 six months after the Employer’s Taking Over of the whole of the Works or the last part of the Works or the date of issuing of the Performance Certificate whichever shall be the later.

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 faultfinding 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 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, including PCBs, 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. Based on the plan it shall be possible for the maintenance organisation to obtain ISO-9002-2002 certification.

(v) Preparation of a computer based Stores management Plan, which shall assist the management, ensuring a timely availability of spares, tools and consumable materials with a low level of inventory.

(vi) Setting in position a computerised defects and failure analysis and documentation system, based on FMEA principles for all systems, sub-systems and components including individual PCBs.

(vii) 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 staffs 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.

* End of Chapter *
CHAPTER 13

13. SUPPLY OF SPARE PARTS, SPECIAL TOOLS AND TEST EQUIPMENT

13.1 Details of supply

13.1.1 Deleted

13.1.2 Deleted

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

(b) the Special Tools and Test Equipment to be supplied by the Contractor as part of the Works to suit stage.

Such list shall be an amplification and confirmation of the list supplied with the bid, as may have been subsequently modified during the bid period, and shall be amended as necessary to reflect changes that may have occurred since the date of the Letter of Acceptance.

13.1.4 The Contractor shall use separate sets of contract spares schedules for different sub-assemblies of the main assembly / equipment.

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

13.1.5.1 core data - main assembly/equipment

(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

13.1.5.2 core data - sub-assembly of main assembly/equipment

(i) manufacturer / brand name

(ii) manufacturer’s type/model number

(iii) rating

(iv) serial number, if applicable

(if items (i) to (iv) above are different from those of the main assembly/equipment)

(v) total number of sub-assembly in the main assembly/equipment supplied under the Contract

13.1.5.3 individual item of main/sub assembly/equipment

(i) manufacturer order number
(ii) parts description - a full description of the Spare Part, including a note as to whether it is a sealed unit or whether it is an assembly or sub-assembly which can be broken-down into component parts

(iii) manufacturer / brand name

(iv) the manufacturer’s part number (if different from the ordering number)

(v) the sub-contractor’s ordering part number/reference, if applicable

(vi) recommended quantity

(vii) unit of measurement

(viii) unit price CIF to Jaipur including delivery to designated location amount (quantity multiplied by unit price)

(ix) total number of the Spare Part in the sub-assembly of the main assembly/equipment supplied under the Contract

(x) total number of the Spare Part in all the sub-assemblies of all the main assemblies/ different equipment supplied under the Contract

The Contractor shall ensure that the ordering part numbers specified shall enable the Employer to procure the exact item in future without reference to the Contractor.

13.1.5.4 primary data

(i) parts catalogue number/cross reference (illustrated parts catalogues to be submitted together with the contract spares schedules to the Employer’s Representative)

(ii) drawing number

13.1.5.5 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) interchangeability information

e) tailor-made product for the Contract or a standard bought-in product

f) the source of the Spare Part or Special Tool and Test Equipment, including the manufacturer’s name and address together with that of his agent
13.2 Manufacture and delivery of Spare Parts

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 manufacture 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 Notwithstanding the quantities defined in the quantities of Spare Parts shall be sufficient for the full operation of the Permanent Works for the first 5 years following the expiry of the Defects Liability Period for the works ("Contract Spares").
13.3.2 The Contractor shall supply and deliver the Contract Spares on or before completion of the Systems Acceptance Test.

13.3.3 Deleted

13.3.4 Deleted

13.3.5 Deleted

13.3.6 Deleted

13.4 **Commissioning Spares**

13.4.1 In addition to the Contract Spares, the Contractor shall keep on the Site, **under his own custody** 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 TS.

13.4.3 Deleted

13.4.4 The Contractor shall not be entitled to use any of the Contract Spares to replace any item in the Permanent Works during the installation, erection and commissioning periods.

13.5 **Defects Liability Spares**

13.5.1 In addition to the Contract Spares, the Contractor shall keep sufficient stocks of Spare Parts, **in his own custody** 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 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.

13.5.3 The Contractor shall not be entitled to use any of the Contract Spares to replace any item in the Permanent Works during the Defects Liability Periods.

13.6 **Special Tools and Test Equipment**

13.6.1 The Special Tools and Test Equipment (together with the relevant calibration certificates) required to carry out all the functions described in the Operation and Maintenance Manual or as required by the TS shall be suitably packed and identified in accordance with Chapter 8 above, consigned to the Employer by the Contractor and delivered to the Employer in accordance with the Employer’s Representative’s instructions not later than the date scheduled for stage commissioning. The extent of supply shall include protective carrying cases as may be appropriate for the storage and use of each item.

13.6.2 All Special Tools and Test Equipment shall be supplied with Operation and Maintenance Manuals, complete diagrams, schematics, assembly and connection drawings, calibration instructions and circuit diagrams/descriptions for future maintenance.
Where the Contractor has used the Special Tools and Test Equipment for installation and commissioning of the Permanent Works, he shall refurbish and re-calibrate each item to the satisfaction of the Employer’s Representative prior to handover to the Employer, accompanied by the Certificate of Calibration traceable to a recognised International or National standard.

Where any item of Special Tools and Test Equipment is provided by the Contractor, it shall be accompanied by drawings, manuals and full operating instructions to enable them to be used by suitably skilled (but not necessarily specially trained) personnel in a non-hazardous manner and to achieve the desired result in terms of accuracy and quality.

The Contractor shall provide the means and instructions which describe the parameters of each item of Special Tools and Test Equipment that are critical to their proper methods of use and which enable the Employer’s staff using the Special Tools and Test Equipment to achieve the proper performance and operation. Such means and instructions shall include, but not be limited to, any routine checking or re-calibration needs for the Special Tool and Test Equipment itself.

**Coding and Tagging of Spare Parts and Special Tools and Test Equipment**

All Spare Parts and Special Tools and Test Equipment to be delivered to the Employer shall each carry a tag suitably marked, bar-coded (as directed by the Employer’s Representative) and numbered.

The numbers on the tags shall correspond with those on the coding system developed by the Contractor for all E&M components, parts and equipment’s. See also clause 7.3.1 above.

* * End of Chapter *
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 12 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.

14.4 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) in accordance with the provisions of the Enactment.

14.6.2 The Contractor shall ensure that the construction and performance of all Temporary Works and the 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.

14.7 Protection from Water

14.7.1 Deleted

14.7.2 Deleted

14.7.3 Deleted

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 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.

* End of Chapter *
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 Deleted

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. Adequate space only for contractor office and material storage shall be provided by Employer.

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:

(1) drawings showing the layout within the Site of the Employer’s Representative’s and Contractor’s accommodation, access roads and major facilities required early in the Contract;

(2) drawings showing the layout and the construction details of the Employer’s Representative’s accommodation; and

(3) proposals for the Employer’s Representative’s Site accommodation (if applicable) as defined by clause 15.4 below.

15.2 Survey of the Site

On or before the Contractor is granted access to a certain portion of the Site, the Contractor shall carry out a survey jointly with the Other Contractors executing works on that portion of the Site. The Contractor shall advise the Employer’s Representative of the date of the joint survey at least 1 week in advance of the date.

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.

15.3.2 Project signboards stated in the Contract shall be erected not more than 28 days, or such other period reviewed without objection by the Employer’s Representative, after the Commencement Date of the Works. Other advertising signs shall not be erected on the Site unless reviewed by the Employer’s Representative.

15.3.3 The permission of the Employer’s Representative shall be obtained before hoardings, fences, gates or signs are removed. Hoardings, fences, gates and signs which are to be left in position after Employer’s Taking Over of the Works shall be repaired and repainted as instructed by the Employer’s Representative.

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 unless stated in the Contract or having been reviewed without objection by the Employer’s Representative. The Contractor’s personnel shall not be allowed to live on the Site.
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 Deleted

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 GoR.

15.5 Site Utilities and Access

15.5.1 Temporary clean drinking water, wash room with water, electricity, telephone, emergency transportation (Passenger vehicle) sewerage and drainage facilities shall be provided for the Employer’s Representative’s accommodation and for the Contractor’s use in carrying out the Works. The Contractor shall make all arrangements with and obtain the necessary approvals from the Relevant Authorities for the facilities.

15.5.2 If, under the Contract, the Contractor is provided with Site utilities and access by any Other Contractor under the attendance of the same or another Other Contractor, the Contractor shall ensure that all requirements in terms of use of such facilities, their upkeep and maintenance, etc. are properly observed. If the facilities provided under such attendance are insufficient for the Contractor’s bona fide needs, the Contractor shall be solely responsible for providing such additional facilities he may require for the execution of the Works.

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

15.6 Site Facilities for the Employer’s Representative

15.6.1 The Contractor will be required to provide suitable accommodation for Employer’s representative in Contractor’s site office/work site as per Appendix-7.

15.6.2 The accommodation for Employer’s Representative shall include furniture, fan, air conditioner, drinking water facilities and suitable communication facilities.

15.6.3 In case of emergency the Contractor will be required to provide emergency transport facilities.

15.6.4 Office facilities and equipment provided for the use of Employer’s Representative shall be maintained in a clean and suitable condition and all containers shall be replenished if required.

15.6.5 If any facility is to be removed/curtailed, the permission of the Employer’s Representative shall be obtained.

15.6.6 The accommodation to be provided for the Employer’s Representative can be used for the Contractor’s staff associated with the Project, if necessary.
15.6.7 All accommodation and equipment for the Employer’s Representative shall be provided throughout the course of the Works and for so long a period of time during the Defects Liability Period as the Employer’s Representative may require.

15.6.8 The Contractor’s proposals for the construction of the offices shall be submitted for review by the Employer’s Representative within 14 days of the Commencement Date of the Works and erected within 42 days of the Commencement Date of the Works.

15.6.9 The Contractor shall, when advised in writing by the Employer’s Representative, remove the accommodation and equipment, leaving the Site in a clean and tidy condition.

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 Offices for the Employer or the Employer’s Representative

Unless otherwise stated in the Contract, the Employer or the Employer’s Representative may supply his own temporary accommodation on the Site at locations indicated in the Contract or in writing. The Contractor shall afford, provide and maintain free and unhindered access to such Employer or the Employer’s Representative’s Site offices and parking areas and for the Employer or the Employer’s Representative’s Site officers, contractors and workmen as may be necessary for installation, inspection, maintenance, repair and removal of the aforesaid Employer or the Employer’s Representative’s Site offices and the services thereto.

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 Metro Rail Safety or other inspecting authorities.

15.8.3.1 The Contractor shall afford all necessary attendance upon the Commissioner of metro 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 necessary for inspection as are requested by the above authorities.

15.8.4 Not used

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, mess rooms, sanitary and welfare facilities provided that these facilities are normally available on the Site at the time.

15.8.5.3 Intentionally left blank

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.

* End of Chapter *
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 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 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 / TS. 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 two copies of the minutes of all meetings within 14 days of each meeting and also two copies of all correspondence with any Other Contractor.

16.3.7 The Contractor shall attend co-ordination 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 ITB and the TS as Access Dates. The ITB and the TS 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 another 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.

* End of Chapter *
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 14 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. Deleted

5. Deleted

6. Deleted

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. 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.

17.2.6 The Contractor shall not allow animals to be brought onto or kept on the Site.

17.2.7 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.

17.2.8 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

17.3.2 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.

17.4 Site Cleanliness

17.4.4 The Employer’s Representative will instruct the Contractor as to the requirements for Site services to be connected to the Employer’s Representative’s portable Site accommodation at any given location and the Contractor shall provide and maintain these services during his use of the Site.

17.5 Prevention of Mosquito Breeding

17.5.1 Measures shall be taken to prevent mosquito breeding on the Site. The measures to be taken shall include the following:

1. empty cans, oil drums, packing and other receptacles which may retain water shall be deposited at a central collection point and those not required for future use shall be removed from the Site regularly;

2. standing water shall be treated at least once every week with an environmental acceptable oil which will prevent mosquito breeding; and

3. Contractor’s Equipment and other items on the Site that may retain water shall be stored, covered or treated in such a manner that water will not be retained.

4. Anti mosquito breeding sprays should be done in the area during the rainy season at frequent intervals.

17.5.2 Posters in both English and Hindi drawing attention to the dangers of permitting mosquito breeding shall be obtained from the Rajasthan Government and displayed prominently on the Site, to the requirement of the Enactments. These posters shall be removed on Employer’s Taking Over of the Works.
17.6 Deleted
17.7 Deleted
17.8 Deleted
17.9 Access to the Site by Other Contractors

17.9.1 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.

17.9.2 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.

17.9.3 The Contractor shall work in accordance with the arrangements prescribed by the TRIP.

17.9.4 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.

17.10 Transportation to Site

17.10.1 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 therefor shall be submitted for review by the Employer’s Representative.

17.10.2 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 in accordance with clause 17.10.1 above.

17.10.3 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.

17.10.4 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.

17.10.5 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.

17.10.6 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.

17.10.7 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.

17.10.8 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.

17.11 **Contractor’s Own Rolling Stock**

17.11.1 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 17.12 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.

17.11.2 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 90 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.

17.11.3 Deleted

17.11.4 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.

17.11.5 Deleted

17.11.6 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.

17.12 **Defined Area Working and Works Train Operations**

17.12.1 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.

17.12.2 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.

17.12.3 Deleted

17.12.4 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.
17.12.5 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.

17.13 Not used

* End of Chapter *
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 Safety, Health and Environment shall in general be governed by SHE manual issued JMRC froming part of the bid. 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, 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 JMRC related project.

18.4.3 The Employer’s Representative shall have the right to order the suspension of any or all of the Contractor’s activities where the Employer’s Representative considers that to continue such activity or activities may pose a hazard to the safety of persons or property.

18.4.4 Where the Employer’s Representative orders such suspension as described in clause 18.4.3 above, such suspension shall continue until the Contractor has satisfied the Employer’s Representative that satisfactory corrective action has been taken to eliminate the hazard, the subject of the suspension.

18.5 Contractor’s Health and Safety Documentation

18.5.1 Sub-contractors documentation

18.5.1.1 Deleted
18.5.1.2 Deleted
18.5.1.3 Deleted
18.5.2 Not used

18.5.3 Site Safety Plan

18.5.3.1 Deleted
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 Not used

18.5.5 Method Statements

18.5.5.1 Deleted
18.5.5.2 Deleted
18.5.5.3 Deleted
18.5.5.4 Deleted
18.6  Contractor’s Safety Arrangements

18.6.1  Co-ordination of work activities
18.6.1.1  Deleted
18.6.1.2  Deleted

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  Deleted
18.6.2.4  Deleted
18.6.2.5  Deleted
18.6.2.6  Deleted
18.6.2.7  Deleted
18.6.2.8  Deleted

18.6.3  Safety audits
18.6.3.1  Deleted
18.6.3.2  Deleted
18.6.3.3  Deleted
18.6.3.4  Deleted
18.6.3.5  Deleted
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, 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.

18.6.2 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 other local Regulations.

18.6.3 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 Deleted

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 staff 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 Deleted

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 for 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.

18.6.11 Alcohol and drugs

18.6.11.1 Deleted

18.6.11.2 Deleted

18.6.11.3 Deleted

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 viaducts 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. Arrangements for transporting the injured (ambulance, stretcher, etc.) shall be provided.

18.7.2.2 A Nurse or trained First-Aider is required at all times at the Site of working.

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

18.7.2.5 Minimum one telephone should be provided at every site/site office for communication in emergency as per clause 15.5.1. The site should also display important telephone numbers of fire police, hospital, Project Management, JMRC etc for immediate use.

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 banksman shall be in attendance at each lifting appliance or hoisting operation.

18.7.3.4 The banksman 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 require re-inspection or disposal.

18.7.4 Fire precautions
18.7.4.1 The Rajasthan State 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.

18.7.5 Dangerous goods, hazardous substances
18.7.5.1 Not used
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.

18.7.5.4 All hazardous substances and dangerous goods brought onto the Site shall be entered into a Site register.

18.7.5.5 The Contractor shall ensure that material safety data sheets are available and issued to workers, for all hazardous substances brought onto the Site.

18.7.5.6 The Contractor shall make adequate provision for the storage and disposal of waste oils, de-greasing agents, etc.

18.7.5.7 Flash back arrestors shall be fitted to all oxygen and acetylene cylinders.

18.7.5.8 Oxygen and acetylene cylinders shall be stored and used in a vertical position and be transported upon a trolley or in cage.

18.7.6 Not used

18.7.7 Excavations and floor openings

18.7.7.1 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.

18.7.7.2 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.

18.7.7.3 The Employer’s Representative shall be notified immediately of any damage or interruption to a utility.

18.7.7.4 A Permit to Dig system shall be established and implemented prior to excavation starting.

18.7.7.5 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.

18.7.7.6 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.

18.7.8 Site transport

18.7.8.1 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.

18.7.8.2 Each vehicle, piece of plant or machinery shall be uniquely and clearly identified and registered for maintenance purposes.

18.7.8.3 When instructed by the Employer or the Employer’s Representative, the Contractor will remove any vehicle from the Site that is not up to the standards required.

18.7.8.4 The Contractor will remove from the Site immediately any vehicle that is beyond repair.

18.7.8.5 The Contractor is to ensure that only vehicles fitted with seats with backrests and seat belts are used as Site transport. If required by law the carrying of passengers in vehicles that have not been fitted with seat belts is strictly prohibited. No person shall
ride in the back of vehicles not legally authorised to carry passengers. Drivers of vehicles permitting this practice are to be warned for a first offence then removed from the Site for the second offence.

18.7.8.6 The speed limit on the Site is to be restricted and signs displayed advising drivers of the limits imposed.

18.7.8.7 Speed bumps are to be located at strategic points throughout the Site to enforce the speed limits.

18.7.9 Driving/operator’s licenses

Drivers of vehicles and operators of the Contractor’s Equipment shall hold the necessary license group for the vehicle or plant they are driving/operating. Where no such license group exists, drivers/operators shall have an equivalent group and undertake training in the vehicle/plant given by the Contractor’s plant department. Records of the training given are to be retained.

18.7.10 Personal protective equipment (PPE)

18.7.10.1 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.

18.7.10.2 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.

18.7.10.3 High visibility vests shall be worn at all times when in the tunnels.

18.7.10.4 Deleted

18.7.10.5 Deleted

18.7.11 NOT USED

18.7.12 Ladders, temporary access

18.7.12.1 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.

18.7.12.2 All ladders shall be free from patent defects, secured against movement and installed in accordance with the relevant construction regulations and Codes of Practice.

18.7.12.3 Wooden access steps with handrails are to be installed and maintained as access where the use of mobile access staircases are impractical.

18.7.13 Temporary Works

18.7.13.1 The Contractor shall appoint an engineer as a Temporary Works Co-ordinator. His duties shall include, but not limited to, checking and certifying all Temporary Works prior to erection and loading, ensuring that the erection work is carried out in accordance with the design, compiling a Temporary Works register, completing a suitably designed form or certificate which is to be displayed on the Temporary Works to say it has been inspected and is safe to load.

18.7.13.2 The Temporary Works Co-ordinator shall not be the same person who designed the Temporary Works.

18.7.13.3 Suspended, cantilever, bracket type scaffolding or working platforms are to be designed, certified and inspected by an independent engineer, who may be the Temporary Works Co-ordinator, prior to loading.
18.7.14 Temporary buildings, sheds, workshops, etc.

18.7.14.1 No temporary structure is to be erected without the consent of the Employer's Representative.

18.7.14.2 Except where consent is obtained from the Employer's Representative, no person shall reside on the Site.

18.7.15 Deleted

18.7.16 Deleted

18.7.17 Deleted

* End of Chapter *
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 Local 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 1.7.2 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 Under no circumstances shall foul sewage flow be diverted into existing storm-water drains and vice versa.

19.2.4 The Contractor shall adequately maintain the existing drainage and sewerage systems at all times including removal of solids in sand traps, manholes, gullies and streambeds.

19.2.5 The Contractor shall discharge water surface run-off from the Site into storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels or sandbag barriers shall be provided on Site to properly direct the storm water to such silt removal facilities. The Contractor shall remove all silt, which may have accumulated in the drainage or sewerage systems whether within the Site, or not. If at any time such provisions prove to be ineffective, the Contractor shall take such additional measures as the Employer’s Representative deems necessary.

19.2.6 Water pumped out of the trenches under construction shall be discharged into storm drains after the removal of silt in silt removal facilities.

19.2.7 The Contractor shall maintain the silt removal facilities, channels and manholes and remove the deposited silt and grit regularly, at the onset and after each rainstorm to ensure that these facilities are functioning properly at all times.

19.2.8 No obstruction to flow is to be left in position longer than is necessary for carrying out the Works. The Contractor shall ensure that adequate provisions are made for dealing with increased flow of water during the wet season.

19.2.9 The Contractor shall keep interruption or disturbance to the public due to the diversion works to a minimum.

19.2.10 If any mechanical equipment is required for the foul sewage diversion work, the Contractor shall suggest and provide precautionary measures to mitigate against consequences of break down of the equipment.

19.2.11 The Contractor shall at all times ensure that all existing stream courses and drains within and adjacent to the Site are kept safe and free from any debris and any excavated materials arising from the Works. The Contractor shall ensure that chemicals and concrete agitator washings are not deposited in watercourses.

19.2.12 The Contractor shall be responsible for the Temporary Works involved in training, diverting, or conducting of open streams or drains intercepted by the Works and the
Site, for the maintenance of the Temporary Works and waterways as required by the Employer’s Representative, and for reinstating these to their original courses on Employer’s Taking Over of the Works, when and where in the opinion of the Employer’s Representative such action is desirable.

19.2.13 The Contractor shall take all necessary precautions to prevent water entering upon or being discharged from the Site, from entering upon the works of adjacent contractors or adjacent properties.

19.2.14 The Contractor shall provide where necessary temporary water courses, floodwalls, flood gates, ditches, drains, pumping or other means of maintaining the Works and the Site free of water.

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. 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 The Contractor shall ensure that the peak particle velocity and amplitude of ground movement due to temporary sheet pile driving for trench excavation or any other construction activities, as measured by a vibrograph at all water mains within or adjacent to the Site shall not exceed the values specified in Table 19-1 of this GS.

<table>
<thead>
<tr>
<th>Type of structure or installation</th>
<th>Peak particle velocity (mm/s)</th>
<th>Vibration amplitude (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water retaining structures</td>
<td>13</td>
<td>0.1</td>
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<tr>
<td>Water tunnels</td>
<td></td>
<td></td>
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<tr>
<td>Water mains</td>
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<td>0.2</td>
</tr>
<tr>
<td>Other structures and pipes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 19-1 – Peak Particle Velocity & Vibration Amplitude

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 use 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 The Contractor shall use every reasonable means to prevent any of the highways or bridges connecting with, or on the routes to, the Site from being damaged by any traffic of the Contractor or any of his sub-contractors of any tier and the Contractor shall, in particular, select routes, choose and use vehicles and restrict and distribute loads so that the moving of Temporary Works, Permanent Works and Contractor's Equipment from and to the Site shall be organised as far as reasonably possible so that no unnecessary damage or injury may be occasioned to such highways and bridges. The Contractor shall in selecting such routes take advice from and follow the instructions of the Commissioner for Transport and other Relevant Authorities of GoR.

19.4.3 Should the Commissioner for Transport or any other Relevant Authority or the Contractor be of the opinion that it should be necessary to move one or more loads of Temporary Works, Permanent Works or Contractor's Equipment over a highway or bridge the moving of which is likely to damage any highway or bridge unless special protection or strengthening is carried out then the Contractor shall, before moving the load on to such highway or bridge, give notice to the Employer's Representative of the weight and other particulars of the load to be moved and request the protection or strengthening of the said highway or bridge. If within 14 (fourteen) days of receipt of such notice the Employer’s Representative directs in writing that such protection or strengthening is unnecessary then the Contractor may move the said load or loads over the said highway or bridge but otherwise the Contractor shall not move the said load or loads until notified by the Employer’s Representative of the route which he may use.

19.4.4 If during the execution of the Works or at any time thereafter the Contractor shall receive any claim arising out of the execution of the Works in respect of damage or injury to highways or bridges he shall immediately report the same to the Employer's Representative and thereafter the Employer shall negotiate the settlement of and pay all sums due in respect of each claim and shall indemnify the Contractor in respect thereof and in respect of all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in relation thereto. Provided always that if and so far any such claim or part thereof shall in the opinion of the Employer’s Representative be due to any failure on the part of the Contractor to observe and perform his obligations under clauses 19.4.2 above and 19.4.3 above, the amount certified by the Employer’s Representative to be due to such failure shall be paid by the Contractor to the Employer.

19.4.5 Where the nature of the Works is such as to require the use by the Contractor of water-borne transport, the foregoing provisions of this Clause shall be construed as though "highway" includes any river or other structure related to, on or beneath a waterway, and "vehicle" includes craft, vessels or platforms and shall be read and construed accordingly.

19.4.6 If in the course of or for the purposes of the execution of the Works or any part thereof any highway or road or way shall have been damaged, broken or broken into then notwithstanding anything herein contained:

(a) If the permanent reinstatement of such highway or road or way is to be carried out by the appropriate Relevant Authority or by some person other than the Contractor or any sub-contractor of any tier to him, the Contractor shall:
   (i) at his own cost and independently of any requirement of or notice from the Employer’s Representative be responsible for the temporary reinstatement of such highway, road or way and the
making good of any subsidence or shrinkage or other defect, imperfection, settlement or fault in the temporary reinstatement of such highway, road or way and for the execution of any necessary repair or amendment thereof from whatever cause the necessity arises until the end of the Defects Liability Period in respect of the part of the Permanent Works beneath or over such highway, road or way or until the Relevant Authority or such other person as aforesaid shall have taken possession of the highway, road or way for the purpose of carrying out permanent reinstatement, whichever is the earlier; and

(ii) indemnify and save harmless the Employer against and from any damage or injury to the Employer or claims by third parties arising out of or in consequence of any neglect or failure of the Contractor to comply with the foregoing obligations or any of them, and against and from all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto; and

b) as from the end of such Defects Liability Period or the taking of possession of such highway, road or way referred to in clause 19.4.6(a)(i) above whichever shall first happen, the Employer shall indemnify and save harmless the Contractor against and from any damage or injury to the Contractor arising out of or in consequence of or in connection with the said permanent reinstatement or any defect, imperfection or failure of or in such permanent reinstatement and against and from all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

19.4.7 Where the Relevant Authority or other person referred to in clause 19.4.6 above shall take possession of the highway, road or way as aforesaid in sections or lengths, the responsibility of the Contractor under clause 19.4.6 above shall cease in regard to any such section or length at the time at which possession thereof is so taken. But shall during the continuance of the said Defects Liability Period continue to be responsible for any section or length of which possession has not been taken and the indemnities given by the Contractor and Employer respectively under clause 19.4.6 above shall be construed and have effect accordingly.

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 Trees and Other Similar Obstructions

19.6.1 Trees which are to be retained or which are not required to be removed in order to carry out the Works, shall be protected from damage at all times by methods reviewed without objection by the Employer’s Representative. Materials, including excavated materials, shall not be banked around such trees and they shall not be trimmed or cut without having been reviewed without objection by the Employer’s Representative.

19.6.2 If any trees or other obstructions are required to be removed during the execution of the Works which are not specifically required to be removed or otherwise catered for, the Contractor shall draw the attention of the Employer’s Representative to them and
shall not remove them without having received a notice of no objection from the Employer’s Representative.

19.7 Noise Control on Works Site

19.7.1 All Contractor’s Equipment shall be effectively “sound-reduced” by means of silencers, mufflers, acoustics linings or shields or acoustic sheds or screens to levels prescribed in the relevant Noise Control Ordinance and measured outside the nearest occupied property or to the satisfaction of the Employer’s Representative. The Contractor shall provide details of proposed noise control measures to the Employer’s Representative for review prior to the use of any Contractor’s Equipment on the Site.

19.7.2 Provided that the provisions of this Paragraph shall not be applicable in the case of emergency work necessary to save life or property or for the safety of the Works or in the case of blasting operations necessitated by urgency and reviewed by the Employer’s Representative.

19.7.3 The Contractor shall provide a sound level meter (as specified in Appendix 7 of this Specification), reviewed without objection by the Employer’s Representative, for the exclusive use of the Employer’s Representative at all times during the continuance of the Contract.

19.8 Spoil Disposal

19.8.1 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.

19.8.2 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

19.8.3 The Contractor shall conform to all pertinent Environmental Protection Ordinances and be liable for any breach of such Ordinances committed by himself and/or his sub-contractors during the disposal of surplus excavated material and water from the Site.

* End of Chapter *
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. Any other statutory requirement as required by GoR.

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 bid, 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.

20.1.6 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.

20.1.7 The Contractor shall ensure that audits of all the activities detailed in his Site Environmental Plan are carried out at weekly intervals or at such intervals as the Employer’s Representative may require to ensure 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.

20.1.8 The Employer’s Representative may conduct quarterly Audits of the Contractor’s Site Environmental Plan and its effective implementation on the works site. Not less than 2 weeks notice will be given by the Employer’s Representative. During the audit by the Employer’s Representative, the Contractor shall provide suitably qualified staff to accompany the auditor.

20.1.9 Payments will be achieved for successful quarterly audits for which the Employer’s Representative has issued a “Notice of No Objection” or a “Notice of No Objection subject to….”

20.1.10 Requirements established in this Chapter shall apply to all sites and all activities of the Contractor, and shall supplement the Employer’s Requirements – Construction.
20.2 AVOIDANCE OF NUISANCE

20.2.1 The Contractor shall take all precautions to avoid any nuisance arising from his operations. This shall be accomplished, wherever possible by suppression of nuisance at source rather than abatement of the nuisance once generated.

20.2.2 Following site clearing and before construction, the Contractor shall remove all trash, debris and other weeds.

20.2.3 The Contractor shall ensure that the work place is free of trash, garbage, debris and weeds. He shall provide and ensure proper uses of refuse containers to ensure that rodents, flea and other pests are not harboured and attracted.

20.2.4 The Contractor shall provide at site, metal or heavy-duty plastic ‘Refuse Containers’ with tight fitting lids for disposal of all garbage or trash associated with food. The containers shall not have openings that allow access by rodents.

20.2.5 To keep the area free of litter and garbage, specific locations shall be designated for consuming food and snacks to prevent random disposal of waste. All waste shall be deposited in the refuse containers described in (3) above. Suitable notice shall be deployed prominently for strict compliance of these requirements.

20.2.6 The refuse containers shall be kept upright with their lids shut tight. These containers shall be emptied at least once daily by the Contractor to maintain site sanitation.

20.3 AIR QUALITY

20.3.1 The Contractor shall take all necessary precautions to minimise fugitive dust emissions from operations involving excavation, grading, 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's Representative.

20.3.2 The Contractor shall use equipment designed and equipped to minimise or control air pollution. He shall maintain evidence of such equipment and make these available for inspection by Employer’s Representative.

20.3.3 If after commencement of activity, Employer’s Representative 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’s Representative and implemented.

20.3.4 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.

20.3.5 Dust generating materials shall be:

(i) Transported in closed containers or covered trucks.
(ii) Loaded and unloaded in closed systems or wind protected areas.
(iii) Watered as appropriate to minimise dust production.

20.3.6 Contractor’s transport vehicles and other equipment shall conform to emission standards fixed by Statutory Agencies of Government of India from time to time at
Jaipur. The Contractor shall carry out periodical checks and undertake remedial measures including replacement, if required, so as to operate within permissible norms.

20.3.7 In the event that approved remedial measures are not being implemented and serious impacts persist, the Employer’s Representative may direct the Contractor to suspend work until the measures are implemented, as required under the Contract.

20.3.8 The Contractor shall cover loads of materials, debris and soil 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.

20.3.9 The Contractor shall be responsible for ensuring that no earth, rock or debris is deposited on public or private right of way as a result of his operations, including any deposits arising from the movement of loaded/unloaded trucks and/or other construction vehicles.

20.3.10 The Contractor shall make his own arrangements for water for purposes stated in above clauses and wherever it may be required to control air pollution, dust and debris.

20.3.11 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’s Representative.

20.3.12 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’s Representative.

20.3.13 The Contractor shall protect structures, utilities, pavements and other facilities from disfiguration and damage.

20.3.14 The Contractor shall place excavation materials in the dumping/disposal areas designated in the plans as given in the specifications.

20.3.15 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’s Representative.

20.3.16 The Contractor shall place material in a manner that will minimise dust production. Material shall be stabilised each day and wetted, to minimise dust production.

20.3.17 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.

20.3.18 The Contractor will make water sprinklers, water supply and water delivering equipment available at any time that it is required for dust control use.

20.3.19 Dust control activities shall continue even during any work stoppage.

20.3.20 The Contractor shall water down work sites as required to suppress dust, during handling of excavation soil or debris or during demolition.

20.3.21 At each work site, the Contractor shall provide storage facilities for dust generating materials and shall be:

(i) Closed containers/bins or;
(ii) Wind protected shelters or;
(iii) Mat covering or;
(iv) Walled.
Or any combination of the above to the satisfaction of the Employer’s Representative.

20.3.22 The Contractor shall implement his blasting techniques so as to minimise dust generation.

20.4 WATER QUALITY

20.4.1 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.

20.4.2 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.

20.4.3 In the event of any spoil or debris from construction works being deposited on adjacent land 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’s Representative.

20.4.4 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's Representative. 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's Representative, 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. 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's Representative or the Agency controlling the system.

20.4.5 The Contractor shall prevent soil particles and debris from entering the wells or water discharge points by use of filters and sedimentation basins as required.

20.4.6 The Contractor shall provide treatment facilities as necessary to prevent the discharge of contaminated ground water.

20.4.7 The Contractor shall at all times ensure that all existing stream courses and drains within, and adjacent to the site are kept safe and free from any debris and any excavated materials arising from the Works. The Contractor shall ensure that earth, bentonite, chemicals and concrete agitator washings etc. are not deposited in the watercourses but are suitably treated and effluents and residue disposed off in a manner approved by local authorities.

20.4.8 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.

20.4.9 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.

20.4.10 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
controller the system. A wastewater drainage system shall be provided to drain wastewater into the sewerage system.

20.4.11 Oil removal / interceptors shall be provided to treat oil waste from workshop areas etc.

20.4.12 The Contractor shall take measures to prevent discharge of oil and grease during spillage from reaching drainage system or any water body through Spill Prevention and Control Plan.

20.5 NOISE

20.5.1 General

(1) The Contractor shall consider noise as an environmental constraint in his 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. The same may be varied from time to time by and at the sole discretion of the Employer’s Representative. 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. However, the monitoring locations shall be decided in consultation with the Employer’s Representative.

20.5.2 Construction material should be handled and transported in such a manner as not to create unnecessary noise as outlined below.

20.5.3 Under the Contract, the Contractor shall:

(1) 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.
(2) 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.

(3) 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.

(4) The Contractor shall submit to the Employer’s Representative 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 nighttime, and of his proposed working methods and noise level reduction measures. The NMCP shall include detailed noise calculations to demonstrate the anticipated noise generation by the Contractor.

(5) 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 shall appear as a regular agenda item in project coordination meetings.

20.5.4 Vibration Level Limits

The vibration level limits at historical sites adjacent to the alignment shall conform to revised version of the German Standard (DIN 4150). The scheme for monitoring vibration level at these historical sites shall be submitted to Employer’s Representative for his approval. The scheme shall include:

(1) monitoring requirements for vibrations at regular intervals throughout the construction period.
(2) pre-construction structural integrity inspections of historic and sensitive structures in project activity.
(3) Information dissemination about the construction method, probable effects, quality control measures and precautions to be used.

20.6 WASTE

20.6.1 The Contractor shall handle waste in a manner that ensures they are held securely without loss or leakage thus minimising potential for pollution.

20.6.2 The Contractor shall remove waste in a timely manner. Scrap and waste material shall be removed and disposed off at landfill sites after obtaining approval of Conservancy and Sanitation Engineering Department of Municipal Corporation of Jaipur for its disposal.

20.6.3 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 (2) above.

20.6.4 The Contractor shall maintain and clean waste storage areas regularly.

20.6.5 If encountered or generated as a result of Contractor’s activity, then waste classified as hazardous under the “Hazardous Wastes (Management & Handling) Rules, 1989” and 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.

20.7 PREVENTION OF MOSQUITO BREEDING

20.7.1 Measures shall be taken to prevent mosquito breeding at site. The measures to be taken shall include:

(a) 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;

(b) still waters shall be treated at least once every week with oil in order to prevent mosquito breeding;

(c) 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.

(d) Water storage tanks shall be suitably provided.

20.7.2 Posters in both Hindi and English which draw attention to the dangers of permitting mosquito breeding shall be displayed prominently on the Site.

* End of Chapter *

* End of Chapter *
CHAPTER 21

21. PHOTOGRAPHS

21.1 Photographs

21.1.1 Colour progress photographs showing the progress of the Works and the quality of the materials and workmanship shall be taken by the Contractor. The photographs shall be taken by a professional photographer, nominated by the Contractor and reviewed without objection by the Employer’s Representative. Processing shall be carried out by a competent processing firm, nominated by the Contractor and reviewed without objection by the Employer’s Representative. The photographs shall be taken under the direction of the Employer or the Employer’s Representative at locations selected by the Employer or the Employer’s Representative. Photographs shall be taken once every month and at other times instructed by the Employer or the Employer’s Representative.

21.1.2 One proof 3R print of each progress photograph shall be provided to the Employer’s Representative not more than 2 days after the photographs are taken. The Employer’s Representative shall select the sets of progress photographs to be provided. The selected sets shall be provided not more than 2 days after the Employer’s Representative has selected the sets. The following shall be provided for the Employer’s Representative:

1. one set of each selected progress photograph comprising the negatives and three 3R prints;
2. albums for the photographs and negatives; and
3. printed labels for each photograph.

21.1.3 The Contractor shall provide to the Employer’s Representative the photographs selected in clause 0 above on Photo Compact Disks with a minimum resolution of 64 Base (4096 x 6144).

21.1.4 The Contractor may propose to the Employer’s Representative the use of a digital photography system to meet the requirements of this Chapter. The Employer’s Representative shall at his discretion, review the proposed system for practical and technical compliance.

21.1.5 Colour progress photographs shall provide a fair representation of the Works. A minimum of 24 photographs per month shall be submitted to the Employer’s Representative.

* End of Chapter *
CHAPTER 22

22 TEMPORARY ELECTRICITY SUPPLY

22.1 Electricity Supply for the Contractor by the Project Civil Contractors

Please Refer Clause 46 of SCC

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 0 to 0 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.

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 All electrical installation work on Site shall be carried out in accordance with the requirements laid down in BS 7375 and the Specification. All work shall be supervised or executed by qualified and suitably categorised electricians, who are registered as such under the Electricity Ordinance 1990/Electricity (Registration) Regulations 1990.

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) BS 7375 Distribution of Electricity on Construction and Building Sites;
(6) BS 4363 Distribution Assemblies for Electricity Supplies for Construction and Building Sites; and
(7) 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 Mains Voltage

22.6.1 The Site mains voltage shall be as the Electricity Companies’ Utility supplies, 415V 3-phase 4 wire system.

22.6.2 Single-phase voltage shall be as the Electricity Companies’ Utility supplies, 240V supply.

22.6.3 Reduced voltages shall conform to BS 7375.

22.7 Types of Distribution Supply

22.7.1 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 - 240V 1 phase;
(4) fixed flood lighting – 240V 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.

22.7.2 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 / 240V single phase as appropriate. The Contractor shall carry out any conversion that may be necessary to enable him to use power from that source.

22.8 Protection of Circuits

22.8.1 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.

22.8.2 Discrimination between circuit breakers, circuit breakers and fuses shall be in accordance with:-

(1) BS 88;
(2) BS EN 60898; and
(3) BS 7375;
(4) Any other appropriate Indian Standards.
22.9 Earthing

22.9.1 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.

22.9.2 Earthing systems shall conform to the following standards:

1. IEE Wiring Regulations (16th Edition);
2. BS 7430;
3. BS 7375; and

22.10 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.

22.11 Cables

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.

22.11.1 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.

22.11.2 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.

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.

22.11.3 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.
22.11.4 For resistance to the effects of sunlight, overall non-metallic covering of cables shall be black in colour.

22.11.5 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 as described in clause 0 above or alternatively of a type insulated and sheathed with a general purpose or heat resisting elastomer.

22.11.6 All cables that are likely to be frequently moved in normal use shall be flexible cables.

22.11.7 Flexible cables shall be in accordance with BS 6500 and BS 7375.

22.12 Lighting Installation

22.12.1 Lighting circuits shall be run separate from other sub-circuits and shall be in accordance with BS 7375 and BS 4363.

22.12.2 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.

22.12.3 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.

22.12.4 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.

22.12.5 Use of wire guards or other such devices shall provide mechanical protection of luminaries against damage by impact whenever risk of damage occurs.

22.13 Electrical Motors

22.13.1 Totally enclosed fan cooled motors to BS 4999:Part 105 shall be used.

22.13.2 Motor control and protection circuits shall be as stipulated in BS 6164. Emergency stops for machinery shall be provided.

22.14 Inspection and Testing

Electrical installations on Site shall be inspected and tested in accordance with the requirements of the IEE Wiring Regulations (16th Edition).

22.15 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.

22.16 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.

22.17 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.
22.18 Metering

22.18.1 For the purposes of the clause 0 above, “construction works” shall mean the Works excluding both the Contractor’s on and off Site, fabrication facilities, workshops, work-yards, offices and stores.

22.18.2 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.

22.19 Inability to Supply

Wherever, the Project Contractor (Civil) 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.

*   End of Chapter   *

*   End of Chapter   *
CHAPTER 23

21 NOT USED
APPENDIX 1

MONTHLY PROGRESS REPORT

1. Topics

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) Programme and overall progress
(3) Physical progress report (see Paragraph 2.19 of the General Specification)
(4) Achievement of Key Dates and Milestone Dates planned vs actual dates
(5) Interface; and Interface co-ordination progress
(6) Approval of design and drawings, vendor finalisation
(7) Issue of purchase orders for equipments, expected date of inspection, expected date of arrival at site.
(8) Installation / erection on Site
(9) Commissioning activity
(10) System integration tests
(11) Training
(12) Maintenance issues
(13) Payments / invoices
(14) Employer’s Representative’s instructions and variation orders
(15) Claims / potential claims
(16) Contractor’s resources (details of all staff and sub-contractors engaged on the Works)

2. PROGRESS REPORTS

The Monthly Progress Reports shall be accompanied by:

a) the Works Programme, marked to show the status of progress to date;
b) control schedules for document submissions and issues of a repetitive or multiple nature;
c) where appropriate, exception reports to highlight any problem areas including any submissions and information which are overdue;
d) the programme analysis report, in accordance with Paragraph 2.18 of the General Specification;
e) the physical progress (earned value) report, in accordance with Paragraph 2.20 of the General Specification;
f) “S” curve showing current status of the Contract;

g) a full list of all submissions and their current status in comparison to the Submissions Programme. Special commentary shall be provided for each item that is late to this programme giving the reasons for the delay and the proposed corrective action that will ensure that the delay does not affect any overall or stage completion dates, particularly those that interface with other parties;

h) identification and discussion of significant accomplishments, problem areas encountered, actions taken or planned to resolve actual or potential problems and conflicts, and other comments or proposals on matters (including the interfacing works) affecting or likely to affect the Works; and

i) a critical items action list which identifies outstanding problems associated with the timely completion of the Works including anticipated actions for their resolution.

2.1 The programmes shall show current status to provide a comparison between the Works Programme and reported progress.

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.

2.3 Actual progress shall reflect the physical scope of the work that has been completed and shall not be calculated based on elapsed time or hours worked. Any automatic statistical indications in the Contractor’s software that is based on this principle shall be disabled.

2.4 Each Monthly Progress Report shall include a programme activity listing and an analysis report. All activities that have negative float shall be analysed by the Contractor to identify the impact on the achievement of target dates.

3.0 Copies

3.1 The Contractor shall submit 1 unbound original and 4 bound hard copies of all Monthly Progress Reports and of the accompanying documents plus one copy in electronic format on PC compatible 3-1/2” diskettes compatible with Microsoft Office and Primavera P3 applications.

* End of Appendix 1 *
APPENDIX 2

3 NOT USED
APPENDIX 3

4 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 submitted is in full compliance with the Contract.

Signed __________________________ (Contractor’s responsible engineer)

Employer’s Representative’s Response Dated

The material submitted has been reviewed 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 be 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)

* End of Appendix 3 *
APPENDIX 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.

<table>
<thead>
<tr>
<th>Article</th>
<th>Reference Paragraph(s)</th>
<th>To be submitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Works Programme</td>
<td>2.4.1.2</td>
<td>Within 60 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Submissions Programme</td>
<td>2.5.1</td>
<td>Within 30 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Procurement and Manufacturing Programme</td>
<td>2.6.1</td>
<td>Within 60 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Material Control Schedule</td>
<td>2.6.5</td>
<td>As stated in the TS, or if none is given, within 60 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Factory Testing Programme</td>
<td>2.6.8</td>
<td>Within 60 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Installation Programme</td>
<td>2.7.1</td>
<td>Preliminary version within 60 days of the Commencement Date of the Works. Full version as stated in the TS or as directed by the Employer’s Representative</td>
</tr>
<tr>
<td>Testing &amp; Commissioning Programme</td>
<td>2.8.1</td>
<td>Preliminary version within 60 days of the Commencement Date of the Works. Full version as stated in the TS or as directed by the Employer’s Representative</td>
</tr>
<tr>
<td>Monthly Progress Report and supporting documentation</td>
<td>2.17.1</td>
<td>The 5th day of each month.</td>
</tr>
<tr>
<td>Contractor’s Project Plan</td>
<td>3.1.2</td>
<td>As stated in the TS, or if none is given, within 60 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Particulars of agent</td>
<td>3.3.1.6 (6)</td>
<td>30 days before the Commencement Date of the Works</td>
</tr>
<tr>
<td>Interface Management Plan</td>
<td>3.3.2 b)</td>
<td>Within 60 days of notification from the Employer’s Representative of the identity of each Project Contractor</td>
</tr>
<tr>
<td>Detailed Interface Document</td>
<td>3.3.2 d)</td>
<td>Within 90 days of notification from the Employer’s Representative of the identity of each Project Contractor</td>
</tr>
<tr>
<td>Contractor’s Factory Testing Plan</td>
<td>3.5.1</td>
<td>As stated in the TS, or if none is given, within 60 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Test Reports</td>
<td>3.5.1.7</td>
<td>Immediately after the completion of Factory Testing</td>
</tr>
<tr>
<td>Procurement, Manufacturing and Delivery Plan</td>
<td>3.5.2</td>
<td>As stated in the TS, or if none is given, within 60 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Contractor’s Health and Safety Documentation</td>
<td>3.6.2.2</td>
<td>Within 30 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Commissioning Plan</td>
<td>3.7.2.1</td>
<td>First draft within 180 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Article</td>
<td>Reference Paragraph(s)</td>
<td>To be submitted</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>------------------------</td>
<td>---------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Installation Test Schedule</td>
<td>3.7.2.2 b. (i)</td>
<td>As stated in the TS or if not given, not later than two months in advance of the Date scheduled for commencement of respective tests</td>
</tr>
<tr>
<td>Partial Acceptance Tests Plan</td>
<td>3.7.2.2 b. (ii)</td>
<td>As stated in the TS or if not given, not later than four months in advance of the Date scheduled for commencement of Partial Acceptance Tests</td>
</tr>
<tr>
<td>System Acceptance Tests Plan</td>
<td>3.7.2.2 b. (iii)</td>
<td>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</td>
</tr>
<tr>
<td>Integration Tests &amp; Commissioning Plan</td>
<td></td>
<td>As stated in the TS or if not given, not later than four months in advance of the Date scheduled for commencement of Tests on Completion</td>
</tr>
<tr>
<td>Operation &amp; Maintenance Manuals Plan</td>
<td>3.7.3.2</td>
<td>As stated in the TS or if not given, not later than nine months prior to the issue of the Taking Over Certificate for the Works</td>
</tr>
<tr>
<td>Training Plan</td>
<td>3.7.4.2</td>
<td>As stated in the TS or if not given, not later than six months prior to the issue of the Taking Over Certificate for the Works</td>
</tr>
<tr>
<td>Defects Liability Management Plans</td>
<td>3.7.6</td>
<td>Upon issuance of the Taking Over Certificate</td>
</tr>
<tr>
<td>Project Document Control Procedure</td>
<td>4.3.2</td>
<td>Within 28 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Quality Manual</td>
<td>5.2.3</td>
<td>Within 30 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Quality System Procedures</td>
<td>5.2.3</td>
<td>Within 30 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Details of Quality Manager</td>
<td>5.2.6</td>
<td>Within 30 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Proposed Corrective &amp; Preventive Action Plan</td>
<td>5.2.7</td>
<td>Within 14 days of issue of CAR</td>
</tr>
<tr>
<td>Management Quality Plan</td>
<td>5.3</td>
<td>Within 30 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Article</td>
<td>Reference Paragraph(s)</td>
<td>To be submitted</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Site Quality Plan</td>
<td>5.5</td>
<td>60 days prior to the commencement of the construction works</td>
</tr>
<tr>
<td>Reports of Quarterly Quality Audits</td>
<td>5.7.2</td>
<td>Every Three months</td>
</tr>
<tr>
<td>Quality Control Register</td>
<td>5.8</td>
<td>7th working day of every month</td>
</tr>
<tr>
<td>Packaging Materials &amp; Procedures</td>
<td>8.4.1</td>
<td>As stated in the TS, or if none is given, within 60 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Latest drawings, test procedures, specifications and quality documentation for inspection of equipment</td>
<td>9.2.7.4</td>
<td>At least 15 days prior to each First Article Inspections (FAI)</td>
</tr>
<tr>
<td>Installation Tests Reports</td>
<td>9.4.3.3</td>
<td>Immediately after the completion of each test</td>
</tr>
<tr>
<td>Proposed Partial Acceptance Tests Records</td>
<td>9.4.4.7</td>
<td>As stated in the TS or if not given, not later than two months in advance of the Date scheduled for commencement of tests</td>
</tr>
<tr>
<td>Partial Acceptance Tests Records</td>
<td>9.4.4.9</td>
<td>Immediately following the successful Partial Acceptance Tests</td>
</tr>
<tr>
<td>System Acceptance Tests Records</td>
<td>9.4.5.8</td>
<td>Immediately following the successful System Acceptance Tests</td>
</tr>
<tr>
<td>Integration Tests &amp; Commissioning Records</td>
<td>9.4.6.8</td>
<td>Immediately following the successful Tests on Completion of the system</td>
</tr>
<tr>
<td>Service Trial Records</td>
<td>9.4.7.8</td>
<td>Immediately following the successful Service Trial of the system</td>
</tr>
<tr>
<td>Summaries of Inspection and/or Test</td>
<td>9.6.11</td>
<td>7th day of the following month</td>
</tr>
<tr>
<td>Operation &amp; Maintenance documentation (Draft Version)</td>
<td>11.4.1</td>
<td>As stated in the TS or if not given, not later than 6 months prior to the issue of the Taking Over Certificate for the Works</td>
</tr>
<tr>
<td>Operation &amp; Maintenance documentation (Final Version)</td>
<td>11.4.3</td>
<td>As stated in the TS or if not given, not later than 1 month prior to the issue of the Taking Over Certificate for the Works</td>
</tr>
<tr>
<td>Operating &amp; Maintenance instructions and illustrated parts list (Final Submission)</td>
<td>11.4.3</td>
<td>At a date set by the Employer’s Representative</td>
</tr>
<tr>
<td>Spare Parts List</td>
<td>13.1.3</td>
<td>As stated in the TS</td>
</tr>
<tr>
<td>Construction &amp; Installation Plan</td>
<td>14.1.1</td>
<td>As stated in the TS, or if none is given, within 60 days of the Commencement Date of the Works, and in any case not less than 12 weeks before starting the construction of the Works on Site</td>
</tr>
<tr>
<td>Proposals for the construction of the Employer’s Representative’s Site Offices</td>
<td>0</td>
<td>Within 14 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Particular Uses of Site</td>
<td>17.2.1</td>
<td>Within 14 days of the Commencement Date of the Works</td>
</tr>
<tr>
<td>Detailed written report of accidents, incidents and dangerous occurrence</td>
<td>18.6.4.1</td>
<td>Within 7 days of occurrence/accident</td>
</tr>
<tr>
<td>Article</td>
<td>Reference Paragraph(s)</td>
<td>To be submitted</td>
</tr>
<tr>
<td>---------</td>
<td>------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Name and qualification of safety representative for temporary site electricity</td>
<td>0</td>
<td>Not later than 4 weeks before appointment</td>
</tr>
</tbody>
</table>

* End of Appendix 4 *
APPENDIX 5

TYPICAL TYPE TEST REQUIREMENTS

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.

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.

1.2 Modes of Testing

i. Electrical tests will generally be applied to the 'external terminals' of the item of equipment to be tested which are normally used to interface the subject equipment to other equipment or external circuits, e.g. power supply terminals, signal input/output terminals, frame (safety) earth terminals, etc. Tests may be applied in Common Mode and/or Series Mode, as described below.

ii. Common mode tests generally involve testing circuits with respect to the equipment’s frame earth. All accessible metal parts (intended to be connected to earth) are to be connected to the frame earth.

iii. All the terminals of the circuit to be tested shall be connected together, where practicable. All terminals of circuits not involved in the test shall preferably be connected to earth.

For example, a common mode test on the AC power supply circuit of an item of equipment would involve connecting all the supply circuit terminals together (e.g. phase (s) and neutral) and applying the test between those connected terminals and the equipment’s frame earth terminal. The terminals of all other circuits, e.g. signal input/output terminals, shall preferably be connected to earth.

iv. Series mode tests generally involve testing circuit connections with respect to each other.

v. Where an item of equipment to be tested has a large number of identical interfaces circuits series mode testing may be restricted to a representative sample of those interfaces, the proportion being to the agreement of the Employer’s Representative.
vi. The test is applied between terminals (other than the earth terminal) either associated with the same circuit (e.g. between power supply terminals) or associated with different circuits (e.g. between input signal terminals and output signal terminals). All terminals of circuits not involved in the test shall preferably be connected to earth.

vii. For example, a series mode test on an RTU analogue input circuit would involve applying the test between the positive and negative analogue signal input terminals, preferably with all other terminals connected to earth.

viii. For each item of equipment to be tested, there may be many combinations of terminals to which series mode testing could be applied. Not all combinations may be relevant or subject to the conditions against which a particular test is to be performed. However, the Contractor shall test all combinations unless specifically agreed otherwise by the Employer’s Representative.

2 Mechanical Tests

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.

iv. Test conditions shall be in accordance with IEC 68-2-31. Information required for paragraph 4.2 of that test:

a. Visual inspection and function test to specification.

b. Assembled ready for installation.

c. Connectorised cables removed, casings or covers in place.

d. Not applicable.

e. All.

f. 25mm, 6 times.

g. 25mm, 6 times.

v. Visual inspection and function test to specification.

vi. Topple (or push over) test is not required.
2.2 Vibration Test

i. 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.

ii. The test shall be in accordance with IEC 68-2-6 1982. Information required for Chapter 12 of that standard:

a. Measuring Points: If four or less fixing points are used for the specimen, these shall also be used as checkpoints. If more than four fixing points are used then those nearest the corners shall be used as checkpoints. The checkpoints shall be located as close as possible to the fixing points.

b. Transverse Motion: Any transverse motion in excess of that specified in the above standard clause 4.1.2 shall be noted and recorded in the test results.

c. Distortion: As defined in clause 3 in excess of the limits in clause 4.1.3 of the above standard shall be noted as defined in clause 4.1.3 paragraph 4 of the same standard.

d. Derivation of Control Signal Single point.

e. Tolerances at check points shall be as clause 4.1.4.2 of the above standard. Where these cannot be achieved, the actual values shall be recorded.

f. Monitoring of Specimen(s): The equipment shall be rigidly mounted in a jig so designed as to transmit the input vibration with minimum modification.

2.3 Vibration Test 1

i. Equipment intended for use with vibration isolators shall normally be tested with its isolator. When this is not possible, the equipment shall be rigidly secured to the vibrator and the input vibration levels modified to include transmissibility of the isolators.

ii. Equipment under test is to be mounted in its normal operational attitude.

iii. Frequency Range: See Chapter 6, Paragraph 5.5 (Equipment Requirements).

iv. Vibration Amplitude: See Chapter 6, Paragraph 5.5 (Equipment Requirements).

v. Special crossover frequency: See Chapter 6, Paragraph 5.5 (Equipment Requirements).

vi. Type and duration of endurance:

a. Endurance by sweeping 6 hours, i.e. 2 hours per axis

b. Endurance at critical frequencies (as defined in the above standard clause 8.1): 1 minute at each frequency providing not more than four such frequencies exist per axis.

vii. Pre-conditioning: None.

viii. Initial measurements Functional test to the appropriate test procedure.

ix. Axes of vibration: Three mutually perpendicular axes in turn.

x. Force Limitation: Not required.
xi. Test stages to be performed in the sequence below:
   a. Vibration response investigation.
   b. Endurance at fixed frequencies derived from vibration response investigation.
   c. Endurance by sweeping.

xii. The equipment functionality shall be verified throughout the sweep test to the appropriate test procedure.

xiii. Action to be taken after vibration response investigation. If less than four critical frequencies are found in each axis, then endurance testing for the prescribed duration shall be performed at each frequency.

xiv. Final response test not required.

xv. Predetermined frequencies shall be derived from the vibration response investigation.

xvi. Conditioning at the resonance frequencies of the specimen on its isolators (where fitted) shall be included.

xvii. Final measurements Functional test to the appropriate test procedure.

xviii. Any resonance liable to affect the performance or reliability of the equipment shall be reduced to an acceptable level by suitable modifications and the complete test repeated.

3. ENVIRONMENTAL TESTS

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.

ii. Test conditions shall be in accordance with IEC 68-2-2. Information required for paragraph 44 of that test:
   a. Laboratory ambient.
   b. Visual inspection.
   c. Assembled and mounted in rack, enclosure or cabinet ready for operation or installation.
   d. On.
   e. Maximum class temperature (see Chapter 6, Chapter 5.2, Equipment Requirements) for 16 hours.
   f. At maximum class temperature after 16 hours, switch on and function test to specification.
   g. Recovery at laboratory ambient.
   h. Visual inspection and function test to specification.
   i. None.

3.2 Low Temperature Test (in case applicable for Jaipur ambient temperature range)
i. 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.

ii. Test conditions shall be in accordance with IEC 68-2-1. Information required for paragraph 33 of that test:
   a. Laboratory ambient.
   b. Visual inspection and function test to specification.
   c. Assembled and mounted in rack, enclosure or cabinet ready for operation or installation.
   d. Off.
   e. Minimum class temperature (see Chapter 6, Paragraph 5.2, Equipment Requirements) for 16 hours.
   f. At minimum class temperature after 16 hours, switch on and function test to specification.
   g. Recovery at laboratory ambient.
   h. Visual inspection and function test to specification.
   i. None.

3.3 Change of Temperature Test

i. If both Dry Heat and Low Temperature Tests are required (as decided by the Employer’s Representative) they may be replaced by a single test in accordance with IEC 68-2-14.

ii. Information required for paragraph 2.9 of that test:
   i. Assembled and mounted in rack, enclosure or cabinet ready for operation or installation.
   ii. Minimum class temperature.
   iii. Maximum class temperature.
   iv. Per Minute.
   v. One.
   vi. Visual inspection.
   vii. On.
   viii. Hours.
   ix. None.
   x. Recovery at laboratory ambient.
   xi. Visual inspection and function test to specification.

3.4 Damp Heat Test

i. The damp 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.
ii. Test conditions shall be in accordance with IEC 68-2-30. Information required for paragraph 10 of that test:
   i. Maximum class temperature, two cycles.
   ii. Visual inspection and function test to specification.
   iii. Switched on, ready to use.
   iv. None.
   v. Variant 2.
   vi. At maximum class temperature after 12 hours, function test to Specification. At 6 hours after the temperature starts to fall a further function test to specification. Tests to be repeated during second cycle.
   vii. Laboratory ambient conditions.
   viii. None.
   ix. Visual inspection and function test to specification within 4 hours.

3.5 Driving Rain Test

i. The test conditions shall be in accordance with IEC 68-2-18 Method Rb 2.2.
ii. Information required for paragraph 5.3.8 of that document:
   a. Minutes/m² for a minimum of 15 minutes.
   b. No preconditioning of seals.
   c. Visual inspection and function test to specification.
   d. Table V1: a = 60°. B = 60°C. duration = 10 minutes.
   e. Table V2: diameter = 0.40mm. water flow = 0.10 + 0.005 dm³/min. supply pressure = 80 kpa.
iii. Equipment functioning throughout the test to be verified by testing.
iv. Any ingress of water shall be reported to the Employer’s Representative, the equipment shall be visually inspected and function tested to Specification.

04 Electrical Tests

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.

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.
4.3 High Frequency Disturbance Test

i. The High Frequency Disturbance test is required to determine whether an item of equipment will continue to operate correctly when specified high frequency transients, representative of practical system conditions, are applied to the fully operating equipment.

ii. The test to be applied is based on IEC 255-4, Appendix E.

iii. This test shall be performed for all equipment required to operate in environments subject to Electrical Interference Class 2 or 3 (refer to Table 8-3) and shall be applied to the AC power supply terminals of that equipment.

iv. Waveform: a damped oscillatory wave with the envelope decaying to 50% of peak value at the end of three to six cycles.

   a. Frequency: 1 MHz tolerance + 10%.
   b. Source impedance: 200 ohm tolerance + 10%.
   c. Repetition rate: the test wave is applied to the equipment under test at a repetition rate of 400 per second.
   d. Duration of test: 2 s tolerance + 10% 0% (see Sub-clause E5.2.7 of IEC 255-4, Appendix E).
   e. Standard value of test voltage: Refer to Table 8-3.
   f. Test voltage tolerance: +0 -10%.
   v. The test voltage levels are the voltages at the output of the test circuit before the equipment to be tested is connected to the test circuit terminals.
   vi. The test leads shall not be longer than 2 m.
   vii. The disturbance test shall be applied to the AC supply terminals of the equipment under test in series mode (refer to Sub clause 2.1.3).
   viii. The tests shall be carried out with the equipment operating under nominal supply conditions.
   ix. The equipment shall function in accordance with the Specification throughout the test.

4.4 Radio Frequency Interference

i. Portable radio communication transmitters are a common source of radio frequency interference when they are operated in close proximity to equipment. A field strength of 10 V/m shall be assumed to be present in the VHF and UHF bands.

ii. These field strengths are approximately those expected at a distance of 35 cm from a 5 watt hand portable radiotelephone. These fields can induce currents of the order of 100 mA into cables, screens and metalwork.

iii. Other possible sources are low level radiation from adjacent equipment including fluorescent lamps and signals from powerful but more distant radio, television and radar transmitters.
iv. The test to be applied is based on IEC 801-3 over a frequency range of 27 MHz to 500 MHz. The Severity Level (Chapter 5) to be applied shall be as follows:

v. The Contractor shall state to what field strength the equipment is immune, and include as an option the cost of testing to 10 V/m. The equipment functionality and performance shall not be degraded during or after the RFI test.

vi. With regard to RTUs and tele-protection equipment, the command outputs shall be immune to mal-operation with the cubicle doors open when the equipment is subjected to the radiated field strengths mentioned above.

4.5 Electrical Stress Impulse Voltage Withstand

i. The Impulse Voltage Withstand test is designed to demonstrate that the equipment has been correctly designed to withstand, without damage, the electrical stresses to which it might be subjected in practice.

ii. The test to be applied is based upon IEC 255-4, Appendix E.

iii. This test shall be performed for all equipment required to operate in environments subject to Electrical Interference Class 2 or 3 (refer to Table 8-3) and shall be applied as follows:

a. To all AC power supply input and output terminals of all equipment.

b. To all signal input/output, communication interface and DC power supply terminals of RTU and tele-protection equipment.

c. For the withstand test, the impulse voltage is a periodic transient voltage without appreciable oscillations (see IEC Publication 60, High-voltage Test Techniques).

iv. Impulse waveform: This shall be the standard 1.2/50 impulse specified in IEC Publication 60 and having the following tolerances:

a. Voltage rise time: + 30%.

b. Voltage falls time: + 20%.

c. Source impedance: 500 ohm tolerance + 10%.

d. Source energy: 0.5 J tolerance + 10%.

e. Standard value of test voltage: Refer to Table 3.

f. Test voltage tolerance: +0 -10%.

v. The test voltage levels are the voltages at the output of the test circuit before the equipment to be tested is connected to the test circuit terminals.

vi. The test leads shall not be longer than 2m.

vii. Three positive and three negative impulses shall be applied at intervals of not less than 5s. Both common mode and series mode tests shall be performed (refer to Sub-clause 2.1.3).

viii. After the above tests, the equipment shall be visually inspected and function tested to check compliance with the Specification.

4.6 Insulation Resistance (Across Isolating Barrier) Test
i. Where a barrier is used to provide isolation from external circuits, its insulation resistance shall be measured.

ii. If the barrier is required to withstand high voltage stresses, then it shall be stressed at the specified voltage to demonstrate its withstand capability and a further insulation resistance test shall be made to ascertain that it has not been significantly degraded as a result of the stress being applied.

iii. The insulation of all circuits that include contacts of switches, relays or contractors for isolation functions shall be tested for insulation resistance, R1. R1 shall not be less than 20 mega ohm when measured at 500 V dc.

iv. For switches, relays and contractors, 500 V is to be applied between:
   a. The opposite ends of each circuit with contacts in open position.
   b. Both ends of each circuit to earth with contacts in closed position.

v. For circuits intended for connection to 100 V ac or dc and above, 2 kV RMS shall be applied for one minute and this shall be followed by a further test for insulation resistance, R2.

vi. Stress to be applied between:
   a. The individual circuits of this type.
   b. Each circuit of this type and all other circuits including earth. These other circuits can be strapped together electrically for the purpose of this test.

vii. Final insulation resistance shall be such that either:
   a. R2 > 20 megohm, or
   b. R2/R1 > 0.7.

viii. For circuits intended to provide isolation against large differences in earth potential, the barrier shall, after the initial resistance measurement, be stressed to the design voltage and this shall be followed by a further insulation resistance test.

*  End of Appendix 5  *

*  End of Appendix 5  *
APPENDIX 6

5 REQUEST FOR INSPECTION OF WORKS FORM

JAIPUR METRO RAIL CORPORATION

CONTRACTOR

REQUEST FOR INSPECTION OF WORKS

To the Employer's Representative

* Location ) Will be ready for your inspection

* Description of Works ) on prior to

4.1 4.2 ) on at hrs

* Labour and plant to be used

Signed for Contractor. Received by for Employer's Representative date 5.

6. 7. 8.

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.

* The following remedial works were required

* Contractor informed verbally (to MR by Mr at hrs)

10. 11.

* Remedial works inspected and permission given to proceed with next operation on at hrs

12. as supervised

12.1 12.3 12.4

by

12.5 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.  

* End of Appendix 6 *
Appendix 7

Not used
APPENDIX 8

FIRST AID REQUIREMENTS

1. Provisions by others

  (1) First aid bases will be located at the Contractor’s principal Works Areas. The bases will consist of a treatment room fitted with two treatment couches, a hand wash basin, sterilising equipment and lockable cupboards to contain sufficient medical supplies for the Contractor’s workforce, the Employer’s Representative’s site supervisory staff, the Designated Contractors working in the area and any visitors to the Site. The first aid post will be air-conditioned, with cooling capability sufficient to maintain the temperature of the inside of the building at 20°C.

  (2) A qualified doctor, nurse and assistant nurse will be in attendance at the first aid base during all times when work is being undertaken on the Site, including work by the Designated Contractors and periods when only emergency activities are being undertaken, such as during periods of inclement weather.

  (3) A fully equipped ambulance and driver will be provided at the first aid base during all working hours. The ambulance will be equipped with emergency life support equipment suitable for application in construction site accidents.

2. Provisions by the Contractor

  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.

  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.

  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.

  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.

* End of Appendix 8 *
APPENDIX 9

WORKS AREAS

1. Works Areas

(a) Temporary occupation of land is governed by Part VI of land acquisition Act 1894 which limits occupation to 3 years.

(b) Deleted.

(c) Deleted.

(d) Deleted.

(e) Prior to the Works Area Handover Dates for returning any Works Area, the Contractor shall carry out the following works:

(i) construct all Permanent Works within the area, to the extent defined in this Appendix, in accordance with the requirements of the Contract,

(ii) reinstate the area to the condition as close as possible to its condition when it was taken over,

(iii) form the area to the approved lines and levels and carry out such other works as may be required by the Employer’s Representative,

(iv) remove all rubbish, debris and other materials.

* End of Appendix 9 *
Procurement of Plant
Design, Supply and Installation
JAIPUR METRO RAIL CORPORATION LIMITED
BIDDING DOCUMENT
for
Procurement
of
NCB No.-JP/EW/1B/E3


PART-II REQUIREMENTS

Section 6 - Employer’s Requirements (ERQ)
Volume – II Technical Specifications
Part-A

JAIPUR METRO RAIL CORPORATION LTD.
Khanij Bhawan, Tilak Marg,
C- Scheme, Jaipur (Rajasthan) PIN-302005
Country: India
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CONTRACT
EMPLOYER’S REQUIREMENTS
TECHNICAL SPECIFICATION

CHAPTER 1

INTRODUCTION
1 INTRODUCTION

1.1 Scope and Purpose

1.1.1 This specification defines the objectives, guidelines and requirements for the contractor’s design, manufacture, supply, installation, testing and commissioning of the Machine-room less Elevators, primarily for the use of for Passengers including Specially abled & elderly persons and JMRC staff at stations of Jaipur Metro.

1.1.2 The works to be executed under the Contract include the design, manufacture, verification, delivery, installation, testing, including integrated testing and commissioning, technical support, maintenance, training of Employer’s staff and documentation for a complete System necessary to deliver the requirements of this Specification.

1.2 Relevant Documents

1.2.1 This Specification should be read in conjunction with the General Conditions of Contract (GCC), Special Conditions of Contract (SCC), 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 this Specification, this Specification shall prevail.

1.2.3 In the event of a conflict between this Specification and any other standards or specification quoted herein, the requirements of this Specification shall prevail.

1.2.4 The order of precedence, with item 1 having the highest priority, is:

1. Technical Specification
2. General Specification
3. Indian Standards
5. Other International Standards
6. Other National Standards.

1.2.5 Notwithstanding the precedence specified in clauses above the Contractor shall always immediately seek advice from the Employer in the event of conflicts between Specifications.

1.3 Design Service of the Works

1.3.1 The Contractor shall be responsible for the design service of the Works and shall satisfy himself that the sizes, ratings and quantities of equipment as specified herein meet the functional and operational requirements of all the stations.
1.3.2 The contract price shall be deemed to include any additional equipment, accessories, assemblies, sub-assemblies, equipment of higher capacities or higher ratings for the systems and sub-systems necessary for the complete, safe, reliable and operable system.

1.3.3 The proposed capacities, sizes, ratings of equipment in elevator systems, as a result of the design development shall be demonstrated by a proper design and testing / simulation study and subject to review by the “Engineer”.

END OF CHAPTER
CONTRACT
EMPLOYER'S REQUIREMENTS
TECHNICAL SPECIFICATION

CHAPTER 2

OVERVIEW OF THE PROJECT
2 OVERVIEW OF THE PROJECT

2.1 General

This Chapter gives an overview of the Project and the information provided in this Chapter is for reference only.

2.2 JAIPUR METRO RAIL PROJECT

2.2.1 The Jaipur Metro Rail Project Phase-1B is expected to have following Corridors:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Corridor</th>
<th>Expected Revenue Opening Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Chandpole – Badi Chopar</td>
<td>March, 2018</td>
</tr>
</tbody>
</table>

2.3 Key Challenges

2.3.1 The following are the Key Challenges presented to the Contractor.

a) Since these elevators are being utilized as passenger amenity, the usage of these elevators is quite heavy. Any dislocation of services or passenger trapping invites avoidable adverse criticism from the travelling public. Being passenger service, the demand on availability of these elevators is quite high. Based on experience, the failures have been analyzed and mainly failures of the following components have been observed:

- V3F drive
- PCB in the shaft
- Door
- Communication

Considering the above, JMRC is of the opinion that design aspects of these elevators are to be looked into to cater to the required level of service i.e. 10 Lakh or above operations per year. This will result in around 25 lakh operations of doors per year. This is besides the testing temperature and dust conditions prevailing in tropical climatic conditions in India, especially on the elevators which are provided (in open) from Ground – Concourse level.

b) The elevators industry is expected to meet these challenges and design these elevators accordingly. These aspects will be thoroughly examined during Design. The specified level of Reliability, Availability, Maintainability and safety requirements of the these systems shall be achieved and verified by the Contractor by analysis, simulation, testing and commissioning, and system demonstrations as required in this Specification.
c) The Contractor shall carefully study the space layouts allocated for the installation of machine-room less elevators to ensure that all relevant safety clearances and rules are complied with and performance requirements are fully met.

d) The space requirement given in the tentative layouts of various stations shall be critically reviewed by the Contractor to economise on space and also to provide a layout amenable to good maintenance and operation practices, to achieve an overall economic design.

e) Various interfacing issues with other designated Contractors are required to be resolved to ensure timely completion of the Works. Whilst some of the interface issues have already been addressed, some of them are yet to be identified or finalised. It is the Contractor’s responsibility to ensure that all interfacing issues are clearly defined and agreements sought from all other Contractors as well as from the local authorities in accordance with the GS and the interface requirements.

f) The System Design shall meet the specified performance and operational requirements stipulated in this Technical Specification. The Contractor shall conduct Simulation Studies in early design stage, to ensure that the system capacity and equipment design meet the Employer’s Requirements.

g) The entire Scope of Works shall generally meet design requirements of fire safety in accordance with NFPA-130 Standard for Fixed Guide-Way Transit System, with latest versions / amendments, except where amended by this TS.

h) The entire installation shall meet the protective provisions relating to electrical safety and life safety described under various standards.

END OF CHAPTER
CONTRACT
EMPLOYER'S REQUIREMENTS
TECHNICAL SPECIFICATION

CHAPTER 3

SCOPE OF WORKS
3 SCOPE OF WORKS

3.1 General

This Specification establishes requirements for the design, manufacture, delivery at Site, installation, testing and commissioning, operating and maintenance manual preparation and training of maintenance/operation personnel of the machine-room less Elevator system for stations of Jaipur or anywhere in Rajasthan. The Contractor shall be required to interface closely with the Detail Design Consultants appointed by the Employer and Designated Contractors working on this Corridor. The Contractor shall also be responsible for obtaining clearances from statutory authorities, whenever required.

3.2 Scope

The Contract shall include but not be limited to the following Works:

a) Provision of machine-room less Elevators in stations and for the movement of Passengers including Specially abled persons.

b) All minor civil works including holes for armoured cable entry, louvers and cutouts (by providing proper size wooden blocks to civil contractor) or modifications required for installation of the equipment and restoring to final finishes.

c) Transportation of materials and equipment for installation purposes.

d) Spare parts, special tools, testing and diagnostic equipment and measuring instruments.

e) Training and Transfer of Technology.

f) Documentation.

g) Maintenance for specified period.

h) Services.

The details of the above works are given in the relevant Chapters of this Specification.

3.3 Services

The Services to be performed by the Contractor shall include, but not be limited to, the following:

a) Design, manufacture, supply, system quality management, installation, testing including integrated testing and commissioning of the complete system as brought out above;

b) Presentations, reviews and audit support as specified in this Specification;

c) Interface management as specified in this Specification;

d) System operations and maintenance support services;
e) Training for Employer’s staff;
f) Decommissioning, removal and/or disposal of temporary works;
g) Prototyping;
h) Defects liability of Permanent Works after commissioning as stipulated in the General Conditions of Contract (GCC) and Special Conditions of Contract (SCC); and
i) Obtaining statutory clearances for the commissioning of Elevators from civil authorities.

3.4 Documentation

The documentation to be delivered by the Contractor shall include, but not be limited to, the following items:

3.4.1 Design Stage

a) Description of general design philosophy;
b) System reliability, availability, maintainability and safety evaluation reports;
c) Automatic fault identification and isolation arrangement;
d) Determination of equipment ratings;
e) Determination of space requirement;
f) Design and proving protection devices/ systems and its validation,
g) Type test reports for equipment selected;
h) Detailed design drawings and reports;
i) Detailed interface reports and interfacing design drawings;
j) Hazard identification and control documentation.

3.4.2 Construction Stage

a) Construction and Installation Plan including site safety plan,
b) Factory Acceptance Test Plan for equipment;
c) Quality Plans.
d) Installation, operation and maintenance instruction of all equipment;
e) Operation and Maintenance Manuals;
f) Records and drawings of equipment installed;
g) All other records of construction, including hidden parts;
h) Site test report of equipment;
i) As built drawings including interface drawings in AUTOCAD and PDF format and
j) Other documentation as required, by the Employer.
3.5 Other statutory requirements

3.5.1 The Contractor shall be fully responsible for obtaining relevant safety certificate or license or any other documents required from statutory authorities for commissioning the regular operation of Machine-room less Elevators. The renewal of the license/safety certificate during DLP will also be the responsibility of the contractor. Fee, if any for obtaining such license/ certificate shall be borne by the contractor.

3.5.2 The Contractor shall submit the relevant safety and clearance certificates obtained for each equipment from the statutory authorities to the “Engineer”.

3.5.3 The Contractor shall provide adequate signage and graphics as being statutory requirements, for the safe and proper utilisation of each equipment, in adequate number exhibited at required locations.

3.6 Key Dates and Access Dates

The ‘Key Dates’ and ‘Access Dates’ applicable to this Technical Specification are given in Chapter 21 of this Specification.

3.7 Provision of Works Areas

The Designated Contractor shall provide the Contractor specified Works Areas at designated locations during construction purpose. The locations, specified area and probable date of access is given in the Chapter 21. The locations indicated are tentative and may change depending upon the availability and utilization of land. The Contractor shall hand over back the Works area to the designated Contractor after the expiry of specified period, reinstatement.

3.8 Items of Work Excluded from Contract

The following items of work associated with the System will be provided by other Contractors and are excluded from the Contract. However, the Contractor shall provide timely inputs such as necessary drawings, instructions, hardware and materials to the relevant other Contractors as required.

3.8.1 The relevant Civil Contractors will provide Major Civil Works including access roads, fences and building services.

3.8.2 Earth mats and Earthing electrodes / Double earthing will be supplied (up to & inside the entry in lifts shaft) and installed up to the entry in lift shaft by Electrical Contractors.

3.8.3 The incoming LT armoured cable from LT switchboard up to the Elevator main power panel/ ELCB shall be supplied (up to & inside the entry in lift shaft) and installed up to the entry in lift shaft.

END OF CHAPTER
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CHAPTER 4

DESIGN AND PERFORMANCE REQUIREMENTS
4  DESIGN AND PERFORMANCE REQUIREMENTS

4.1  General

4.1.1  The design, manufacture, supply, installation, testing and commissioning of the Machine-room less Elevators shall meet the design and performance requirements within the design environments specified in this TS.

4.2  Design Environment

4.2.1  Climate Conditions/Operating Environment stipulated in clause 1.12 of General Specification shall apply.

4.2.3  Isoceraunic level: Average 30 thunderstorm days per year as per IS 2309:1989.

4.2.4  The stations are exposed to extreme weather conditions such as heat, dust, humidity and occasional seepage. The system design shall, take into consideration these conditions and ensure that performance of the system remains unaffected due to such conditions.

4.3  Basic Design Philosophy and Requirements

4.3.1  Proven Design

(a)  The Contractor shall develop the design based on this specification and on proven and reliable Engineering Practices. The design details shall be submitted with technical data and calculations to the “Engineer” for review.

(b)  The System, including all Sub-systems and Equipment shall be of proven design.

(c)  The Elevator Sub-systems and Equipment proposed by the Contractor shall have been in use at minimum two MRTS Projects to and have established their performance reliability over a period of at least two years.

(d)  Where similar equipment or Sub-systems of a different rating are already proven in service, then the design shall be based on such equipment. In case these stipulations are not fulfilled, the Contractor shall furnish sufficient information to prove the basic soundness and reliability of the offered Sub-system.

(e)  The design philosophy should meet the following criteria:

(i)  Application of state-of-the-art Technology.
(ii)  Service proven design.
(iii)  Design life 30 years.
(iv)  Minimum life cycle cost.
(v)   Low maintenance cost.
(vi)  Use of interchangeable, modular components.
(vii)  Extensive and prominent labelling of parts, cables and wires.
(viii) Use of unique serial numbers for traceability of components.
(ix) High reliability and ensure Zero passenger trapping.

(x) Low energy consumption.

(xi) System safety.

(xii) Adequate redundancy and factor of safety.

(xiii) Fire and smoke protection.

(xiv) Use of fire retardant materials.

(xv) Environment friendly.

(xvi) Adherence to operational performance requirements

(xvii) Maximum utilisation of indigenous materials and skills, subject to quality conformity.

(xviii) Specified values for Reliability, Availability and Maintainability (RAM) for equipments / components in elevator.

4.3.2 Adequate margin shall be built into the design particularly to take care of the higher ambient temperatures, dusty conditions, and high seasonal humidity, etc. prevailing in JAIPUR.

4.4 Design Management and Control

4.4.1 In order to ensure that the requirements of this Technical Specification are met, the Contractor shall establish and maintain documented procedures using ISO 9001 to control and verify the design of the System and all its equipment. These procedures shall be subject to review by the “Engineer”.

4.4.2 The Contractor shall establish and maintain a systematic, documented, comprehensive, and verifiable system integration process throughout the execution of the Contract.

4.4.3 This process shall ensure that interfaces and interaction between System, infrastructure, sub-systems, software, and operating and maintenance requirements have been identified and engineered to function together as a system.

4.5 System Integration Process

4.5.1 The Contractor shall systematically identify and formally document all design, manufacturing and operational interfaces between equipment within the System, and between the System and external systems, facilities, operations and the environment likely to affect or be affected by the System.

4.5.2 The Contractor shall define methods to confirm compatibility between System equipment and carrying out integration tests at different stages of the design and interface management process to demonstrate that all equipment functions perform properly, both individually and as part of the complete System.

4.5.3 The system integration process shall be capable of audit by the “Engineer”.
4.6 Interface Management Plan

4.6.1 The Contractor shall submit to the “Engineer” for review an Interface Management Plan (IMP) and Detail Interface Documents, in accordance with the General Specification, which defines how the Contractor will systematically identify and document technical interfaces. This will not absolve the contractor of the ultimate responsibility for ensuring timely & appropriate interface.

4.7 Design Submission Requirements

4.7.1 The Contractor shall perform his designs for the Contract in accordance with the requirements of this TS and the GS. The Contractor shall submit to the “Engineer” for his review, relevant design information as identified under each stage. Such submissions shall incorporate the relevant Standards applicable.

4.7.2 The design submission requirements are detailed in the General Specification.

4.8 Performance Features Required

4.8.1 The Contractor shall provide built-in diagnostics and remote monitoring functions for each microprocessor-based equipment and module of the systems such that the performance requirements can be demonstrated.

4.8.2 The reliability and maintainability processes and procedures shall be planned, integrated and developed in conjunction with the operating environment, and the design, development and production functions to permit the most effective and economical achievements of the systems and equipment design objective.

4.8.3 A high design standard incorporating redundancy if practicable, flexible system arrangement, together with good quality products, and adherence to strict construction standards, are required to ensure high reliability of systems installed for smooth operation of train services.

4.8.4 Specified values for Reliability, Availability and Maintainability (RAM) for equipments / components in elevator.

4.9 Reliability, Availability and Maintainability Requirements

RAM Requirement will be as per clause 6.2.5 of Chapter-6 of this TS

4.10 Safety

4.10.1 Safety Requirements

- The installation design shall incorporate measures to avoid presenting safety hazards to people.
- The Systems design shall incorporate measures to provide for its safe management and operation.
The Systems shall not give rise, or be subject to, dangerous interactions within the railway or with other systems.

The installation shall meet the fire safety requirements generally as per NFPA-130.

The design of the earthing system shall conform to IS 3043 : 1987

4.10.2 Safety Targets

- The Contractor shall show that the Systems can be maintained safely. The Contractor shall prepare a Quantified Risk Assessment (QRA) to model the risk to (a) travelling public and (b) maintenance and operations staff. The QRA may be based on a comparison of System features and operating practices with other system metro systems for which risk levels are known.

- The contractor shall demonstrate that the systems have been designed to minimise the risk due to operator and maintainer error, considering both ergonomic aspects of the system designed to reduce the likelihood of the error, and protective measures to mitigate the consequence of such error.

- The Contractor shall demonstrate that risk to passengers, members of public, including trespassers is as low as reasonably practicable.

4.11 Conformity with Governing Specifications and other Statutory Requirements

4.11.1 The work shall be carried out in accordance with the following governing specifications and other statutory rules:

- Central Electricity Authority Regulation 2010 with latest amendments.
- Indian Electricity Act 2003 with latest amendments.
- Rules and Regulations prescribed by local authorities as applicable.
- Relevant, Indian Standards, IEC Standards, EN Standards, British Standards, and other National/International standards as applicable.

4.11.2 The Contractor shall furnish information asked for by a statutory body (e.g., Inspector of lifts, Commissioner of Railway Safety, etc.) in particular format as directed by “Engineer”.

4.12 Functional Requirements – Machine - room less Elevators

4.12.1 Machine-room less Elevators shall be provided in the stations to facilitate the movement of commuters, specially abled persons, JMRC staff and cash trolleys between the different levels of the stations from Ground level (GL) to the Concourse (C) or from Concourse (C) to Platform (P), or to any other level as decided as per Site requirements.

4.12.2 The Contractor shall verify the number of Elevators vertical rises, travels, stops, delivery routes and all other relevant information by co-ordination with the respective
Technical Specifications, Part - A

Civil Contractors. It shall be responsibility of the Contractor to provide the elevator suitable for the constructed shaft. No variation on this account will be payable.

4.13 Not used

4.14 Elevator Schedules

4.14.1 The following table summarizes the number of elevators to be provided:

<table>
<thead>
<tr>
<th>Height of Travel (in Meter)</th>
<th>Number of Lifts</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
</tr>
</tbody>
</table>

Note:

(1) The above rises may vary by ± 0.50 m based on site conditions, however the Contractor shall not be entitled for any extra payment on account of this variation. In case height of Elevator falls in two categories of rise / height, the lower band / category of height shall be applicable, e.g. Elevator with rise of 4.5m will be considered in the category of rise / height of 4m instead of band / category of 5m.

(2) Elevators shall have carrying capacity of 1000kg / 13 passenger.

(3) The station wise number of lifts, type of Lift and height of travel within these bands shall be confirmed to the Firm 90 Days after issue of Letter of Acceptance.

(4) Car and Landing Door of the Elevators shall be either Stainless Steel or of Glass

4.15 Codes and Regulations

4.15.1 Local Codes, Regulations and Standards

Unless otherwise stated herein, the design, installation, testing and commissioning shall comply with the latest edition of all applicable standards issued by the Bureau of Indian Standards and other relevant local regulations applicable.

- IS – 14665: All parts (Latest Version).

Additional requirements imposed by statutory or government authorities not listed above shall be complied with.
4.16 Additional Standards

Elevators shall comply with the requirements as per latest edition of EN 81 and BS 5655 of the British Standards: Safety rules for the construction and installation of electric lifts. The provisions related to the application for Specially Abled persons stated in these codes shall also be complied with.

The Contractor shall also comply with the “Guidelines and space standard for Barrier free Built Environment for Disabled And Elderly Persons” published by C.P.W.D. (Central Public Works Department). India.


4.17 Abbreviations

The abbreviations used in this Specification are listed in Appendix - 'D'.

END OF CHAPTER
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CHAPTER 5

(NOT USED)
5  NOT USED
CONTRACT
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CHAPTER 6

DESIGN CRITERIA AND PERFORMANCE REQUIREMENTS – MACHINE-ROOM LESS ELEVATORS
6 DESIGN CRITERIA AND PERFORMANCE SPECIFICATION - MACHINE-ROOM LESS ELEVATORS

6.1 Introduction

Jaipur Metro System shall be equipped with machine-room less elevators being used in transportation establishment for Passengers including specially abled & elderly persons and JMRC staff in locations as listed in the Technical Specification. It may be noted that these elevators will be subject to rugged use as per passenger demand. Most of the elevators will be with two landings.

6.2 General Requirements

6.2.1 Each Elevator shall have its own driving machine. The method of drive shall be Electric Traction with Gear less motor having VVVF Control & regenerative braking (supporting detailed calculation of energy saving viz a viz cost saving shall also be submitted) *

(i) The System, including all Sub-systems and Equipment shall be of proven design.

(ii) The Elevator Sub-systems and Equipment proposed by the Contractor shall have been in use and have established their performance reliability over a sufficiently long period of time. In support of the performance certificate from the client/ user of the system is to be submitted.

(* Note:- The price in Statement – 1 shall be without Regenerative braking. In Statement – 7 (B), adjustment Price for Providing Regenerative Braking shall be quoted and which shall be part of Tender evaluation. Employer may decide to adopt Regenerative braking at the time of detailed Design stage)."

6.2.2 All elevators shall be capable of operating satisfactorily and smoothly at a rate of 180 motors starts per hour or above for a period of not less than 20 hours per day, seven day a week, within the environmental conditions as stated in the General Specification and at the location where the elevators are to be installed. These elevators should be designed for minimum 10,00,000 (Ten lakh) operations per year and with minimum failures as defined in TS.

6.2.3 The design of the Elevators shall be such that no replacement of major component shall be necessary for a period of 20 years from the date of issue of Certificate of Taking Over. This is based on the requirements that detailed inspections and maintenance are carried out annually, whilst routine cleaning and maintenance are carried out as necessary. The elevators should be designed for minimum life cycle cost. Detailed life cycle cost analysis should be submitted before submission of Reliability, Availability & Maintainability Analysis. The necessary data shall be collected by the contractor on his own end without any additional cost to JMRC. Life of all
components including major components should be clearly mentioned in the design submission (refer Annexure – 4, Appendix – D2 of ITT). Major components are mentioned at clause – 6.2.4.

6.2.4 Major components shall mean replacement of car frame, car enclosure, car and landing doors, elevator shaft wiring (except travelling cables), guide rails, drive machine and driving sheave but parts attached to these components which are subjected to normal wear and tear are excluded.

6.2.5 The reliability, availability and maintainability requirement of elevator are as follows:

(a) **Reliability Requirement**

The Reliability requirements of this TS shall be subsidiary to the Availability and Maintainability requirement of this TS. The reliability of equipment should be of level that it does not result in trapping of Lift User in the Elevator due to equipment failure. Any claim / Damage / Compensation claimed by the affected passenger / elevator user on account of equipment failure shall be recovered from the firm. In addition, JMRC shall impose a penalty @ Rs.10000/- (Rs Twenty Thousand Only) per case. The penalty shall be applicable during DLP and AMC.

The Reliability measure for the Elevators shall be the Mean Time Between Maintenance Action (MTBMA). This covers both preventive as well as corrective maintenance.

The Elevators shall achieve a MTBMA not less than 7 days. Each day means 24 hours. MTBMA shall be calculated for each calendar month separately and MTBMA calculation shall be done based on the total number of elevators operational on 01st day of that applicable month.

(b) **Availability**

Service Availability Targets:

(i) The Systems shall be designed to ensure that failure of any major equipment, caused by an external accident or negligence of internal staff, will not lead to unavailability of the whole System, other than temporary outage of the failed equipment.

(ii) All elements of the systems shall be able to be maintained during out-of-traffic hours to avoid interrupting passenger train services.

(iii) If elevator is kept out of service for more than 24 hrs due to non-availability of Spares or due to lack of proper attention. JMRC shall impose a penalty of Rs. 10,000/- (Rs Ten Thousand Only) per day for each such case. The penalty shall applicable during DLP and AMC.

(iv) The Employer will assess the reasons for the equipment not being in service, accordingly the penalty will be imposed. The Employer decision is
The measure for Availability for the Elevators shall be based on call out ratio.

\[
\text{Availability} = \frac{((365 \times 20 \text{hrs.}) \times \text{No of lift population in section}) - \{\text{Total Unavailability hrs. in one year}\}}{((365 \times 20 \text{hrs.}) \times \text{No of lift population in section})}
\]

The Elevator shall achieve minimum availability of 99.9% calculated as above. For the purposes of Availability calculation, the contractor shall assume the service operating hours are 20 hours per day (4:00 Hrs to 00:00 Hrs Midnight). For 365 days a year for the design life.

(c) **Maintainability**

(i) The Contractor shall undertake maintainability analysis to assess the preliminary maintainability targets of the systems.

(ii) The Contractor shall state the maintainability requirements, and demonstrate that System maintainability is sufficient to support the claimed System reliability and availability performance. The Contractor shall demonstrate that maintenance errors have been considered, and, as far as is practicable, the risk of maintenance-induced faults has been mitigated by the appropriate design.

(iii) The equipment to be supplied by the Contractor must be designed for minimum or no maintenance. Maintenance activity required must be capable of being performed with minimum or no impact on the train service.

(iv) Maintenance activities may be classified into two areas, routine preventative and corrective, both of which affect service availability. Other maintenance strategies such as condition monitoring may be incorporated.

(v) Routine / preventive maintenance periods shall be limited to non-operational maintenance hours during the night or if essential during off peak periods.

(vi) To optimise speedy corrective maintenance, techniques employing automatic diagnostics test points, and rapid repair facilities shall be provided.

The MTTR time measurement shall include on site diagnostics and rectification of the failure up to point that the system is restored to full functionality. In the event that the failure cannot be rectified, the measurement shall include the time necessary to remove the failed piece of equipment from the system and replaced it with a functioning module.
The maintainability shall be measured by fault rectification time which should not exceed 4 hours since its reporting to contractor call centre or his representative by Operational Control Centre (OCC).

(d) **Call out ratio**

Failure: Elevator not available for more than one hour for passenger service shall be registered as a failure provided:

1. Failure is attributable to –
   - Design defect
   - Equipment failure / replacement
   - Manufacturing defect.
   - Wrong Erection
   - Maintenance lapse (during DLP & AMC by the contractor)

   or

2. “Mantrap” resulted because of any of the above defect.

The call out ratio i.e. engineer visits to the site for non schedule maintenance for the failures as defined above, should not exceed 2 on any one of the elevator in a year. The average call out ratio should not exceed 1.5 for No. of elevators provided by the bidder under this contract. The period of one year will commence from date of commencement of Revenue Operation / Taking over, whichever is later. If the visit of engineer for non schedule maintenance exceeds 2 per lift per year or average call out ratio exceeds 1.5, a penalty of Rs. 10,000/- (Rs Ten Thousand Only) shall be imposed for each such visit. The penalty shall be applicable during DLP and AMC period also (if separate contract will be awarded for AMC after completion of 2 years DLP).

**Penalties as specified in the respective paras shall be applicable from the date of Revenue Operation.**

6.2.6 The design of the Elevators shall take into consideration fire prevention, elimination of dust and dirt traps, and easy accessibility for cleaning and routine maintenance.

6.2.7 The gear less drive machine shall be mounted on guide rails accommodated within the elevator shaft. The power switch gear and main control equipment shall suitably locate inside or near the Elevator shaft, the location of which is to be decided in coordination with the Designated Civil Contractors. No separate machine-room will be provided for machine room less & gear-less elevators.

The function of each Elevator involves primarily for the movement of passengers including Specially able and elderly persons and staff. The reliability of the Elevator is therefore of paramount importance.

Elevators intended to be procured shall have a carrying capacity (rated load) of at least 1000 kg / 13 passengers as defined in the Form of tender. The nominal speed for the
Elevators shall be 1.0 m/s in either direction, unless specifically defined in Bill of Quantity.

Shaft dimension for non-hanging type 1000 kg / 13 passenger elevator shall be approximately 2500 mm (Width) x 1950 mm (Depth). Shaft dimension for hanging type 1000 kg / 13 persons elevator shall be approximately 2500 mm (Width) x 2100 mm (Depth). Shaft dimension for through type 1000 kg / 13 persons elevator shall be approximately 2650 mm (Width) x 2300 mm (Depth). The Contractor shall take all necessary measures to accommodate the elevators in the above shaft. The Contractor shall co-ordinate/interface with the Designated Civil Contractors for all matters related to shaft size. Any minor reduction in the shaft size (width & depth) to the tune of +250 mm and -100 mm shall have to be accommodated in the design by the elevator contractor by way of provision of suitable guide brackets / stainless steel channels without any additional cost to JMRC. The contractor shall be responsible for any delay on this account. All the ISMC’s / Channels required to do installation shall be in the scope of work of Elevator Contractor.

For the Elevators with “Hanging – Pit” / “Floating – Pit” the dimensions of Lift shaft shall be increased by 200 mm in Depth. For such cases, the Elevator contractor should provide the detailed design / requirements for such Lift shafts as per specific site conditions and interface with designated civil contractor to ensure that the Lift is constructed as per the design / requirements.

6.2.8 Elevator car shall have minimum internal dimensions of 1600 mm (Width) X 1400 mm (Depth) for carrying the rated load of 1000 kg / 13 passengers. The false ceiling height of the Elevator car shall not be less than 2300 mm. The Elevator and door shall be so configured that it is feasible to handle a person on a wheel chair.

6.2.9 Both the car and landing entrance clear opening width shall not be less than 1000 mm and height shall not be less than 2100 mm. The door shall be of center opening type.

6.2.10 The approximate quantity and travel / rise band of Elevators are given in Table-1 Chapter-4. The Contractor shall verify the above and all other relevant information through co-ordination with the Designated Civil Contractors.

6.2.11 The approximate headroom of 4250 mm and pit depth of 1650 mm (min.) shall be provided in the shaft for 13 passenger elevator (Headroom & Pit depth requirement shall be as per IS 14665; Latest Version). The Contractor shall submit in their technical packages the requirement in respect of reaction load on the walls and in the pit and other relevant shaft requirements. The Contractor is required to interface with Designated Civil Contractor in respect of the Elevator shaft requirement. The Contractor shall co-ordinate with the Designated Civil Contractors to finalize all the details. The pit depth and overhead dimensions shall be such as to confirm the requirement of bottom and top clearances as per relevant IS.
6.2.12 The leveling accuracy shall be within ± 5 mm of the finished floor level.

6.2.13 The running clearance of each Elevator between the Elevator car threshold and landing door sill shall not be less than 15 mm but not more than 30 mm.

6.2.14 The software for elevator should be so designed that :-

(i) The problem of man-trap and safety related requirements are completely addressed and the software enables the doors to open in all type of faulty situation.

(ii) Suitable provisions shall be made in hardware/software so that there should not be loss of any data due to power failure or any type of power disturbance etc.

Various fault situation covered by the software shall be reviewed at design stage.

6.2.15 The above specifications are summarized below:-

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Item</th>
<th>13 passenger</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Weight</td>
<td>1000 kg</td>
</tr>
<tr>
<td>2</td>
<td>Motor starts/hr</td>
<td>180</td>
</tr>
<tr>
<td>3</td>
<td>Shaft Dimension (approx) (mm)</td>
<td>2500(W) X 1950(D) (For non-hanging)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2500(W) X 2100(D) (For hanging type)</td>
</tr>
<tr>
<td>4</td>
<td>Car Dimension (approx) mm</td>
<td>1600(W) X 1400(D)</td>
</tr>
<tr>
<td>5</td>
<td>Landing entrance opening width (in mm)</td>
<td>1000 mm</td>
</tr>
<tr>
<td>6</td>
<td>Head room (in mm)</td>
<td>4250 mm</td>
</tr>
<tr>
<td>8</td>
<td>False ceiling height (mm)</td>
<td>2300 mm</td>
</tr>
<tr>
<td>9</td>
<td>Entrance door height (mm)</td>
<td>2100 mm</td>
</tr>
<tr>
<td>10</td>
<td>Pit depth</td>
<td>1650 mm (min.)</td>
</tr>
</tbody>
</table>

Note: W= Width and D= Depth

Note: Headroom & Pit depth requirement shall be as per IS 14665; Latest Version

6.3 Electric Traction Drive System

6.3.1 Traction Machine

The construction of all Elevator machines shall conform with IS-15785 and EN 81.

6.3.2 Motor

(a) Driving motor shall be of the AC synchronous / asynchronous axial type designed for special duty cycles required for Elevator operation with no slip rings. It should have a high starting torque, high power factor, efficiency not less than 85% and low energy consumption. As per IEC 60034 – 1, Motor should be suitable for Duty Cycle S5 – 60%.
For all type of elevators the motor shall be capable of not less than 180 starts per hour without excessive temperature rise.

The maximum temperature rise of the winding shall not exceed 50°C above ambient temperature when operated under normal condition.

Not Used.

Provision shall be made to enable the speed to be checked at main Control cubicle.

The motor shall carry a nameplate giving full details of its ratings and characteristics.

The motor used shall have Class ‘F’ insulation and shall be designed for 110% of rated load.

## Brake

(a) The Electro-magnetic brake shall be of the spring applied and electrically released type.

(b) The brake shall be capable of stopping and holding the Elevator car in its downward travel to rest with 125% of its rated load from the maximum governor tripping speed. In this condition the retardation of the Car shall not exceed that resulting from the operation of the Safety gear or stopping on the buffer.

(c) Springs to apply the brake shoes (two nos.) shall be in compression and adequately supported. Power coating or other alternative Anti-corrosion measures to be ensured.

(d) Brake linings shall be of renewable incombustible materials and shall be secured to the brake shoes that normal wear shall not weaken their fixings. Band brakes shall not be used.

(e) No earth fault, short circuit or residual magnetism shall prevent the brake from being applied in the event of loss of power supply to the Elevator motor and control circuit.

(f) A means of adjusting the brake plunger stroke and releasing the brake in emergency shall be provided.

(g) The Elevator machine shall be fitted with a manual emergency device capable of having the brake released by hand and requiring a constant effort to keep the brake open. The manual emergency device shall be handle operated. The handle should be robust and able to bear the human intervention. It will be evaluated during detailed design stage.
6.3.4 Deleted

6.3.5 **Driving Sheaves**

(a) The sheaves shall be manufactured in steel or SG iron and fitted with seal for life lubricated bearings.

(b) The sheaves shall have machined rope / belt grooves that can be reworked for future wear.

(c) Adequate provision shall be made to prevent any suspension ropes / belts leaving groove due to rope slack or introduction of foreign objects.

(d) Not used

6.3.6 **Alignment**

(a) The brake plunger, collar, sleeve, motor, sheaves and all bearings shall be mounted and assembled so that proper alignment of these parts is maintained.

(b) The assembly shall be reviewed and rectified when excessive noise is emitted during operation.

6.3.7 **Anti-Vibration Supports**

The whole traction machine shall be mounted on appropriate anti-vibration supports to minimize noise and vibration.

6.4 **Hoisting Rope / Belt**

6.4.1 At least three (3) steel wire ropes or coated steel belts specially manufactured for Elevator use shall be employed for the suspension of Elevator car and counterweight. The diameter/dimension and specification of rope/coated steel belts for the car and counterweight shall conform to latest version/ amendments of IS: 14665 (Part 4/Sec. 8) and IS: 15785.

A plate giving the number, size, year of installation and ultimate tensile strength of the rope or steel / coated steel belt used shall be permanently fixed to the crosshead.

Steel rope / coated steel belt of adequate size and number, is to be provided whose capacity / strength will be verified at design / test stage. The coated steel belt shall be provided with continuous operating fatigue monitoring system as per IS 15785.

6.4.2 Before installation, manufacturer’s certificates shall be supplied for each set of hoisting ropes / Belts with the data not limited to following:

(a) The type of wire rope / Belts

(b) The diameter of rope / dimensions of the belt (in mm)
The manufacturer’s rated breaking strength

The month and year the ropes / belts were manufactured

The manufacturer’s name

The factor of safety based on maximum static load for car and counterweight ropes shall be at least 12.

The ropes / belts shall be attached to dead-end hitch assemblies, fitting to supporting beams, car frames, counterweights by means of suitable rope/belt termination. A locking device or anti-twist rope device shall be fitted to the roping system. Alternately approved arrangement for wedge type rope fastening may be used.

Compensation ropes or chains or any other arrangement shall be provided if necessary to achieve the leveling required and smooth starting. If chains are provided, they shall be galvanized and enclosed in canvas hose or other accepted means to reduce noise.

Counterweight

Guide shoes, having non-metallic renewable linings requiring minimum lubrication shall be provided at the top and bottom of the counterweight. The counterweights shall be made of cast iron/ wrought iron/ steel and shall be appropriately secured and housed. They shall be of uniform density and physical dimensions.

Counterweights shall be guarded by means of a rigid, galvanized steel sheet screen extending from a position 300 mm above the pit floor to a position at least 2.0 m above the pit floor or the height of counterweights when car is at top landing, whichever is more.

The counterweight shall be balanced to 40% to 50% (±3%) of the rated load.

Not used

Clearances and Run-by for Car and Counterweight

The top clearance of the car and counterweight shall be as stated in IS Standards.

The bottom run by of car and counterweight shall be as per relevant IS Standards.

When the car rests on its fully compressed buffer, there shall be a vertical clearance of at least 600 mm between the pit floor and the lowest structural or mechanical part, equipment or device installed beneath the car platform except guide shoes or rollers, safety-jaw assemblies and platform aprons, guards or other equipment. However, when the car rests on its fully compressed buffer, no part of the car or any equipment attached thereto shall come into contact with any part of the pit or any part of the equipment located therein.
6.6.4 The clearance between the car/counterweight and the hoistway enclosure shall be at least 20 mm except on the side for loading and unloading.

6.6.5 The clearance between the car and the counterweight shall be at least 25 mm. The clearance between the counterweight and the counterweight screen shall be at least 20 mm.

6.7 Guides and Fixings

6.7.1 Planed steel tees shall be provided as guides for the Elevator car and counterweight, as appropriate, erected plumb and fixed securely to the Elevator shaft by steel brackets. The bracket shall be solidly fixed with the RCC beam/bonds. The guide rails shall be connected by steel fish plates.

6.7.2 The rail contact surfaces of the connecting rail plates and back of the guide rail ends shall be accurately machined and fitted at site to form smooth joints.

6.7.3 The stem sections of all guides shall be tongued and grooved to provide matched joints. The guides and their fixings shall be able to withstand the forces imposed by a fully loaded car traveling at or higher than the tripping speed of the governor, due to the application of the safety gear, without permanent deformation or bending due to the uneven loading of the car. The guide rail brackets shall be hot-dipped galvanized.

6.7.4 Guide rail brackets shall be of steel and bolted securely to the building or structure steelworks. The brackets shall be designed and located such that the rail will not deflect more than 5 mm under normal & Safety gear operation. There shall be a minimum of two brackets per piece of guide rail and the distance between brackets shall not be more than half the length of each piece of guide rail. The bracket should be fixed to PCC blocks or RCC beams. This particular requirement is to be ensured during interface with designated civil contractor. It is the sole responsibility of the elevator Contractor to Interface with Civil Contractor, to satisfy himself about the Shaft strength (as per latest standards) before taking up Lift Installation, and get the strength of the shaft wall certified from Civil Contractor.

6.7.5 Not used.

6.7.6 The fixing of guide rails to their brackets and to the building structure shall permit compensation, either automatically or by simple adjustment, due to normal settling of the building or shrinkage of concrete.

6.8 Elevator Car

6.8.1 Guide Shoes

(a) Adjustable guide shoes shall be provided and properly fitted at the top and bottom on each side of the car frame and the counterweight frame. The guide shoes shall be either slipper type or roller guides as appropriate.

(b) Slipper type guide shoes shall be of milled cast iron or steel frame type or sheet metal with non-metallic renewable liners, of low coefficient of friction.
and good wear resistance, which require minimal lubrication. A drip tray fabricated from Fire resistant plastic material shall be provided.

c) **Roller guides shall comply with the following requirements:**

i. Each roller guide shall consist of three wheels tyred with polyurethane or a durable resilient material, each rotating on ball bearing having sealed-in lubrication, assembled on a substantial metal base. They shall be so mounted as to provide continuous contact of all wheels with the corresponding rail surfaces under all condition of loading and operation. The wheels shall run on three finished rail surfaces. The Contractor shall provide a means of adjustment of spring pressure and of play between shoes and guide rails.

ii. The roller guides shall run on dry guide rails. Sheet metal guards shall be provided to protect the wheels on top of the car and counterweight. The roller wheels for the car shall not exceed 500 rpm and the roller wheels for the counterweight shall not exceed 1000 rpm at rated speed.

iii. The car and the counterweights are to be statically balanced following fitting of all its equipment and finishes prior to fitting the guide shoes.

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6.8.2 Car Frame

A suitable car frame fabricated from galvanized cold-rolled steel, bolted, or welded together to form a rigid structure shall be provided. The deflection of the members carrying the platform shall not exceed 1/1000th of their span under static conditions with the rated load uniformly distributed over the platform. It shall be able to withstand the operation of the safety gear or any condition loading without permanent deformation and shall not transfer the load to the enclosure. The safety factor of the frame shall not be less than five (5).

6.8.3 Car Enclosure

(a) The car enclosure shall be fabricated from Stainless steel of not less than 1.5 mm in thickness or any other material where specified and securely fastened to the car platform and so supported that it cannot be loosened or become displaced in ordinary service or on the application of safety gear or on buffer engagement. The design of the final finishes of the walls, ceiling and floor is subject to the acceptance of the “Engineer”.

(b) No wood or other combustible materials shall be used for any part of the Elevator car including car door and emergency trap door.

(c) The enclosure shall be designed and supported such that when subjected to a pressure of 335N applied horizontally at any point over an area of 5 cm²
on the walls from the inside of the cars toward the outside, there shall be no permanent deformation and deflection shall not be more than 10 mm.

(d) The enclosure shall be insulated to prevent the transmission of noise and vibration from the car frame.

6.8.4 Car Platform

(a) The car platform shall be constructed from spray galvanized cold rolled steel with steel flooring. The platform shall be designed on the basis of the rated load being evenly distributed with a minimum safety factor of five (5). The design of the final floor finish is subject to acceptance by the “Engineer”.

(b) The car platform shall be insulated to prevent the transmission of noise and vibration from the car frame to the platform.

6.8.5 The car roof shall be suitably constructed with galvanized sheet steel and reinforced to permit the maintenance and inspection of the Elevator shaft equipment to be carried out by maintenance personnel standing on the car roof. Perforated with mesh construction of the roof or wooden platform(s) on the car roof shall not be acceptable. The car roof shall be fitted with toe board & guard rails set as at a height and of suitable dimensions and strength to protect maintenance personnel.

6.8.6 A toe guard shall be provided for the car doors conforming to Paragraph 8.4 of EN81 Part 1. The toe guard for elevators shall be made of galvanized sheet steel of not less than 1.5 mm thick and painted and shall be adequately braced at the back. The depth of the toe guard shall be sufficient to prevent any object from being trapped between the underside of the car platform and the landing during re-leveelling operation (with a minimum of 700 mm). Similar Toe guard is also to be provided for all Landings.

6.8.7 Ventilation

(a) Each Elevator car shall be adequately ventilated using Cross Flow Fans to achieve minimum standard of 20 air changes per hour. The fans shall be located above the suspended ceiling or recessed in the car ceiling as appropriate.

(b) A low speed fan of low noise shall be used. The noise level of fan used for ventilation shall not exceed 55db at a distance of 1 meter away from the fan inside the elevator car.

(c) The effective area of ventilation apertures shall be at least 1% of the car platform area as per EN-81.

(d) Fan shall automatically start on registering the command / Auto Call for 2 floors elevators. However, fan Switch shall be provided to disable auto-starting of the Fan when not desired.
6.8.8 The car door shall be provided with an electric contact arranged to prevent the normal operation of the Elevator unless the gate is in the closed position. The car gate shall be arranged to give the minimum clear opening width as specified.

6.8.9 The car junction box with IP Class 55 protection, for the travelling cables and car enclosure wiring shall be installed at the car top.

6.8.10 **Car Interior and Elevator Finishes** Unless specified elsewhere in this Specification, the following finishes for the Elevator shall be complied with:-

(a) **Landing Finishes**

i. Landing Transom Panels  
   - Scratch Resistant Stainless steel,

ii. Architrave (Fascia/ Jamb)  
   - Scratch Resistant Stainless Steel / Stone work, The fascia of minimum 300 mm width on every landing or as per site condition for fixing the Landing Plate, Indicators, and MAP etc shall be of Scratch Resistant Stainless Steel / Stone work and shall be in scope of elevator Contractor.

iii. Landing Doors  
   - Scratch Resistant Stainless steel,  
   - For the glass Door, Thickness of glass door shall not be less than 10 mm and with the stainless steel hairline / scratch resistant frame. **The fire rating of the Glass & Stainless Steel Door shall be minimum 1 hour** in conformance to NBC. Fire Door Testing shall be conducted from Independent lab.

(b) **Car Finishes**

i. Car Transom Panels  
   - Scratch Resistant Stainless steel,

ii. Car Door Frame  
   - Scratch Resistant Stainless steel,

iii. Car Wall  
   1. Front Panels  
      - Scratch Resistant Stainless steel,
   2. Side Panels including the COP (Car Operating Panel)  
      - Scratch Resistant Stainless steel,
   3. Back Panels  
      - Scratch Resistant Stainless steel,

Joints in all surfaces shall be coordinated. All fixings to be of the hidden secret type (Cover strips at joints are not acceptable).
Depending on site conditions, for some Concourse to Platform Lifts with Glass Rear Panel may be required. The Glass used shall be laminated toughened glass of minimum 10 mm thickness (subject to review during Design stage, considering the strength requirements). Glass shall be provided with reflective film in place of mirror up to half height to facilitate reversal of wheel chair.

(Note:- Adjustment price as per 7 F of BOQ; Part – A shall be applicable).

iv. Car Doors

- Scratch Resistant Stainless steel,

For the glass door, Thickness of glass shall not be less than 10 mm and with the stainless steel hairline / scratch resistant frame. The Fire rating of Car door shall be complying with the requirement as per the National Building Code,

v. Car Floor

15mm thick Granite/ synthetic artificial stone having anti-slippery design distinguishable through grating of any suitable material which can take the desired load. However, the approval for the colour of granite/ artificial synthetic stone and its specifications will be obtained from the Employer during design/ proto type testing.

vi. Car Ceiling

- Scratch Resistant Stainless steel panels with sufficient LED down lights or other energy efficient light. Ceiling design to be coordinated with the overall station design for the “Engineer” acceptance

vii. Car Kick-Plates and skirting

- Scratch Resistant Stainless steel,

viii. Hand/grip rail

- Polished Stainless steel, of straight through type & supported from minimum 3 places.

All stainless steel materials specified for car and landing finishes shall be of grade of 304 and shall be subject to the acceptance of the “Engineer”.

The degree of ingress protection provided to Car Door and Landing Door internal machinery shall be IP - 54
All car interiors / architrave, doors and interfaces with civil structure and finishes shall be subject to the acceptance of the “Engineer”.

6.8.11 Illumination of Cars and Lighting Fixtures

The minimum illumination level at the floor of the Elevator car shall be 150 Lux using energy efficient LED fittings. The light inside the car cabin shall be either of light yellow or white colour. It will be decided during the design evaluation.

6.8.12 Emergency Lighting

In addition to the normal car lighting provided, a maintenance free emergency light fitting shall be provided in each elevator car, which may be the same type of fitting as the normal car light and shall illuminate immediately and automatically in the event of failure of the normal car lighting electrical supply. The luminous intensity of the emergency lighting shall not be less than 100 lux measured at floor level and on the car operating panel(s).

6.9 Heavy Duty Elevator Doors

6.9.1 Car and Landing Doors

Heavy duty doors should be of Robust Design to cater to 10,00,000 (Ten Lakhs) operations of Elevators per year. Each elevator shall be provided with horizontal sliding doors complete with door frames and architraves, arranged in centre opening with two panels.

Unless otherwise specified, the car and landing door panels shall be imperforate and fabricated from stainless steel hairline (grade 304) finish of at least 1.5 mm thick. The back of the door panels shall be treated with an anti-drumming compound which is non-combustible and shall not emit toxic fume when affected by fire. The compound shall be reviewed without objection by the “Engineer”.

The requirements of Glass Door are specified in sub – clause 6.29 below.

The door shall be able to withstand horizontal or lateral load according to latest version/ amendments of IS: 14665 (Part 4/sec 6): 2001.

The doors shall be provided with keyways for interlocks. Door sills shall be made of machined SS block to provide anti-skidding surface, its bottom plate thickness shall be minimum 5.0 mm with non-slip wearing surface.

6.9.2 Door Hangers and Rollers

The proven – ness and design of heavy duty doors shall be specifically evaluated during the detailed design stage.

6.9.3 Door Operators

Operation of Door shall commensurate with elevator motor starts / stop. The door operator for each Elevator shall consist of a motor, operating mechanism, linkages
and switches to give adjustable or variable speed door operation and shall be adjusted to ensure smooth, fast opening and closing. The average door speed shall be between 150 – 250 mm / sec. The car and landing doors shall operate simultaneously and quietly while the Elevator car is levelling.

For all type of car and landing doors, stainless steel cover of not less than 1.5 mm thick or other suitable arrangement for headers shall be provided with “Engineer" approval to prevent the door locking devices, door tracks and mechanism from accumulation of dust.

On “Without Attendant” mode, if no command is registered or due to some abnormality in Lift Safety circuit, after the expiry of a preset time interval of 10-30 seconds (Adjustable) the door shall re-open once for 30 seconds (Adjustable so as the commuter can come out) and close.

For Elevators on “With Attendant” operation, the car and landing doors shall open automatically but the closing of doors will be subject to the pressure on ‘Door Close’ button. During the closing motion it shall be possible to reverse quickly and open the doors by pressing of the “Door Open” button.

The door lock shall prevent the car doors from being opened by the door operator or by force when the car is moving or is not stopped within the unlocking zone of a landing. Electric interlocks shall be provided to ensure that elevator will not operate, if the car door is not closed and locked. If the car door is forced open, the Elevator shall stop and the alarm activated until the door is fully closed. The audio visual alarm signal shall be sent to the relevant landing as well as to SCR and CC rooms.

**6.9.4 Door Safety Devices**

**6.9.4.1 Electrically Operated Proximity Detection Device**

Electrically operated proximity detector devices(s) shall be installed on the leading edge of the car doors. The device(s) shall create a three dimensional zone of protection for the entire height of the door opening. This zone of detection shall extend a short distance in front of the landing doors. The zone of detection shall move forward as the doors close and the presence of a person, if within this zone, shall activate the detector to stop the closing movement of the doors and re-open them before hitting the person. After a pre-set time interval (which is programmable) the doors shall start to close again in the absence of further interruption. A passenger entering or leaving the car shall not cause the doors to stop and re-open unless the doors’ edge reaches a certain predetermined proximity to the passenger. The contractor shall consider the ambient condition inclusive of sunlight before deciding the sensitivity of the device, so as to avoid mal operation.
If the doors are prevented from closing by the pressing of hall and/or car buttons or a person in their path for an adjustable pre-set time, the safety devices, except the mechanical door safety edge, shall be rendered inoperative to cause door reversals. The doors shall proceed to close at a reduced speed and a buzzer located on the car shall sound before and during the closing.

6.9.4.2 Photo Cells

Two Photo cells shall be provided for each car door for preventing door closing when a passenger is entering or leaving the car. This should act as a backup protection to 3D – infrared curtain.

6.10 Not Used

6.11 Car Operating Panel (COP)

6.11.1 Car operating panels and car call buttons shall be ergonomically designed and of robust construction to the Engineer acceptance. The car operating panel shall be integrated and flush mounted, on one of the side panels. All buttons shall be of Jumbo Size with minimum dimension of 50 mm X 50 mm on the panel shall be of robust design and construction and flush with the panel.

6.11.2 The faceplate shall be made of scratch resistant stainless steel grade 304 hairline finish. Specifications / features of various items to be provided in COP are following:

(a) An alarm button in yellow colour with bell shaped symbol, when pressed, shall activate the alarm hooters and register the alarm condition through Remote Monitoring System at the SCR / CC room or as per requirement of employer and also provide Audio Visual indication at all Landings for the Alarm.

(b) A red “Car Overload” indicating lamp with buzzer and Message in Hindi and English Language.

(c) Two vertical rows (where appropriate) of car minimum dimension of 50 mm X 50 mm on the call buttons for floor designations, bearing, numerals/alphabets and Braille code next to each button for visually handicapped.

(d) A “Door-Open” button which, when pressed, shall cause the closing door to reopen or when continuously pressed shall keep the door open.

(e) A “Door-Close” button which, when pressed, shall cause the door to close to shorten the door opening time.

(f) An intercom button (self illuminated feedback type), when pressed, shall allow direct communication with the personnel in the SCR / CC room, and
main control cubicle. The contractor shall submit their features and proven vendor of intercom to Employer for review and approval.

(g) A capacity plate engraved onto the car operating panel shall indicate the rated load in kilograms and the maximum number of passengers to be carried. The size and design of the lettering shall be subject to the acceptance of the “Engineer”.

(h) Not used.

(i) An “ON/OFF” switch whereby the ventilation fan can be switched ‘ON’ and ‘OFF’. Each button shall be of Jumbo type (50 X 50 mm) micro-push suitable for heavy duty and vandal proof type. The response light shall be either orange or red when illuminated.

6.11.3 A key operated switch shall be provided on the car operating panel at a suitable location to facilitate elevator operation as under:-

(a) One or more switches whereby the following modes of operation can be effected as desired:

(i) Fully Automatic with **out** Attendant operation.

(ii) Automatic with Attendant operation.

(iii) Not used.

(b) Not used.

(c) “UP/DOWN” buttons which shall cause a car to travel in the desired direction. These buttons shall be operative only during the “Attendant” operation.

(d) An “ON/OFF” switch whereby the ventilation fan can be switched on and off.

6.12 **Big Size Car Position Indicator**

6.12.1 The faceplate of the big size car position indicator shall be made of stainless steel grade 304 hairline finished. The Stainless steel plate should be at least 2.5 mm thick and its mounting arrangement should have minimum two sunken screws. This plate should be pilfer proof. Floor numbers shall be digitally displayed using 5 x 7 square DOT matrix display or suitable LED display. There shall also be an arrow in motion vividly and dynamically indicating car movement and direction. It shall also be capable of displaying simple message such as, floor names like “Concourse, Platform”, “Out of service”, under maintenance”, “This landing is not in Use” etc. The surface of the display unit shall be non-glare type.

6.13 **Elevator Inter-Communication System**
6.13.1 The Contractor shall provide an Elevator inter-communication between the Elevator Car, main control cubicle and SCR / CC room consisting master and slave stations.

6.13.2 All stations shall be equipped with handsets except those slave stations installed inside the Elevator cars, which shall be of the hands free type.

6.13.3 The power supply arrangements for handsets / intercoms shall be connected with UPS power supply of the station such so as intercoms working shall not be affected by the failure of main supply.

6.13.4 A master station shall be supplied and installed in the Station Control Room (SCR) / CC room. A single intercom system to handle the simultaneous calls from all lifts shall be installed and it shall be handset type with call identification facility.

6.13.5 A slave station shall be supplied and installed in the main control cubicle and also in each Elevator car. The loudspeaker and microphone unit of the slave station shall be concealed in the car operating panel. The necessary cabling, conduits including from SCR/CC room to main control cubicle etc shall be provided by the Contractor with proper interfacing with designated Contractor. Routing shall be finalized with the designated contractors before fixing of the false ceiling in the stations. It should be possible to decipher the identity of calling Elevator at the SCR / CC room. The Lifts (inside and outside) should also be numbered at each station for the purpose of easy identification.

6.14 No-Smoking Notice

6.14.1 A “SMOKING IS STRICTLY PROHIBITED” sign shall be supplied and surface mounted on the front return panel in each Elevator. The graphics, lettering and material shall be subject to the acceptance of the “Engineer”.

6.15 Certificate Holder

6.15.1 A framed and glazed panel made of stainless steel, suitable to display the Elevator certificate shall be provided above the car operating panel. This shall be subject to the acceptance of the “Engineer”.

6.16 Hallway Equipment

6.16.1 Landing Doors

(a) Fire Rating

Stainless steel Landing doors & Landing doors with glass panels shall have a minimum of 1 hours fire rating in conformance to NBC. These doors shall be suitably tested.

(b) Door Frames
Door frames shall be of at least 1.5 mm thick scratch resistant stainless steel in hairline finish and shall comprise head and jamb sections of the same material. The door frames shall be suitably braced and reinforced.

The frames shall be provided with adjustable wall anchors or comparable devices to permit bonding of these anchors or devices into the walls after the frames are in place. All frames shall be securely fastened to sills and hanger supports, and shall be returned to the hoist way side to present a neat appearance.

(c) Door Sills

Toe guards similar to those provided to the car door sill shall be provided beneath each landing door sill.

(d) Supports and Covers

Structural steel angles shall be furnished and of sufficient size to accommodate the door closing equipment. The angles shall be continuous and securely bolted to the sills and the building structure.

Hanger cover plates shall be made of galvanized steel, for elevators with landing as well as car door made of stainless steel. For other elevators having car door as well as landing door made of glass with scratch-resistant stainless steel frame, hanger cover plates shall be made of stainless steel. These covers shall be removable, and so arranged to ensure hanger accessibility from within the Elevator car for maintenance purposes.

Cover bolts and threaded screws shall be adequately strong, with long life and capable of frequent opening and closing.

(e) Self Closing

Gravity or spring actuated self-closing device shall be fitted to the landing doors so as to automatically re-close the doors when manually opened by means of the emergency unlocking device in form of gravity weight or spring tension. The gravity weight shall move freely and quietly within its enclosure fixed at each end of the door sill and be protected from falling into the elevator shaft due to whatever reason. This device shall not be accessible to public.

(f) Locking Device

i. Each landing door shall be provided with an accepted locking and interlocking device to prevent the operation of the elevator unless all landing doors are closed and locked.
ii. It shall not be possible to open the landing door from the landing side without a landing door key.

iii. The locking device (door contact switch) shall have at least IP 20 protection.

iv. The electric contacts of the door locking device shall open positively independent of gravity.

v. Each landing door panel shall be provided with its own locking device.

vi. Provision shall be made for opening of all landing door locks by means of a landing door key by an authorized person irrespective of the position of the Elevator car.

(g) Fascia

Where the gap between the car door sill and surface of the Elevator shaft wall exceed 125 mm, galvanized sheet steel fascia plates of not less than 1.5 mm thick shall be provided. These shall be fixed between the undersides of landing entrance sills and the top of the door hanger case to form a flush surface in the path of travel at the car entrance. The plates shall cover the whole width of the landing door and extend by 150 mm on each side of the door. It shall be rigid and properly reinforced. The fascia plate shall be painted in an accepted colour & of 750mm height.

(h) Door Profile

To avoid the sticking of fingers in between Car frame and Car door, profile shall be provided & the gap after provision of profile if any shall not be more than 5 mm.

6.16.2 Jumbo type Hall Call Buttons

One (1) set of Jumbo type of minimum size 50 X 50 mm hall call buttons shall be provided for each Elevator at every floor served. The set of buttons shall be installed on the wall adjacent to each Elevator landing.

The faceplate shall be made of stainless steel grade 304 hairline finishes. The Stainless steel plate should be at least 2.5 mm thick and its mounting arrangement should have two minimum Sunken Screws. This plate should be pilfering proof. The Jumbo type hall call buttons shall be micro-push type, suitable for heavy duty and vandal proof. The response light of the call buttons shall be orange or red, when illuminated. When an Elevator arrives at the hall, the illumination shall cease.

The fireman switch shall be provided as per IS-14665 (part-5) and statutory requirement.
6.16.3 Hall Position Indicator

One (1) set of hall lanterns shall be provided for each Elevator at every floor served. The set of lanterns shall be installed on the wall adjacent to or on top of each Elevator landing. The display shall be the same as the car position indicator.

Prior to the car's arrival, the hall lantern shall begin flashing and the chime shall sound twice.

The response light of the “UP” and “DOWN” indication lanterns shall be red when illuminated.

6.16.4 Elevator Designation Number Sign

At each landing, Car Designation Number Signs shall be supplied and installed next to each Elevator by the Contractor. The Elevator No. with Station Name of elevator (as recorded on the elevator license) shall also be indicated on the plate.

The Number Signs shall be made of stainless steel grade 304 hairline finishes. They shall fit into the designated space to be coordinated with the civil contractor and shall be subject to the acceptance of the “Engineer”.

6.16.5 The elevators equipment (i.e. Big size Indicators, landing call plate, MCB etc), if any at Ground level should be pilfer proof.

The Stainless steel plate of SS 304 grade for mounting the indicators and landing call buttons should be at least 2.5 mm thick and its mounting arrangement should have minimum two Sunken Screws suiti

6.17 Elevator Functions

The Elevator shall incorporate the following functions.

6.17.1 Landing Door Bypass (LDB)

In case of fault in elevator due to landing door system not functioning properly, a suitable arrangement of Landing Door Bypass shall be provided in elevator to rescue passenger safely from elevator car in conformance to EN 81; Latest Version.

6.17.2 Door Nudging Feature

If the Elevator doors are kept open longer than the pre-determined time, an override alarm shall sound to alert the passenger that the doors must close so that system performance is not adversely affected.

6.17.3 Not used

6.17.4 Not used

6.17.5 Next Landing
The car shall automatically proceed to the nearest floor with a functioning landing door if the car doors fail to open at the designated floor.

6.17.6 Door Load Detector

When an object is caught in or interferes with the opening or closing of the doors, the doors shall reverse direction when an excess load is detected.

6.17.7 Safety Door Edge

When a passenger comes in contact with the door safety edge when the doors are closing, the doors shall re-open.

6.17.8 Overload Holding Stop

When the car load exceeds the pre-determined weight, in addition to the overload buzzer with the announcement of overloading, the Elevator shall not operate and the doors shall remain open. The load measuring device shall be proven product. The load measuring device should be of latest technology and of latest version. The complete technical features of devices that can be used for sensing the over load in the car should be most reliable and defined. The approval for the same shall be obtained from the Employer.

6.17.9 Electronic Door Safety

When passengers are boarding or exiting the car as the doors are closing, the doors shall re-open before touching the passengers.

6.17.10 Homing Service

This function shall automatically home the respective Elevators to the pre-assigned floors. After transporting passengers to the assigned floor, the Elevator shall automatically home to its pre-assigned floor.

6.17.11 Not used

6.17.12 Up/Down Selective Collective Automatic Operation & Auto Call Registration

The elevator shall automatically respond to the call, when for 2 floor type elevators the hall-calls are registered. The elevator shall respond to the call when for more than 2-floor elevators hall-calls and car-calls are registered.

It shall respond to all registered hall calls and car calls in the direction of service. When no call is registered then after a pre-set adjustable period elevator car shall come to designated floor and open the door for 30 seconds (adjustable time) and then park the car there with doors closed.

6.18 Operating and Safety Devices
6.18.1 Each Elevator shall be provided with an overload device of accepted design, which shall operate when the load in the car exceeds the rated load. When activated, this device shall prevent any movement of the Elevator car and shall cause a warning buzzer on the car to be set off and illuminate an “Overload” signal. This device shall be incorporated in the car-operating panel.

6.18.2 The water sensors in the elevator pits shall be provided wherever pits are on the ground level or below the ground level. The requirement of water sump in the elevator pits for such elevators shall be co-ordinated with the civil contractor.

6.18.3 An inspection control panel shall be fitted on the top of the Elevator car for maintenance purpose. The design of the inspection control panel shall comply with the following requirements and prevent the Elevator car from being operated accidentally:

a. It shall not be possible to control the Elevator car from any other position after the NORMAL/TEST change-over switch has been set to the TEST position. When in the TEST position, the UP and DOWN continuous pressure push buttons within this panel shall become operative.

b. An ON/OFF switch shall be provided. It shall render the Elevator inoperative in any mode, when the switch is in the OFF position.

c. The Elevator car shall only move when all safety devices are in the safe position.

d. The Elevator car shall move in either direction only on continuous pressure of the appropriate direction button at a car speed not exceeding 0.25 m/s.

e. Not used

f. The control panel shall incorporate an adequately protected permanently located light fixture with a separate switch and a 15A switch socket outlet.

g. A door operator ON/OFF switch shall be provided. The door operator shall only be operative when the switch is at the “ON” position.

h. Associated with this control, a terminal stop limit switch shall be provided to stop the car from traveling in an upward direction not less than 1.8 m from the soffit of the Elevator shaft. When this switch is activated, it shall not stop the car from operating in the down direction.

i. There shall be provision of LED lights inside the Shaft & in undercroft of car base which can be controlled from the top landing & from pit it should have an intensity of 200 Lux at floor level.

j. All switches and buttons on the inspection control station shall be clearly engraved with their functions. All buttons and switches shall be shrouded
against accidental operation, with the exception of the emergency stop button.

6.18.4 The Elevator shall be provided with a floor-leveling device, which shall automatically bring the Elevator car to stop within ±5 mm of the level of the floor for which a stop has been initiated regardless of the load or direction of travel. In case of ARD mode the car should stop within ± 10 mm of the level of floor, this is subject to the Engineer’s Acceptance at the design stage.

An automatic re-leveling device shall be provided which returns the Elevator to the floor automatically should the Elevator creep down or move up from floor level for any distance from 6 mm to 50 mm. This device shall be operative at all floors served whether the landing and car doors are opened or closed.

6.18.5 Each Elevator car shall be provided with safety gear mounted on the lower member of the car frame structure. This safety gear shall be capable of operating only in the downward direction and capable of stopping the car with full load at the tripping speed of the over speed governor, by gripping the guides and holding the car stationary. The motor circuit shall be opened by a switch on the safety gear before, or at the same time the safety gear is applied. It shall be possible to release the safety gear by raising the Elevator car without the use of any special tools.

A mechanical device and electrical device shall be provided to prevent the car movement resulting from maintenance/inspection that can be dangerous to persons carrying out maintenance/inspection works from inside the car or car roof.

6.18.6 An over speed governor shall be provided, which is capable of activating the safety gear in the event of the Elevator exceeding the rated speed. The tripping of the over-speed governor for the safety gear shall occur when the car speed exceeds 140 % of the rated speed (of 1.0 m / sec) downwards. A mechanically operated safety switch shall be provided to disconnect the power supply to the motor when the governor is activated. The governor shall be adjusted to operate the safety gear in accordance with the recommended limits set out in IS 14665. The governor rope shall be of steel and shall comply IS: 14665. For elevators with rated speed more than 1.0 m/sec the Over Speed Governor selection and setting shall be to ensure compliance to IS 14665 (Latest Version).

An over speed governor shall be provided to the Counter weight in case of Hanging pit. The Contractor is required to interface to the designated Contractor for the requirement of hanging pits.

6.18.7 A phase protection device and 3 phase as well as single phase earth leakage protection device shall be provided in the main control cubicle of each Elevator to prevent the Elevator car from moving in the event that there is a phase failure, or the phase of the power supply being reversed due to any reason whatsoever. These
devices, when activated, shall cause a visual indicator to illuminate on the main control cubicle, until the fault has been rectified.

As in the case of Power failure (including single phasing / unbalanced phase), elevator should operate in the Automatic Rescue Device (ARD) and BDT or Electronic Rescue Tool (ERT) mode. This software for providing this feature is subject to the Employer’s acceptance.

6.18.8 Two switches shall be provided in the Elevator shaft, one at bottom landing and other in the pit which, when in the “STOP” position, shall prevent any movement of the Elevator car, including inspection/ test operation, until both the switches are set to the “RUN” position. The switching positions shall be prominently labeled. The knob of these switches shall have luminous paint.

6.19 **Electrical Requirements**

6.19.1 Each Elevator shall be provided with a main control cubicle to accommodate all electrical switchgear. A caution notice with the wording “Danger- 415V/240V A.C. Do Not Remove Cover Unless Incoming Supply is Switched Off” shall be affixed to the cover/ door. The size and shape of the main control cubicle shall be same as that of Maintenance Access Panel (MAP).

6.19.2 The Elevators shall be designed to operate on a 415V±10% a.c. 3 phase, 4 wire, 240V±10% a.c. 50Hz single phase power supply. Power supplies armoured cables up to elevator’s main control cubicle, and routing done up to the entry point in the elevator’s shaft shall be supplied by the Designated Contractors. The Contractor shall coordinate with the respective Contractors to incorporate their requirements. Main switch/MCB Box with ELCB etc in unpaid area should be in lockable enclosure and in scope of elevator contractor. MCB box shall be IP-54. All ELCB’s, MCBs & Switches should be as per Employer approved vendors. The shaft LED lighting (200 Lux as per IS: 15785), Ventilation arrangement and pit socket outlets shall be provided by the elevator Contractor. The Fixtures and cables will be got approved by the Employer.

6.19.3 There should be provision of light on the top ledge of elevator door on landing at Ground Level to ensure proper illumination and their identification. The light should be LED type and with astronomical timer to control switching ON & OFF.

6.19.4 All switchgear and other auxiliary apparatus shall be of accepted design and labeled for identification. All the PCB’s provided for elevator shall be provided with conformal coating of industrial grade.

6.19.5 The control wiring shall be laid out neatly and clearly in cable sleeves and all terminals and cables shall be properly sealed, labeled or marked or tagged for identification.
6.19.6 All casing, covers, trunking and armouring shall be thoroughly and efficiently earthed and adequate protection shall be provided to prevent fuses and circuit breakers from arcing to earth or between phases.

6.19.7 Maintenance Access Panel (MAP) should preferably be located at Top Landing of elevator. Maintenance Access Panel (MAP) & Shaft Electrification Panel (SEP) shall be IP55, Pilfer proof. MAP shall have data down loading facilities for fault diagnostic through RS – 485 port and USB Port. Fault data logging in MAP should have date & Time stamping facilities of 500 events. There should be provision of resettable type counter for recording number of operations of the Elevators. Also there shall be provision of lift data transfer including number of operations, energy consumption i.e. consumed & regenerated from open protocol either BACNET or MODBUS inside LED base RMS system through RS 485 or TCP / IP to Centralized Monitoring System by which Employer can access the data. Flexible controller to be provided for Communication whose setting can be changed.

6.19.8 In addition to above, facility to transfer Fault Data / Log of Elevators through Short Message Service (SMS) to designated Contact Numbers also to be provided. Details of the scheme to be finalised during Design stage. Cost of SIM Card shall be borne by Employer.

6.19.9 Not used.

6.19.10 The design of the contactors and relay contacts shall be such that the break and make contacts shall not be closed at the same time at any position of the armature. The operating conditions shall be as follows:-

a. If, one of the break contacts (i.e. normally closed) is closed, all the make contacts are open.

b. If, one of the make contacts (i.e. normally open) is closed, all the break contacts are open.

c. The layout of cards in SEP should be maintenance friendly so that they are easily accessible to the maintainers. This would be evaluated during detailed design.

6.19.11 In the control and safety circuits, the operating voltage of the mean value in the case of direct current or the r.m.s. value in the case of alternating current, between conductors or between conductor and earth shall not exceed 250 V.

6.19.12 There shall be provision of surge protection, power filters and other necessary equipment to avoid failure of elevator equipment on account of quality of power.

6.19.13 In the event of failure of the normal electrical supply, the supply to the alarm cum intercom system, emergency car lighting, and the ventilation fan shall be automatically switched to an emergency battery operated power supply (UPS) of E&M System. The Elevator contractor shall do the necessary interface with E&M contractor for Supply of Armoured Cable up to the Electrical Box of UPS (inside the
elevator's shaft) & for routing of armoured cable up to the entry point inside the elevator's shaft. All hoist way and car top safety switches shall be rated to IP Class 55 (minimum).

6.19.14 All wiring and apparatus shall be subject to acceptance and suitable for the specified electrical supply. The insulation of all wiring including those within the controller shall be of flame retardant, low smoke, zero halogen FRLSZH complying with the special cable requirement of this Specification. *All wires shall be FRLSZH type and Cables shall be Armoured FRLSZH type*.

6.19.15 All field wiring shall be multi-strand copper conductor type. No joints shall be permitted in any cables or wires in any location.

6.19.16 All lift wiring shall be run in galvanized conduit or steel trunking. All conduit outlets shall be bushed with insulating bushes of accepted pattern. All wiring connections to switches and conduits shall be water tight.

6.19.17 The arrangements of terminals at either end of flexible trailing cables shall be identical and the terminal blocks marked to identify the cables connected to them. The cable boxes and wiring for the car light and the alarm bell shall be entirely independent of the elevator control wiring. Flexible trailing cables shall be securely clamped at each end so that the weight is not supported by any fixing of the various cores. The outer sheath of these cables shall be of waterproof and flame retardant material. A total of 10 or 10% of the total number of wires used whichever is more and 2 spare shield cables shall be provided per Elevator. The outer sheath of these cables shall be waterproof and of flame resistance material with low smoke zero halogen type (FRLSZH).

6.19.18 The compatibility of MCB and ELCB used for elevators shall be verified with the requirement of the elevators. The MCB & ELCB are in the scope of elevator Contractor. Termination of main incoming armoured cable on the MCB/ELCB shall also be the responsibility of the elevator contractor.

6.19.19 Regarding harmonics generation in VVVF system
OEM shall design the VVVF system in such a manner that generation of harmonics is minimal. OEM shall also provide suitable harmonics filters to eliminate harmonics. Ceiling limits for "total harmonics distortion" (THD) shall be as per IEEE 519-1992 and values mentioned at clause-11.4, Chapter-11 of this TS may be referred.

6.20 **Provision for LED Based Remote Monitoring System (RMS)**

6.20.1 The LED BASED RMS will be provided by the elevator contractor, the details of which are given in figure 6.20 as under.
### Lifts Monitoring Panel

(Figure 6.20)

<table>
<thead>
<tr>
<th>LIFT PARAMETER S</th>
<th>L-1 C-P</th>
<th>L- 2 C-P</th>
<th>L-3 G-C</th>
<th>L-4</th>
<th>.......</th>
<th>....L- N</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER AVAILABLE</td>
<td>![Red &amp; Green Icons]</td>
<td>![Red &amp; Green Icons]</td>
<td>![Red &amp; Green Icons]</td>
<td>![Red &amp; Green Icons]</td>
<td>![Green Icon]</td>
<td></td>
</tr>
<tr>
<td>UNDER FAULT</td>
<td>![Red Icon]</td>
<td>![Red Icon]</td>
<td>![Red Icon]</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>UNDER MAINTENANCE</td>
<td>![Red Icon]</td>
<td>![Red Icon]</td>
<td>![Red Icon]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALARM BUTTON PRESSED</td>
<td>![Red Icon]</td>
<td>![Red Icon]</td>
<td>![Red Icon]</td>
<td>![Red Icon]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- BUZZER TEST BUTTON (CHECK EVERY 24 HOURS)
- LED TEST BUTTON (CHECK EVERY 24 HOURS)
- ALARM ACCEPT BUTTON

The following status monitoring points and control points shall be provided in the RMS panel:

- **a.** Provision of elevator fault/trip signal & button
- **b.** Provision of elevator car alarm signal
- **c.** Provision of power available and failure status
- **d.** Provision of elevator under maintenance signal
- **e.** Provision of buzzer test button.
- **f.** Provision of LED test button.
g. Provision of Alarm accept button.

h. Provision of buzzer.

6.20.2 The elevator fault/trip signal shall be activated whenever there is a fault in the elevator system, which causes a breakdown. The signal shall be latched on for at least 10 seconds. It shall only be reset after the fault is cleared. The Audio Visual shall be available in SCR, with the approval of Employer.

6.20.3 The alarm signal shall be activated with an audio repeated buzzing till it is reset whenever the alarm inside the elevator car is pressed.

6.20.4 The panel shall be made of SS 304 grade with 1.6 mm thickness sheet, the width of the panel will vary according to the numbers of lifts on a particular station.

6.20.5 Audible Buzzer with 80 dB(A) to 85 dB(A) sound level should operate whenever the LED of parameter “Under Fault” and “Alarm Button Pressed” become “On”. The audible buzzer will become off on pressing of “Alarm Accept Button” however visual indication of LED should persist till the fault is cleared.

6.20.6 Each colour LED should be circular in shape with a diameter of 28.5 mm and text should be in black colour English Words with Arial Font of size 20.

6.20.7 An actual prototype of Lift Monitoring Panel should be shown & got accepted before starting mass production for all lifts.

6.20.8 The contractor shall provide all wiring and apparatus shall be subject to acceptance of “Engineer” and suitable for the specified electrical supply. The insulation of all wiring including those within the lift shaft shall be of flame retardant, low smoke halogen free (FRLSZH) type for underground stations only and FRLS for elevated stations complying with the special cable requirement of this Specification.

6.21 Special Emergency Operations for Elevators

6.21.1 The Elevator operation system shall be designed to provide the following emergency operation. The Contractor shall provide the ITBs with terminals for the Designated Contractor to terminate the fire and power failure signals. The Contractor shall provide the cabling up to the ITB.

6.21.2 Emergency Operation of Elevators in the Event of Power Failure

In the event of power failure or power interruption or single phasing or unbalanced phases (or any problem in the power supply which affect the normal operation of the lifts), the supply to all Elevators shall be automatically switched over to the emergency power supply ie. To Automatic Rescue Device (ARD) and the Elevators shall be brought to the designated floor and shall park there with the doors remaining open. In case Power supply to the lift is restored through DG set/ Alternate source before the lift reaches designated floor even then ARD will
complete its function and lift doors open at designation floor to evacuate the passenger. Thereafter, Elevator designated by the authorized person may resume operation depending on the capacity of emergency power.

6.21.3 Emergency Operation of Elevators in the Event of Fire

In the event of fire when any fire detection device is activated, all Elevators shall automatically be brought to the designated floor (Ground Floor in case of Ground to concourse lift and to Concourse in case of Concourse to Platform Lift or as per requirement of Employer) and shall park there with the doors open for 15-20 seconds and then close. All Elevators shall automatically be rendered inoperative after it has been brought to the designated floor. The essential buttons such as “Door Open”, intercom and alarm bell etc on the car operating panels shall remain functional and illuminated. Normal operation of the elevators shall be manually reset by the operation of a reset key switch.

6.21.4 Emergency Operation of Elevators In the Event of Power Failure and Fire

In the event of power failure and fire, the operation of the Elevators shall be in accordance with the “Emergency Operation of Elevators in the Event of Fire” and the power supply shall be from the emergency supply panel at the stations.

6.21.5 A battery back-up device to home the Elevators to the landing in the event of power failure shall be provided. This shall be battery operated and shall be able to move the elevators with any load from no load to full load at reduced speed to the landing and open the doors, which shall be achieved by provision of ARD and BDT or ERT. The elevators door shall remain close until resumption of power supply and the Elevators shall automatically reset to normal. The direction of travel shall depend upon the load in the Elevator which shall be provided by defining different loading conditions such as more than 50% / less than 50% / at 50%. During this operation all safety features of the Elevator shall remain operational. The rescue time of the device from the time of power failure to the time the doors fully open shall not exceed two minutes. However, the ARD start time can be adjusted from 0 to 30 sec depending upon resumption of emergency supply from alternative source/ DG sets. The requirement of ARD will be finalized during the design stage depending upon availability of power from DG set. The landing accuracy shall be less than +/- 10.0 mm. The capacity of the battery when fully charged shall be capable of operating the Elevator at rated load from one landing to another for a minimum of 3 trips without further charging. To ensure the same new battery shall be capable to perform the test for 6 trips without intermediate charging at the time of commissioning. The battery shall be housed in a cabinet/ rack with a corrosion proof finish. The device shall immediately stop the Elevator and prevent its further immediate movement, if there is a short circuit or open circuit in the inverter output. The rating of the battery
shall be approved by the Employers during the design stage and battery shall have minimum of 02 years life. The power supply indication in MCB for ARD shall be of red colour to properly distinguish it from other power supplies in MCB's. Over and above the ARD system, a manual lever and push button shall be provided for manually rescuing.

This device shall not modify the Elevator design and all its original safety features. The device shall be an additional accessory to the Elevator and shall not in any way affect the performance of the Elevator. The Electrical circuit of different Rescue arrangements shall be fully redundant / totally independent.

The performance of the charger and charging rate shall be equivalent to that of the UPS unit. Maintenance free batteries conforming to the relevant Indian or international standard shall be provided.

6.22 Elevator Monitoring and Fault diagnostic system

6.22.1 An Elevator monitoring and fault diagnostic system shall be provided for each Elevator by the Elevator Contractor. This system shall provide an auxiliary output port on the controller for plugging the laptop

6.22.2

6.22.3 and down loading historical data, the exact requirement of which shall be reviewed at design stage.

6.22.4 Not used.

6.23 Not Used.

6.24 Pit Facilities

6.24.1 Spring buffers / Oil Buffers shall be provided in the Elevator pit.

6.24.2 A safety switch to prevent the car from moving when the governor rope tension weight is out of position shall be provided.

6.24.3 Fixed cat ladders shall be provided between the bottom landing and the pit floor by the Contractor.

6.24.4 Two stop switches, one at bottom landing level in the shaft and the other in the pit shall be provided, which, when in the “STOP” position, shall prevent any movement of the elevator car including movement during inspection operation, until both the switches are set in the “RUN” position. The switch shall have a mushroom head (red). It shall be locked off when pushed and reset manually.

6.24.5 First stop switch shall be accessible from the lower landing on opening of the landing door and the second switch from the pit floor. A stainless steel faceplate of
not less than 2 mm in thickness, indelibly marked “Pit Stop Switch” in both English, and Hindi characters and with legends to show the “STOP” and “RUN” positions shall be provided and fixed immediately adjacent to the switch. The knob of these switches or plate shall have luminous Paint.

6.24.6 The contractor shall do all necessary interfacing for ensuring proper drainage system. Designated Civil Contractor shall provide drainage. But, to ensure proper drainage of Lift Shaft/Roof shall be the Elevator Contractor responsibility before starting the Installation. Interface table is attached at Annexure-A.

6.25 Corrosion Protection

The Contractor shall take into consideration, the corrosive effect of the atmosphere in the Elevator design.

6.25.1 All steel components shall be hot dipped galvanized in accordance with BS 729, with minimum thickness of 85 µm.

6.25.2 All mechanical and cast iron assemblies shall be cleaned and painted. The running surfaces of car guides shall be treated with an accepted rust preventive compound.

6.25.3 All parts constructed in sheet steel shall be either galvanized by the hot dipped process or fabricated from hot dipped galvanized sheet steel.

6.25.4 All hardware, fastenings, screws and shims shall be hot-dipped galvanized. However, all visible screws and fastenings shall be of stainless steel. Epoxy painting will be permitted only on site damage repairs

6.25.5 Wherever galvanization on ferrous components has been damaged in handling the same shall be given two coats of zinc chromate primer and two coats of aluminum paints conforming to IS 2339; Latest Version.

6.25.6 The contractor shall provide all parts, hardware fastenings, screws, components, assemblies and shims confirm to latest Indian Standards.

6.25.7 Galvanization shall comply with the standard mentioned below:-

ISO 1459  - Metallic Coatings - Protection against corrosion by hot dip galvanizing – Guiding Principles;

ISO 1460  - Metallic Coatings - Hot dip galvanized coatings of ferrous materials – Gravimetric determination of the mass per unit area;

ISO 1461  - Hot dip Galvanized coating on fabricated ferrous products – Specification;

ISO 2064  - Metallic and other non-organic coatings – definitions and conventions concerning the measurement of thickness;

ISO 2177  - Metallic Coatings measurements of coating thickness – coulometric method by anodic
dissolution;

ISO 2178 - Non-magnetic on magnetic substrates – measurements of coating thickness – magnetic method;

ISO 2859 - Sampling procedures and tables for inspection by attributes.

6.26 **Provision for the Specially abled persons:-**

All Elevators shall be provided with following features:

(a) Elevator control buttons at locations and height specified in IS 15330.

(b) Hall call buttons at locations and height specified in IS 15330.

(c) Hand rails, straight through type, having minimum 3 supports, shall be provided on the side walls of the Elevator at height & locations specified in IS: 15330. An international symbol of access of the Specially abled shall be permanently and conspicuously displayed at each and every Elevator landing. The Signage is to be made part of the Architrave work. Braille notations indicating the Up/down shall be incorporated next to each button at the handicap COP and handicap hall call buttons.

(d) A digital voice system for announcing the car position, opening/closing of doors, direction of travel and messages shall be provided as per IS: 15330.

(e) A laminated framed safety mirror of at least half of the size shall be installed on rear panel of both glass and stainless steel car door type elevators at appropriate position. To facilitate easy reversal/ exit of person on wheel chair from the elevator without the need of rotating the wheel chair in the elevator.

6.27 **Miscellaneous**

6.27.1 Circuit wiring diagrams shall be provided for all electrical circuits. They shall be in A1 size paper suitably treated to prevent deterioration from dirt or age.

6.27.2 A data plate shall be attached to the cross head members of the car frame giving the following information:-

(a) Contract load of the Elevator,

(b) Speed of the Elevator,

(c) Year of manufacture.

A Do’s and Don’ts instruction plate shall be provided only after approval of Employer. There should two different plates one outside and one inside the car. These plates should be very friendly and simple.
The instruction plate inside the car shall be provided for guiding the passenger how to act at the time of lift stopping.

6.27.3 Special tools required for the operation, servicing, maintenance and repair of the Elevator shall be provided and the list of such tools shall be submitted in Technical package.

6.27.4 Fault diagnosis procedures and circuit diagrams of the printed circuit board, detail information, software and technical data shall be provided to assist in trouble shooting for breakdown during normal operation and maintenance.

6.27.5 A maintenance barrier shall be provided for elevator landing entrance which shall prevent people from entering the elevator car. The barrier shall be painted yellow, made from aluminium / Fibre Reinforced Plastic (FRP) and be of minimum height 900 mm.

6.27.6 The contractor shall ensure that there is no water seepage inside MAP and elevator car even due to heaviest of rain.

6.27.7 Provision of supplying and installing signage at the each landing shall be in the scope of the elevator contractor. The signage at each landing shall be flushed in to the landing architrave panel. The elevator contractor shall interface with other designated contractors on his own for the provision of architecture signage other than the provided in the architrave. Architrave Signage’s shall be LED based and their Cable / Wire shall be FRLSZH. Design and its fitment will be approved during design approval stage.

6.27.8 The elevator contractor shall ensure that the architrave supplied by him matches with the stone cladding (provided by civil contractor) at each landing of the elevator.

6.27.9 The elevator contactor shall supply and install the indication board and board for Specially abled commuters on the architrave. (Interface table is modified to that extend)

6.27.10 Accessories

Each Elevator shall be provided with the following accessories:

a. Three sets each of all necessary keys for the landing door, operating panel, etc.

b. Not used.

c. Not used

d. Not used.

e. Two sets of maintenance barrier.

6.28 Earthing

All the Elevators shall be provided with earthing arrangements as per :-
IS-15785; latest version.
IS-3043; latest version.
Indian Electricity Rules; latest version
IS: 14665; latest Version.

6.29 Special Requirement for Elevators with car and landing doors made of glass panels with stainless steel hairline / Scratch – resistant frame

6.29.1 Detail design of the elevators of Glass door with stainless steel hairline / scratch – resistant frame shall be carried out by the Contractor and reviewed without objection by the “Engineer” before fabrication.

6.29.2 Proto type landing and car doors made of glass panels with stainless steel hairline / scratch – resistant frame shall be pre-assembled in factory for inspection before delivery.

6.29.3 Car roof shall be stainless steel cover panels exposed to public view with a collapsible maintenance platform or any other suitable arrangement with “Engineer” approval above. It shall be able to sustain two persons and be able to resist a vertical force of 2000 N at any position without permanent deformation. Permanent, hinged and foldable safety balustrades or any other suitable arrangement with “Engineer” approval forming an integral part of car top maintenance platform shall be provided. The design shall be subject to the review of the “Engineer”.

Glass shall comply with the following requirements:

(a) General
   i. All glass shall be clear float glass.
   ii. Glass thickness shall not be less than 10 mm. The selection of glass thickness and type shall be in accordance with the information contained in BS: 6262, BS 952: Part 1, BS: 6206 and European Standard EN-81, Annex J or equivalent international standard.
   iii. Particular regard shall be given to adequacy of glass thickness to withstand the calculated design loads and types of location to satisfy safety recommendations. Any reduction in strength characteristics due to acid etching, etc. shall be taken into account.
   iv. Where the edge of laminated glass is to be exposed, the interlayer material must be shown to be resistant to the effects, including clouding and delaminating, of moisture absorption and contact with normal industrial strength cleaning solutions.
v. The Contractor shall conduct a thermal stress analysis of the glazing system, undertake thermal calculations and make due allowance for toughened glass.

vi. All glass shall be manufactured and processed in a factory where the quality control procedures comply with ISO 9000 (BS 5750, or equivalent international standard) and are independently maintained.

vii. No glass shall be used which contains scratches, chips, bubbles or other blemishes which are likely to lead to failure at loadings less than which the unit is designed to withstand.

viii. The glass shall be free of all discernible body and surface faults, and no glass which exhibits discernible optical or reflective distortions shall be used.

ix. Unless reviewed without objection by the “Engineer”, all glazing shall be marked with permanent identification in accordance with BS 6206, and in a position visible but not prominent at the bottom left hand corner of the glazing unit.

x. Glazing shall be provided with edges that are ground, have a frosted appearance and arises chamfered and polished.

xi. Toughened glass shall be tempered on a roller hearth furnace and shall conform to Class ‘A’ Classification of BS 6206 or equivalent international standard. Vertical toughening shall not be permitted. Glass panel of landing door shall have minimum one hour fire rating.

xii. All toughened glass shall be heat soak tested to prevent the risk of spontaneous glass breakage due to nickel sulphide inclusions and other impurities. The method of heat soak testing shall be determined by the glazing manufacturer, such that after testing the probability of failure in service shall be less than one in 130 tonnes of glazing. The Contractor and glazing manufacturer shall, after testing, demonstrate by statistical analysis of test data that the probability of failure is not greater than the specified value.

xiii. All edgework, holes and notches in the toughened glass shall be completed before the toughening process.

xiv. Permissible roll distortion inherent in toughened glass shall be restricted to the horizontal plane when glazed/installed, and local defects such as tong marks shall not be permitted.

xv. Dimensional tolerance on panel size shall be ±1 mm of the theoretical dimension required.
Glass door elevator cars is to meet the following performance criteria:

i. Laminated glass with one pane of toughened glass and one pane of heat strengthened glass.

ii. Glass panels to be capable of resisting applied loads when supported at each corner by a bolt fitted within a hole drilled in the glass. The details shall be reviewed by the “Engineer”:

Applied loads:

<table>
<thead>
<tr>
<th>Dead</th>
<th>Self-weight of glass. Dead loads imposed by adjacent glass panels (if any).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live</td>
<td>Normal to panel 0.75 KN/m².</td>
</tr>
<tr>
<td></td>
<td>Live loads 0.75 KN/m² @ mid pane.</td>
</tr>
<tr>
<td>Impact</td>
<td>Equivalent to 50 Kg baggage trolley @1.8m/sec.</td>
</tr>
</tbody>
</table>

iii. Laminated toughened glass shall be capable of resisting point impacts, to the toughened face, equivalent to an 85 mm hardened steel ball freely dropped from a height of 3 m, carried out in accordance with BS 5544.

iv. The glass shall remain in place if either one or both panes break.

v. The glass shall be free of bow sufficient to cause visual distortion when viewed normal to glass.

vi. Maximum deflection under applied loads 15 mm.

vii. Statistical / failure rate of glass under normal operating load < 0.4%.

(c) All glass shall be marked to identify that it has been tested and inspected to manufacturer’s standard which is reviewed without objection by the Employer’s Representatives.

(d) The tolerance of glass shall be within:

   i. Panel size + 3 mm.
   ii. Step in laminated edge + 3 mm.
   iii. Bolt holes position + 2 mm.

(e) A typical 5 mm gap shall be allowed between adjacent glass panels and between edges of glass panel and stainless steel corner. The gaps shall be sealed with a suitable sealant material. Extent of seal shall be from the base of the floor to the top of the glass walls. All areas of glass edges subject to contact with the sealant shall be treated with a separator chemical to mitigate the chemical reaction between the PVB interlayer and sealant. The Contractor shall conduct standard test from the glass manufacturer to
demonstrate compatibility between sealant and PVB interlayer, the width of edge de-lamination is not to exceed 1 mm under simulated exterior exposure for a period of 2½ years.

6.30 Special Cable Requirements

6.30.1 All cables used except those within the enclosed controller shall comply with the following requirement:

6.30.2 All Control cables shall be rated for minimum grade of 650V and all power cables for minimum grade of 1100 V.

6.30.3 The conductor shall be of stranded conductor composed of plain annealed copper wire complying with IEC 228, Class 2.

6.30.4 The insulation shall consist of an extruded layer of cross-linked polyethylene complying with IEC 502.

6.30.5 The cables shall be manufactured from fire retardant, low smoke, halogen free material (FRLSZH) for underground lifts. The Contractor may propose to use cables manufactured from fire retardant materials (FRLS) only in elevated stations and above ground open areas.

6.30.6 Fire retardant, low smoke, halogen free materials shall meet the following requirements:

(a) London Transport executive Three Metre Cube Smoke Emission Test, using optical measuring instruments. The maximum value of absorbance AO (ON), AO (OFF) shall be 0.8 & 1.2 respectively.

(b) The US National Bureau of Standard Smoke Chamber Test, used to evaluate plaque samples of materials of constant thickness (NFPA-258 Smoke Generation of Solid Materials 1982). The maximum specific optical density shall 170 under the non-polluted condition.

(c) The flame propagating criteria of US IEEE Standard 383, with a minimum test short circuit time of five minutes, in the IEEE Standard 383 test.

(d) IEC 332 Parts 1 and 3, Category ‘B’, tests on single and bunched cables under fire conditions.

(e) Limiting Oxygen Index of at least 30, to ASTM D-2863.

(f) A temperature index (TI) of 260°C to ASTM D-2863.

(g) All insulation is to be moisture and heat resistant, with temperature ratings appropriate to the application conditions, and in no case lower than 90°C.

(g) When a sample of the cable is subjected to a combustion test for the determination of the amount of halogen acid gases (other than hydrofluoric acid) as set out in IEC 754 - Part 1 the halogen acid evolved shall not exceed a maximum of 0.5%.

Fire retardant materials shall meet the requirements of item (c), (d), (e), and (f) only. The above tests shall be certified from Independent Test Lab. The test sample cable shall be taken from material of elevator supplied under this Contract only. These tests may be witnessed by JMRC Representative.
6.30.7 The above requirements shall be met without compromising the anti-termite, pest-resistant, mechanical and electrical properties of the cables both during and after installation to meet the other requirements of this Specification.

6.31 Noise Generation

6.31.1 The whole of the elevator assembly, including the opening and closing of the car and landing doors shall be quiet in operation and shall be free of rattling or squeaking noises. Elevator door operation shall be smooth to avoid the transmission of impact noise to the surrounding structure.

6.31.2 Noise levels resulting from the operation of the elevator, including direct sound transmission, breakout noise and re-radiation of structure borne noise shall not exceed 55 dB(A) (fast response) at 1.5 m from the elevator shaft and 1.5 m above the floor.

6.31.3 Machinery noise level under normal operating conditions shall not exceed 70 dB(A) at 1 m from the equipment in free field.

6.31.4 The total noise level in a moving elevator car shall not exceed 55 dB(A) with ventilation fan operating.

6.32 Ride Comfort Parameters.

Apart from noise (whose permissible value is mentioned above in clause 6.31.4), lateral quaking, acceleration, jerk and vertical vibration are the other parameters based on which ‘Ride Comfort’ and its quality is measured. These parameters are defined below (definition as per ISO 18738):

(i) Lateral Quaking: A sideways acceleration / deceleration measured in gal.

(ii) Acceleration / Deceleration: A rate of acceleration/ deceleration measured on the z-axis velocity and expressed in meter per second squared (m/s$^2$).

(iii) Jerk: The rate of change of z-axis acceleration/ deceleration, attribute to lift motion control and expressed in meter per second cubed (m/sec$^3$).

The contractor by performing suitable tests as per ISO 18738 shall ensure that following permissible values of above parameters shall be achieved for satisfactory ride comfort quality:

<table>
<thead>
<tr>
<th>S. No</th>
<th>Ride Comfort Parameter</th>
<th>Unit</th>
<th>Permissible value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Maximum Lateral Quaking (in any of X or Y direction)</td>
<td>Gal</td>
<td>12 Pk - Pk</td>
</tr>
<tr>
<td>2.</td>
<td>Acceleration / deceleration (adjustable)</td>
<td>m/s$^2$</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>Maximum Jerk</td>
<td>m/s³</td>
<td>2.0</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------</td>
<td>------</td>
<td>-----</td>
</tr>
<tr>
<td>4.</td>
<td>Maximum Vertical Vibration (in Z direction)</td>
<td>Gal</td>
<td>20 Pk-Pk(1-100 Hz)</td>
</tr>
</tbody>
</table>

**Note:** The permissible values given above for various ‘Ride Comfort Parameters’ are indicative only. The actual values shall be those prevailing in the elevator industry at the time of commissioning of the elevators and the contractor has to ensure that those values are achieved.

The contractor shall submit the “Ride Comfort Report” whose acceptance shall be subject to Engineer’s approval.

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CHAPTER 7
QUALITY ASSURANCE AND
SYSTEM ASSURANCE
7 QUALITY ASSURANCE AND SYSTEM ASSURANCE

7.1 General

A Quality Assurance programme shall be developed and implemented as a means of determining compliance with the Employer’s Requirements. This programme shall comply with the requirements as set out in ISO 9000. The programme shall include but not be limited to the procedures necessary to ensure that all equipment, materials, systems and sub-systems are properly specified, designed, purchased, recorded, inspected, installed and tested at all appropriate stages. The procedure shall also ensure that handling, storage and delivery arrangements are satisfactory.

7.2 Quality Assurance Programme

The Contractor’s quality assurance programme shall include as a minimum, the following functions:-

7.2.1 Inspection System: A system for in-process inspection of work operations and manufacturing as well as installation processes, including observations, measurements and tests, to ensure conformance with the requirements of the Contract.

7.2.2 Calibration System: A system for periodic calibration and control of the accuracy of precision instrumentation and gauges.

7.2.3 Record System: Data and records essential to the operation of the quality programme shall be maintained by the Contractor and made available to the “Engineer” upon request. These records shall include work performance, inspection and testing observations and the number and type of deficiencies found. In addition, records shall be maintained for monitoring work performance, inspection and testing which indicate the acceptability of work or products and the remedial action taken in connection with deficiencies.

7.2.4 Supplier Control System: A system for ensuring that all supplies and services procured from suppliers (subcontractors and vendors) conform with the requirements of the Contract.

7.2.5 Manufacturing Control System: A system for providing necessary control over manufacturing operations to ensure that the final product conforms with all requirements of the Contract. This system shall include controls for the following areas:

(a) Materials

Suppliers’ materials and products shall be subject to inspection to demonstrate conformance with the technical requirements.

(b) Production Process and Fabrication
The Contractor’s quality assurance programme shall ensure that all machinery, wiring, batching, shaping and basic production operations (of any type) together with all processing and fabricating are accomplished through documented work instructions. These instructions shall be the criteria for acceptable workmanship.

(c) **Completed Item Inspection and Testing**

The quality programme shall ensure that there is a system for final inspection and testing of completed products. Such testing shall provide a measure of the overall quality of the completed product and be performed so that it simulates, to a sufficient degree, product end use and functioning.

The contractor shall do the testing of “RIDE COMFORT” with EVA Meter and submit the analysis report stating the limits of ride quality parameters with each elevator’s ride quality measured parameter and ensure the ride quality as per relevant standards.

(d) **Statistical Quality Control and Analysis**

Statistical methods may be utilised for planning, analysis, tests and quality control whenever such procedures are suitable for maintaining the required control of quality. Sampling plans shall be subject to the acceptance of the “Engineer” prior to use.

(e) **Indication of Inspection Status**

The Contractor shall maintain a positive system for identifying the inspection status of products. Identification may be accomplished by means of stamps, tags, routing cards, move tickets or other control devices acceptable to the “Engineer”.

7.2.6 **Installation Control System:** A system providing necessary control, monitoring, inspection of the progress, quality of work and protection of equipment, to ensure that the equipment is installed according to the requirements of the contract.

The system shall include but not be limited to the following, which shall be subject to the acceptance of the “Engineer” prior to use:

(a) **Shop Drawings**

All layout and shop drawings giving detailed layout of equipment, structural cut-outs, supports, openings, all dimensions, tolerances setting, etc (Refer Clause 4.7 of TS).

(b) **Assembly Procedures and Drawings**

This shall show details of all installation and assembly procedures, including tolerances, tightening torque, alignment, precautions, etc.

(Refer Clause 4.7 of TS)

(c) **Inspection Checklist**

Checklists giving all items to be checked and inspected with tolerances setting, etc.
7.2.7 The Contractor shall submit checklists to demonstrate compliance with all applicable standards.

7.3 Systems Assurance

The Tenderer shall demonstrate a clear understanding of all the requirements of this Clause in his tender submission.

7.3.1 General

a) The Contractor shall develop and implement the requirements for Systems Assurance. These requirements shall be applied also to subcontractors and suppliers and shall be carried out during the design, manufacture, installation, testing and commissioning phases of the Works.

b) The Contractor shall prepare and submit for review and acceptance by the “Engineer” a Systems Assurance Plan thirty days after Contract Award.

c) The System Assurance Plan shall define the Contractor’s approach, procedures and schedules for conduct of Safety Engineering, Reliability Engineering and Maintainability Engineering. Human Factors Engineering is an integral part of Systems Assurance and shall be considered and reflected within the Systems Assurance Plan.

d) The Contractor shall pro-actively engineer the systems to meet the safety, availability, reliability and maintainability performance requirements listed below and demonstrate that the requirements have been met by the system installed.

e) In the process the potential hazards to safety, availability, reliability and maintainability performance should be further minimised where design options permit.

f) The deliverables listed below are intended to provide the “Engineer” with a sound basis for acceptance of the safety, availability, reliability and maintainability performance; progress information; confidence that the design is proceeding with a low risk of failing to meet the performance requirements; information that will aid the planning of work schedules; and part of the foundation of the safety case for operation of the line.

7.3.2 Not used

7.3.3 Safety Engineering

a) The Contractor shall as part of the safety engineering activity prepare analyses of identified potential hazards to ensure resolution of hazards. The following analyses shall be prepared and submitted by the Contractor:

i) Subsystem Hazard Analysis (SSHA)

ii) Interface Hazard Analysis (IHA)
iii) Operating and Support Hazard Analysis (O&SHA)
iv) Quantitative Fault Tree Analysis (FTA)
v) Failure Modes, Effects and Criticality Analysis (FMECA)

d) The Contractor shall prepare a Fire Safety Design Report for review and acceptance by the “Engineer”. At a minimum, this report shall contain documentation of the specific fire hardening and life safety features and attributes the Contractor has incorporated in the elevator design; especially those relating to: -
   i) Structural fire resistivity
   ii) Choice of electrical wiring and insulation for vital safety critical circuitry.
   iii) Flammability, smoke emission, and toxicity characteristics of selected materials.

e) Further, the information presented by the Contractor shall be supported by the history of tests conducted and by approved test certificates from accredited laboratories which attest to the materials' characteristics and behaviour.

7.3.4 Reliability, Availability and Maintainability (RAM) Engineering

a) Reliability, availability and maintainability requirements and goals shall be developed as defined in clause 6.2.5 of P.S.

b) Final reliability, availability and maintainability predictions shall be verified by testing after system design has been completed.

c) The subsystems and equipment shall be designed to maximise system availability during traffic hours, to minimise the amount of maintenance required and to ensure that any maintenance can be easily and quickly carried out at minimum cost.

d) The Contractor shall perform RAM analysis up to the point of interface with other systems.

e) Reliability block diagrams shall be developed which show each equipment element that is essential to the performance of the system, including element interrelationships. Block diagrams shall be revised to keep current with design iterations.

f) The Contractor shall develop a reliability model consisting of reliability block diagrams and probability of success equations. The model shall show the relationships required for system success. The Contractor shall revise the model to keep current with design iterations.

g) The Contractor shall provide RAM prediction and apportionment in accordance with established techniques or standard or properly documented and verifiable field failure data for identical or similar equipment. The standards used or the source of field data shall be identified.

h) Quantitative RAM assessments to all significant functional levels of the system, subsystems or equipment shall be allocated. Maintainability analyses during
design, development and testing shall be used to evaluate the degree of achievement of the maintainability requirements. The Contractor shall identify the standards by which these allocations are made.

i) The Contractor shall develop predictions to judge the adequacy of the proposed design to meet quantitative RAM requirements and shall identify design features requiring corrective action during early stages of design and development.

j) The Contractor may submit existing analyses which are properly documented and verifiable for equipment and applications which are identical or manifestly similar. The documents used for calculating the Reliability, Availability and Maintainability shall be certified by the Customer whose data's are used. Existing data need not conform to the agreed format but shall contain the same data presented in a neat, concise and logical manner.

7.3.5 Not used

7.3.6 Not used

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CHAPTER 8

DESIGN SERVICES
8 DESIGN SERVICES

8.1 Design Requirements

The Contractor shall perform all design functions necessary for the development, manufacture, installation and site testing of elevators as described in this Specification.

8.1.1 The design of each component shall achieve the minimum service life given below.

The failure rate of the components shall not exceed 5%. Failure rate is defined as the number of failures (during the service life) divided by the total quantity of the components in one section.

<table>
<thead>
<tr>
<th>Elevators</th>
<th>Service life(years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Safety gear rope / Coated Steel Belt</td>
<td>8</td>
</tr>
<tr>
<td>(ii) Governor</td>
<td>20</td>
</tr>
<tr>
<td>(iii) Anti Creep device</td>
<td>20</td>
</tr>
<tr>
<td>(iv) Hoisting chain / hoisting rope</td>
<td>8</td>
</tr>
<tr>
<td>(v) Contractors / relays</td>
<td>10</td>
</tr>
<tr>
<td>(vi) Traction machine / motor</td>
<td>20</td>
</tr>
</tbody>
</table>

The Service life of each equipment shall be specified by the firm in the design submission.

8.1.2 The Contractor shall prepare and submit drawings, which clearly illustrate details of equipment down to sub-assembly and component level, equipment locations and configurations. Drawings shall indicate plan views, elevations, sections, charts, tables, schematics and diagrams with legends, dimensions, part numbers, tolerances, setting clearances, materials, etc., as required to cover the facilities being provided under the Contract. Drawings shall also be prepared showing circuit wiring for each of the systems included in the Contract.

8.1.3 The Contractor shall prepare and submit specifications to provide a clear description of the functional requirements such as, loading, materials, clearances, tolerances, of all equipment and its components planned for use in the Contract. The specifications shall indicate acceptable levels of performance, the expected normal life span, and the mean time between failures (MTBF) for the equipment, materials and workmanship, with due consideration given to the service and environment to which such equipment will be subjected. The Contractor shall identify, by manufacturer and model or part number, each component, which he plans to install under the Contract.

8.1.4 The Contractor shall prepare and submit a Quality Assurance programme in accordance with requirements contained in the Specification.

8.1.5 The Contractor shall submit all applicable data, criteria, standards, directives and information used as a basis for the design of the elevators.
8.1.6 The Contractor shall comply with the drawings and graphic standards identified in the Employer's Requirements.

8.1.7 The Contractor shall submit the design calculations for the following, to demonstrate how the operational requirements are achieved.

(a) Structural loading to pit and shaft wall.
(b) Heat dissipation value for the elevator
(c) Power requirements and efficiency of motor/machine.
(d) Any other information necessary or asked by the Employer

8.1.8 The Contractor shall submit catalogues and/or samples for all parts and components used in this Contract as per Employer’s Requirement.

8.1.9 The Contractor shall prepare equipment layout plans and other documents necessary to facilitate the design interface co-ordination with other System-wide and Designated Contractors. These plans shall, (if necessary) be incorporated in design drawings but they must be prepared at appropriate times and in sufficient detail to permit successful co-ordination of space provisions for the elevators.

8.2 Endorsement Requirement

All drawings, calculations, test certificates, technical information, data and analysis submitted in this Contract shall be endorsed by the Contractor’s registered Professional Engineer. The design certificate & drawings shall confirm to Performa (Refer clause 4.7 of TS).

8.3 Co-ordination with Designated Contractors

The Contractor shall co-ordinate with the Designated Contractors, shall finalise and agree with the Designated Contractors all relevant matters relating to the equipment including but not limited to the following:

a) space requirements, including tolerances for construction of the civil works.

b) fixing requirements

c) loading

d) interface with architectural finishes

e) cabling routes, termination details including providing information to the Designated Contractors.

f) information on embedded parts, box-outs, etc. to enable the Designated Contractors to provide the necessary works.

g) equipment access route and temporary/permanent lifting requirements.

h) lighting requirements
i) power requirements
j) ventilation requirements
k) fire protection
l) drainage requirements

8.4 Not Used (Interface with BMS System)

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CHAPTER 9

INSTALLATION
9  INSTALLATION

9.1  The Contractor shall be responsible for the timely and proper setting out of the Works which shall include verifying the positions, levels, dimensions and alignment of elevator pits, supports, shaft, walls and floor openings, etc. Any error in the civil construction in so far as they relate to the Works shall be immediately brought to the attention of the “Engineer” and the Designated Contractor to allow prompt rectification by the Designated Contractor so as to avoid delays to the Works. The Contractor shall not be entitled to claim for any additional costs incurred by him arising out of such errors in the civil construction, if such additional costs could reasonably have been avoided had the Contractor carried out timely and proper setting out of the Works. The method adopted for installation shall be in accordance with relevant standards with latest versions/amendments stated at Clause 4.17 of this specification.

9.2  The Contractor shall be responsible for all aspects of the Work required to install the equipment, including the provision of all lifting facilities such as frames where the provision of hooks is not possible. The Contractor shall co-ordinate with the Designated Contractors on the necessary precautions to be taken by both the parties to prevent damage to any part of the civil works during installation. The Contractor shall take all necessary precautions including transportation of various part of elevators on rubber typed wheel and handling these with proper equipment so that floor finishes are not damaged by the Contractor during erection of Elevators at the stations. In case any floor finish is damaged by the Contractor the same shall be made good by the Contractor in full panel/area at his cost, so as to maintain uniformity.

9.3  The Contractor shall ensure that levelling of all landing equipment shall be within ± 1.0 mm. The vertical alignment of all door jambs, doors etc. shall be truly plumb to within ± 1.0 mm.

9.4  Guide rail shall not be skewed. The distance between guide rail shall be within ± 0.5 mm. Guide rail joints shall be smooth to within 0.1 mm. It shall be erected plumb within ± 1.0 mm.

9.5  The Contractor shall provide protection, such as plywood box-up etc., to protect the door, the jamb, decking, from being damaged until the work is handed over at no additional cost. Any damages to the equipment will be the sole responsibility of Contractor and the firm shall replace the damaged part without any extra cost. The complete equipment will be inspected and tested at the time of taking over of the equipment.

9.6  All Elevator landing door gaps shall be less than 4 mm.

9.7  The Contractor shall be responsible for the installation of all guide rail brackets, separator, sill supports, hanger brackets including drilling and all related materials. The
contractor shall verify and satisfy themselves in respect to the loading capability of the shaft wall holding the bracket etc. If the Contractor feels that load test is necessary/required, then he can arrange the same in co-ordination with civil contractor.

9.8 Electrification Panel of elevator shall be fully protected against the ingress of grit, dust and moisture and maintenance friendly enclosure.

9.8 All equipment shall be fully protected against the ingress of grit, dust and moisture during delivery, storage and installation.

9.9 The equipment shall be delivered to Site in accordance with an accepted installation programme with a minimum temporary storage period to avoid damage. Access into the station will be either by train or by road depending on site environment and constraints.

9.10 The Contractor shall design the equipment to comply with the Site access restrictions and shall ensure that the largest piece of equipment can be brought into the station through the access opening/entrances and passage ways. Method Statement of Installation shall be submitted for Employers review and approval at least 30 days prior to the starting the installation. As part of the preliminary design submission the Contractor shall submit to the “Engineer” for acceptance a General Method of statement for Installation however, Contractor will submit schedule of tests giving full details of all tests to be carried out.

9.11 Where the structure does not permit the provision of lifting points, the Contractor shall make his own arrangements to provide the required lifting facilities such as “A” frames or similar arrangements to carry out installation work at no extra cost.

9.12 Once the elevator shaft is handed over to the contractor to commence installation, he shall be responsible for providing fencing and barricades to protect his working areas during the installation period for the safety of his workers and other personnel working in the station until the taking over of the lift by JMRC.

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CHAPTER 10

TESTING AND INSPECTION
10 TESTING AND INSPECTION

10.1 General

10.1.1 As part of the preliminary design submission the Contractor shall submit to the “Engineer” for acceptance a schedule of tests giving full details of all tests to be carried out.

10.1.2 Tests at places of manufacture to be witnessed by the “Engineer” shall be grouped together so far as can be arranged so that as many tests as possible can be witnessed on each visit.

10.1.3 The Contractor shall prepare and forward to the “Engineer” an original and four copies of all Test Reports as soon as practicable after completion of each test whether witnessed by the “Engineer” or not. All test data shall be certified by the Contractor’s Professional Engineer.

10.1.4 The Contractor shall perform all applicable test specified in these specifications as per the relevant standards. Any test required as per the applicable safety standards but not specified in this specification shall be performed without any extra cost to JMRC.

10.2 General Requirements for Type Tests and Acceptance Tests

10.2.1 The Tenderer shall provide details of any type and acceptance tests, which have been carried out on equipment offered, or any additional tests he recommends.

10.2.2 In general, certificates of previous type tests may be accepted at the discretion of the “Engineer”, provided that they are for identical equipment and conditions. Where appropriate, new and/or modified components to meet the requirements of this Specification shall be made available for type testing.

10.2.3 All applicable Type tests as per the relevant standards on equipment shall be carried out strictly as specified in the Specification and procedure of testing shall be submitted to “Engineer” for No Objection.

10.2.4 The “Engineer” shall have right to witness tests and inspections on individual materials, components, or sub-assemblies, and details of these shall be agreed between the Contractor and the “Engineer”.

10.2.5 At the conclusion of all type tests, the Contractor shall compile all the test data together with any observations made during the tests, file them into a type test binder and submit it to the “Engineer” for acceptance and record.

10.3 General Requirements for Tests during Manufacture
The Contractor shall carry out all applicable tests during manufacture as specified and propose any additional tests to be carried out as per relevant safety standards. These tests shall be subject to the acceptance of the “Engineer”. Routine tests shall be integrated with the manufacturing programme. The “Engineer” will, at his discretion, witness the routine tests during the period of manufacture, or accept the records of the Contractor’s in-house quality control scheme, where appropriate, as sufficient evidence for the execution of the routine tests.

Routine tests shall be carried out strictly as specified in the test specification as outlined in Clause 10.4.

On completion of the manufacture of items or sub-assemblies, and following completion of the manufacturer’s own tests and inspection, the “Engineer” shall be invited to witness such tests as he deems appropriate. The Contractor shall schedule the routine tests to meet the manufacturing programme, whether or not the “Engineer” will be present at the tests, provided advance notice has been served to the “Engineer” in accordance with Clause 9.8 of GS.

The “Engineer” will determine and advise the Contractor of those tests where certification by the manufacturer may be acceptable in lieu of witnessed tests.

Before equipment is dispatched, the “Engineer” will signify his acceptance by signing certificates releasing such equipment from the place of manufacture or test.

Methods of packing and shipping shall be as specified in the Employer’s Requirements, the “Engineer” reserves the right to visit the manufacturers’ or packers’ premises to ensure that accepted methods are employed.

**Test Specification**

The Contractor shall submit for acceptance by the “Engineer”, test specifications for type tests, routine tests, tests on site, final acceptance tests and commissioning. The specifications shall detail the methods of conducting the tests, the tools and instruments used. Reference to the accepted documents and drawings shall be included in these specifications. The records/results shall be tabulated in a prescribed format applicable to this Contract.

Nothing in this Specification shall prevent the “Engineer” from calling for extra tests.

These test specification shall include the design values of all quantities to be verified, with allowable tolerance or limits. Summary drawings or diagrams shall be included with the test specifications to show the dimensions and tolerances of all structural assemblies and sub-assemblies. In the case of welded fabrications, key diagrams giving all weld data shall be provided to enable systematic inspection to take place.
10.4.4 Verification of accuracy shall be required for all tools, apparatus, testing jigs, measuring instruments and ‘go’ or ‘no go’ gauges used for the purpose of routine tests.

10.4.5 All test instrument shall be calibrated not more than one year prior to their use. The Contractor shall submit calibration certificate or other documents for proof of Compliance.

10.5 Testing of Materials and Details

10.5.1 Where materials or components used in this Contract are not covered by separate test specifications, samples of such materials, or up to two per cent of such components shall, if desired by the “Engineer” be tested at the Contractor’s expense at an approved laboratory.

10.5.2 The Contractor shall supply the material required for testing free of charge and shall supply and prepare the necessary test pieces, labour and appliances for making all tests, and for carrying out all gauging and weighing on his premises in accordance with the terms of this Specification. If the Contractor is unable to provide approved facilities at his own factory for making the prescribed tests, the Contractor shall bear the cost of carrying out the tests elsewhere, at a place subject to the “Engineer” acceptance.

Such radiographic examination of welds or castings as the “Engineer” deems necessary shall be carried out.

10.6 Not Used

10.7 Elevator Prototype Tests

10.7.1 One complete Elevator shall be available for the commencement of witness testing after Contract Award. The selected Elevators shall be representative of their various types.

10.7.2 A complete Elevator system including traction drive system, in addition to the controller, Elevator car enclosure, landing and car doors, protection devices and call fixtures shall be assembled on a test rig or inside a test tower to undergo a comprehensive running and functional testing in accordance with the accepted test specification to verify compliance with the Specification.

10.7.3 The tests shall include the following minimum requirements.

a) Verification of the suitability of the traction drive system, its efficiency, etc.

b) Verification of the car operation and response to call fixtures, door operation including the safety edges, all indications and signaling features, and car top control features;
c) Weight tests on safety gear and measurement of electrical readings and verification of the operating speed under various loading conditions;

d) Verification of riding comfort and leveling accuracy under various load conditions.

e) Verification of the fault indication and fault diagnosis features.

f) Verification of the construction of the various control panels to the specification shall be done. Insulation resistance and high voltage tests shall be conducted in accordance with the test specification.

g) Any additional testing as required by BS 5655 Part 10.

h) A 12-hour duty cycle test, during which the Elevator shall run continuously with the contract load for 12 hours and shall travel up and down with intermediate stops such that the number of starts per hour as specified.

i) Complete functional tests on the isolating transformer and ripple filter.

j) Operation of the battery back-up device and the battery operated power supply.

k) Simulation of the emergency homing sequence during fire and power failure.

10.8 Not Used

10.9 Elevator Type Tests

10.9.1 Elevator Contractor shall ensure that Type Test Certificate for elevator equipments / components should not be older than 05 years, if any certificate is older than 5 years the same must be got revalidated from time to time during the contract period (excluding defect liability period) by the Elevator Contractor at his own cost from independent third party laboratory.

10.9.2 Motor

Frequency of Tests

One unit selected by the “Engineer” for each range of motors supplied for this Contract.

If the quantity of the same range of motor exceeds forty, an additional motor shall be selected from the second batch by the “Engineer” to repeat the same tests described below.
If a separate motor is used for achieving maintenance speed, the same requirements shall also apply to the maintenance motors.

In general, all tests shall be conducted in accordance with the relevant parts of BS 4999.

Scope of Tests

a) Insulation Test
   i) Insulation resistance of windings using 1000V megger shall not to be less than 200 M Ohm.
   ii) Insulation resistance of thermistors subject to 1000V for 5 seconds shall not be less than 200 M Ohm. Windings shall be earthed.
   iii) Main and slow speed winding shall each be pressure tested to 2000V r.m.s. for 60 seconds. During this test, thermistor wires shall be grounded to earth.
   iv) Cold resistance of both high and low speed windings shall be recorded.

b) Dynamic Tests
   i) No load current and speed shall be recorded at rated voltage and frequency for both high and low speed windings.
   ii) Full load, 75%, 50% and 25% load tests shall be carried out on both high and low speeds at rated voltage and frequency. Current and speed shall be recorded for each. Input power, efficiency, slip and power factor shall be established and recorded for each.
   iii) Temperature rise test on full load shall be carried out on high speed windings only. Voltage shall be 415V. Frequency shall be as rated.
   iv) Ambient, air outlet, casing, output power and temperatures shall be recorded at 15 minute intervals for the first two hours and 30 minute intervals subsequently until temperature levels off.
   v) Voltage, current, frequency, output power and temperatures shall be recorded at 15 minute intervals for the first two hours and 30 minute intervals subsequently until temperature levels off.
vi) When the temperature has leveled off, the motor shall be switched off and the winding temperature rise shall be established using the resistance method as specified in BS 4999 Part 101.

vii) A momentary overload of 200% full load shall be applied for 15 seconds. The motor shall not stall or abruptly change speed.

viii) A locked rotor test shall be carried out at rated voltage and frequency for both high and low speed windings. Current and torque shall be recorded in both cases.

ix) The speed/torque characteristic and the starting current characteristic shall be produced from the results obtained.

10.9.3 Controller

Frequency of Test

One of each type of controller shall be type tested.

Scope of Tests

a) Physical Construction Checking

The construction of the control cubicle shall be checked against the approved drawings. Facilities to padlock incoming fused isolator shall be checked. Verification of the protection classification shall be conducted and/or provided.

b) Pressure Test

i) Earth leakage circuit breakers shall be tested on both poles. The current and time required to trip shall be recorded. Similarly, the dc earth leakage unit shall be tested and values to be recorded.

ii) Pressure testing at 2000V ac r.m.s. for 60 seconds between: phase to phase and phase to earth.

iii) Control wiring itself shall be pressure tested at 1,500V ac r.m.s. for 60 seconds between control/auxiliary wiring and frame. Insulation tests shall be carried out before and after the above tests by a 1000V insulation tester. The insulation resistance thus measured shall not be less than 200M ohm.

iv) All protection on electronic circuits shall be tested by a 500 V installation tester.
Wiring to all electronic components shall be meggered. Megger setting shall be at the discretion of the “Engineer”.

v) Verification of the protection circuit shall be carried out in accordance with the approved procedures.

Temperature rise during the tests shall be recorded and verified.

10.9.4 Braking System

Frequency of Test

One of each type of brake provided shall be required to undergo type testing.

Scope of Test

A full dimensional check shall be carried out to verify compliance with the manufacturing drawings and a full functional test shall be carried out. A demonstration of brake adjustment and setting shall be carried out.

10.9.5 Door Endurance testing shall be done for 4 million operations of Door Assembly & based on this testing, an analysis shall be done to modify the existing List – A (Predictive Replacement plan is based on the door testing) in Appendix – G: Maintenance Requirements.

10.9.6 Elevators Inter-communication System

Two of each type of Elevator-Inter-Communication Systems shall be type tested. A full functional test shall be carried out to verify compliance with the specification.

10.10 Not Used

10.11 Elevator Routine Tests

The following are the minimum requirements of the routine tests.

10.11.1 Driving Machines

Random Check:

Verification of the insulation resistance of the windings using a 1000 Volts megger test. A high voltage test to 2000 Volts r.m.s. for one minute of the stator winding shall be conducted.

A dynamic test for every driving machine shall be conducted for a period of 4 hours continuously without stopping, except for changing of direction, 2 hours in each
direction, at contract speed and 25% load conditions. The test is to ensure no undue vibration or abnormal temperature rise occurs in any component.

10.11.2 Power units

100% check:

The assembled power unit shall be checked in accordance with the accepted test specification along with surge protectors, power filters, etc.

10.11.3 Main Control Cubicle

100% Check:

The complete control cubicle shall be checked with a simulator to verify correct wiring connection and function of the electrical/ electronic devices.

Verification of the insulation resistance of the control wiring and electronic components shall be conducted in accordance with the accepted test specifications.

10.11.4 Call Button and Fixtures

Random Check:

The call button shall be checked at random to confirm the manufacturing quality.

The assembled fixtures shall be inspected and functionally tested accordance with the accepted test specifications.

10.11.5 Hoist Rope/belt

A manufacturer’s certificate or sample test will be acceptable to the “Engineer”.

10.11.6 Safety Gear

Manufacturer’s certificate or test report on the assembly will be accepted by the “Engineer”.

10.11.7 Car Enclosure and Door Assembly

Random Check:

The assemblies shall be checked at random to ensure the correct dimensions and layout. Quality of the finishing shall be inspected to ensure the correct type of materials have been used for fabrication.

Protection of the finished assembly shall be inspected in accordance with the accepted test specifications.
For Glass Elevators, the Contractor shall fabricate and erect a prototype Glass Elevators and carry out strength, deformation and stability testing compliance with European Standard EN 81. In addition, the assembly shall be subject to pendulum impact test according to DIN 52 337 with the following fall heights.

Fall height 0.7m, pendulum impact test with a soft impact body (PW), (sack filled with 45 kg of shot);

Fall height 0.5m, pendulum impact test with solid impact body (PH), (pear-shaped steel ball 10kg).

The Contractor shall provide certification of the test results. Only the complete absence of breakage, permanent deformation, delimitation, dislodging of panels or fixings, and loss of stability will result in a successful test finding.

10.12 Not used

10.13 Elevator Site Checking and Inspection

A test and inspection specification shall be prepared for each of the following critical phases of work. Forty-eight hours notice is required prior to completing these phases to enable the “Engineer” to carry out any checks he deems necessary. The following are the minimum requirements:

a) Setting out the plumb lines;

b) Erection and alignment of guide rails; rail brackets

c) Erection and alignment of landing doors; jamb, sills, header etc.

d) Erection of Elevator shaft and Elevator pit equipment;

e) Erection of car enclosures;

f) Positioning of machine equipment and control cubicles;

g) Installation of the hoist ropes; and governor rope

h) Erection of landing fixtures and car fixtures;

i) Installation of hoistway and machine room trunking prior to installation of wiring;

j) Installation of wiring and cabling
k) Installation of car fixture and car top equipment

l) Earthing and bonding checks

10.14 Not used

10.15 Elevator Commissioning and Acceptance Tests

10.15.1 Tests shall be carried out on each Elevator in accordance with the relevant portions of BS 5655, which shall include but not be limited to the following:-

(a) Readings on starting current, running current and supply voltage shall be taken at the rated speed of each Elevator in both directions of operation under no load, 20%, 40%, 60%, 80% and full load conditions.

(b) Both power and control wiring of the controller shall be tested between lines connected together and earth at 1000V 50Hz. This voltage shall be applied and maintained for one minute. The control wiring shall be separately tested between poles and earth. Immediately following each test a 1000 Vdc. Insulation tester shall show an insulation resistance of not less than 3 M ohms. All field wiring shall withstand a 1000 V megger test on site and each conductor shall show an insulation resistance to earth of not less than 3 M ohms.

(c) The over speed governor shall be tested to ensure that it will activate when the speed exceeds 40% of the nominal speed.

Functional tests on the safety gear with no load at rated speed by manually tripping the governor.

The Elevator car shall be operated up and down several times including tests to demonstrate the leveling operation.

(d) Test on the car and landing doors system

(i) Checking of the condition of the landing and car door for smooth operation,

(ii) Functional tests on the door closing time, door speed, re-opening, safety edge, proximity detection landing and car door contacts of the door lock.

(e) Functional tests on all the landing call buttons, indicators and all function provided in key-switch operated cabinet mounted below the car operating panels.

(f) Functional tests on the emergency call buttons.

(g) Functional tests on the final limit switches, terminal slow down and terminal over travel limit switches.

(h) Functional tests on the following safety switches and devices:-

(i) Overload device.
(ii) Phase protection device.
(iii) Anti-creep system.
(iv) Emergency lowering and raising devices.
(v) Pipe rupture device.
(vi) Over current protection device.
(vii) Counter weight safety (if applicable)
(viii) Remote Monitoring System (RMS)
(i) Functional test on the car top maintenance panel.
(j) Testing of the Intercom system.
(k) Compress buffer test.
(l) Running clearance tests.
(m) Functioning test of Elevator management, monitoring and fault diagnostic system.
(n) Noise/ sound level test of equipment and installation.
(o) Functional tests of battery backup device.
(p) Complete function tests on track machine, motor brake and control equipment.
(q) Floor leveling accuracy and re-leveling at different loads.
(r) Tests on Emergency Power and Fire operation.
(s) Temperature readings of elevator controller and equipment shall be taken every fifteen minutes for at least 2 hours or the duration of test whichever is longer.
(t) Functional tests of all features and functions not included in the above but required in the Contract.

10.15.2 Twelve Hour Run

Each Elevator shall be subject to a 12-hour duty cycle test, during which the Elevator shall run continuously with the contract load for 12 hours and shall travel up and down with intermediate stops such that the number of starts complied with the specification.

10.16 Interface and Integrated Tests

The Contractor shall co-ordinate and carry out interfacing and integrated testing together with other System-wide Contractors to ensure that the all integrated systems function as desired.

10.17 Certificate of Taking Over
The final acceptance tests of each item of equipment shall be undertaken in the presence of the “Engineer”, in accordance with the test specification. Any defects and/or deviations discovered without prior written approval during the tests shall be rectified at the Contractor’s own expenses. These shall be entered into a defects list agreed between the Contractor and the “Engineer”. The Certificate of Taking Over will not be issued until these tests have been completed and the defect list substantially reduced to such an extent that the “Engineer” considers that the equipment is safe for operation.

10.18 Certification

Upon completion of each elevator the Contractor shall submit to the Employer, a Certificate of Supervision issued by the Contractor’s Professional Engineer, in a format acceptable to the “Engineer”.

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CHAPTER 11

ELECTROMAGNETIC COMPATIBILITY REQUIREMENTS
11 ELECTROMAGNETIC COMPATIBILITY REQUIREMENTS (EMC)

11.1 General

The requirements stated below must be read in conjunction with the other EMC requirements mentioned in GS.

The contractor shall take adequate measures to reduce conducted, induced, and radiated emissions, especially the levels of harmonics, to acceptable values as specified by the relevant international standards or by the concerned statutory authority.

11.2 Not Used

11.3 Inter-System EMC

11.3.1 The various electrical systems installed on the Railway under Construction will after installation interact with each other by mutual coupling and all plant and systems shall be designed so that there is no malfunction due to interference.

11.3.2 The Contractor shall ensure that all equipment supplied shall have minimum Radio Frequency Interference introduced onto the main network and comply with the Electromagnetic Compatibility (EMC) requirements of the following standards:

- EN 50081-1 : EMC Generic Emission Standard
- EN 50082-2 : EMC Generic Immunity Standard
- BS EN 12015 : Electromagnetic compatibility- Product family standard for lifts, escalators and passengers conveyors- Emission.
- BS EN 12016 : Electromagnetic compatibility- Product family standard for lifts, escalators and passenger conveyors- Immunity.

11.4 Harmonic distortion

The total harmonic distortion (THD) caused by the elevator equipment to the supply mains at the power supply input terminals of the elevator shall not exceed the following values when the elevator is travelling up at full load and rated speed:

<table>
<thead>
<tr>
<th>Rated load Current ($I_L$)</th>
<th>THD (%)</th>
</tr>
</thead>
</table>

200A ≤ I_L < 400 A  < 12.0
20A ≤ I_L < 200A    < 15.0
I_L < 20A           < 20.0

11.5 Installation and Mitigation Guidelines

IEC1000-5 series of guidelines must be observed wherever applicable.

11.5.1 Earthing

An earthing system should be designed to assure personnel safety and protection of installations against damage. It should also serve as a common voltage reference and to contribute to the mitigation of disturbances.

To achieve the primary goal of assuring personnel safety and damage control, a low impedance path must be made available to large currents generated due to lightning or power system fault. The potential differences (touch and step voltages) between any two points must be as low as possible. Safety considerations also require the chassis or enclosure to be earthed to minimise shock hazards to passengers and the maintenance staff.

To achieve the secondary goal of providing protection for sensitive and interconnected electronic and electrical systems, earthing should be designed to minimise the noise voltage generated by currents from two or more circuits flowing through a common earth impedance and to avoid creating earth loops susceptible to magnetic fields and differences in earth potentials.

Earthing shall also be designed to accomplish the following minimum requirements:

i) Protect personnel and equipment from electrical hazards, including lightning, where practical.

ii) Reduce potential to system neutrals.

iii) Reduce or eliminate the effects of electrostatic interference and electromagnetic interference arising from within the system.

iv) Provide a single-point earthing method for all equipment enclosures, cabinets, drawers, assemblies and sub-assemblies.

v) Provide a clean zero-volt reference point for signals in computer and related equipment.
11.5.2 Bonding

Bonding all exposed metallic parts of all equipment and connecting them to the earthing network is a way for meeting safety requirements and minimise noise voltages due to potential differences.

Direct bonding should be used wherever practical. Where indirect bonding via bonding strap is used to connect two isolated items, the bond must satisfy the following minimum requirements and prevailing international standards, for example, IEC1000-5-2.

i) Low bonding resistance from DC to at least 2 Ghz.

ii) Low bonding inductance from DC to at least 2 Ghz.

iii) Proper bonding procedure, including appropriate surface treatment before and after the bonding process is adopted.

iv) Proper use of bond material to reduce electrolytic corrosion.

11.6 Reliability, Availability and Maintainability

All elevators shall be subject RAM conditions as laid down in clause 6.2.5, Chapter 6 of this TS and shall always be under good running and maintainable condition within the environmental conditions prevailing in the General Specification, where the elevators will be installed.

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CHAPTER 12

MATERIALS AND WORKMANSHIP

NOT USED
12 MATERIALS AND WORKMANSHIP REQUIREMENTS

- NOT USED -
CONTRACT

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CHAPTER 13

INTERFACES
13 INTERFACES

13.1 Interfaces

The Contractor shall interface the design and construction of the Works with that of other contractors, principally the Contractors for the Designated Contracts as defined in the General Conditions of Contract. The Contractor shall keep the “Engineer” fully informed in respect of such interfaces, such information being given to the “Engineer” in a manner and form and at such intervals as stated in the Contract or as required by the “Engineer”.

Contract Package for:

Signaling, Communications and Train Control

This contract provides for signalling and automatic train control systems including equipment in the station control rooms and the Operation Control Centre (OCC) such as train mounted control equipment, relay room equipment, independent telephone networks including automatic switching centres and exchanges, main trunk cables, direct telephone lines, communication equipment, emergency telephones, closed circuit television, radio communication and all non-power SCADA system.

Automatic Fare Collection

This contract provides for the revenue control system at stations, including automatic ticket vending machines, barriers, manual control and checking equipment and electronic linkages to station control rooms and the Central Control room.

Rolling Stock

This contract provides for air-conditioned rolling stock.

Civil, E&M and VAC

The Contract provides for Civil and E&M works including the stations & Viaduct. The E&M works include stations lighting, 415V AC distribution, air-conditioning, fire protection system etc.

The Contractor shall co-ordinate with these Contractors for design as well as installation related issues as part of his interface responsibilities The relevant Contractors shall be referred to as Designated Contractors in this specification.

13.2 Interface Responsibilities

The responsibility for specification and provision of the requirements for the works which interface with Designated Contractor’s equipment are tabulated in interface matrix given in Appendix ‘A’ of this TS
The Appendix "A" describes the interface requirements between Designated Contractors, which includes Civil Contracts, E&M Contract etc. and this Contract. This Appendix shall be read in conjunction with the relevant clauses of the Employer's Requirements. The Contractor shall be responsible for ensuring that all requirements of the specifications pertaining to interfaces are properly satisfied.

This Appendix outlines the interfacing requirements during the execution of the Works. However the requirements herein specified are by no means exhaustive and it remains the Contractor's responsibility to develop, update and execute jointly an Interface Management Plan (IMP) after the commencement of the Works and throughout the execution of the Works to ensure that:

a) All interface issues between the contractor and the Designated Contractors are satisfactorily identified and resolved; and

b) All the construction tolerances at the interface shall meet the requirements of the respective specifications relating to the interface points.

Where details of the contractor's design of this contract are required to enable the Designated Contractor to implement interface works, the Contractor shall provide the Designated Contractors with the necessary information including, but not limited to, those described in the summary table appended to this requirement. The level of information provided shall be in sufficient detail to enable the Designated Contractors to design and / or construct the required interface works.

The Contractor shall take a lead in developing the Interface Management Plan. The IMP will be prepared in conjunction with the Designated Contractors to cover all aspects of the implementation of the interface works required. The IMP will define the interface works necessary to complete all the works in this contract and is not limited to those listed in the summary table attached.

Should it appear to the "Engineer" that the progress of the Works, Works Program or the Three Month Rolling Program does not conform with the IMP, the Contractor shall be required to revise all such programs and plans such that they do reflect the progress of the Works, are mutually consistent and conform to other provisions of the Contract.

The Contractor shall review the details of interface works and notify the "Engineer" of any amendments to the summary table required in the process of his works. Unless such requests are reviewed without objection by the "Engineer", the Contractor shall design and construct the works in accordance with the provisions outlined in the Appendix "A".
13.3 Scope of Work of Interface Management Plan (IMP)

The information and scope of works to be provided by the Contractor include but are not limited to those outlined in the Appendix ‘A' of this TS. The Appendix A only defines those tasks at the interface point and is not a complete itemisation of the Scope of Work.

The Designated Contractors shall liaise with the Contractor in the design, installation, testing and acceptance of works.

The Contractor shall provide all access and attendance necessary in accordance with the contract requirements to enable the Designated Contractors to complete those activities defined under the summary table attached to this interface specification in a timely manner.

Where the Contractor’s works are identified as failing to meet the requirements of the contract and which will impact the Designated Contractor’s works, the Contractor shall submit the proposed remedial measures to the “Engineer” for review and shall copy the same to the Designated Contractors.

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CHAPTER 14

SITE ARRANGEMENTS
14 SITE ARRANGEMENTS

14.1 General

14.1.1 In addition to the general conditions and provisions of the Site as described in the General Specification, this Section of the Specification sets out the site arrangements, conditions and requirements for the delivery and installation of the elevators supplied under this Contract.

14.1.2 Methods and procedures may vary depending upon site conditions which shall be discussed and agreed with the “Engineer” during the planning and installation stage but the Contractor shall make provision for alternatives in the methods and procedures provided that the basic criteria for delivery and installation as described below remain unchanged.

14.1.3 The conditions and requirements set out in this Section of the Specification shall not relieve the Contractor of his responsibility to deliver the equipment in time to meet the approved programme as defined in Chapter 21 of this Technical Specification and to install the Plant in accordance with the Specification.

14.2 Access and Power on Dates

14.2.1 The Contractor shall note that no exclusive possession of the Site will be granted. The Contractor will be required to work with the Designated Contractors, the Interfacing Contractors and other contractors.

14.2.2 The Contractor shall take note of the access and power on dates shown in the “Engineer” Preliminary Programme and Project Calendar. Except approved by the “Engineer”, the Contractor shall not have exclusive access to the designated areas.

14.3 Works Areas

14.3.1 The Contractor shall coordinate with the Designator Civil Contractor for the works areas allocated within the site in which he may erect offices, workshops and stores. The area allocated to the Contractor and the period of availability shall be interfaced with Civil Contractor as per decision of Employer which shall be binding to the Contractor.

14.3.2 The Contractor shall allow for transportation of all materials and equipment to the Works Areas and from the Works Areas to the Site.

14.3.3 The Contractor shall note that works trains are not intended for transportation of material and equipment except to those locations where road access would not
normally be available. The Contractor shall coordinate with the relevant Designated Civil Contractors for delivery of major equipment by road access.

14.3.4 General attendance and other services will be made available at the Works Areas in accordance with the General Specification.

14.3.5 The Contractor shall be responsible for the cleanliness and tidiness of the Site after each period of work.

14.3.6 The period within which the area will be available to the Contractor is shown in Appendix 'C'. The Works Area shall be returned to the Employer no later than the date specified for the completion of the Works. The Contractor shall remove all facilities erected by the Contractor at the Works Areas before returning the Works Area to the Employer.

14.4 Delivery

14.4.1 Methods of Delivery

The method of delivery of elevators to site shall be by road, and access to the Works Areas through a station entrance, and/or temporary access openings if provided, and via a route within the Site. The Contractor shall be responsible for arranging access into the Site with the Designated Contractors for the stations’ works. The Contractor shall co-ordinate the routes and time of entry into the stations with the Designated Contractors. The delivery route within the stations shall be agreed between the Contractor and the Designated Contractors. The access plan of each station shall be submitted for the “Engineer” Approval.

The locations and size of the access openings and the size of working area around each opening will depend on site and local traffic conditions and shall be agreed by the “Engineer”. The method of delivery for each station shall be governed by the overall installation Programme of Jaipur MRTS and be subject to the “Engineer” Approval, whose decision shall be final.

14.4.2 Delivery, Access to and Through the Site

The Contractor shall make provisions to deliver his equipment by vehicles into the working area around the access opening. In the event that the working area is not large enough or the local traffic conditions cannot permit any container vehicle to gain access into a particular working area during normal working hours, the Contractor shall make arrangements to deliver the equipment by trucks and unload the equipment within a limited working area allocated by the “Engineer”.

When it is unlikely that a mobile power crane can be used within the vicinity of the access opening due to restricted site conditions, the Contractor shall arrange to maneuver his Plant by smaller traction equipment from the unloading working area into the access opening and Works Areas.
Transportation, unloading and delivery equipment such as hoisting frames, gantries, lifting tackles, chain blocks, trolleys etc., required for delivery, shifting and equipment access to the Works Areas shall be provided by the Contractor, unless otherwise specified herein or as Approved by the “Engineer”.

The Contractor shall provide a Schedule of major deliveries of Plant for each station to the “Engineer” at least 2 months prior to the first delivery.

Each elevator shall preferably be hoisted into position in the hoist way immediately after delivery to Site. Long period of storage inside the station will not be allowed, unless written permission has been received from the “Engineer”.

The Contractor shall provide adequate means to protect completed architectural finishes during delivery and shall make good any damage caused by delivery of the equipment.

14.5 Installation

14.5.1 It is desirable that the installation time of Elevators on Site shall be kept to a minimum and the proposed design shall take due account of this requirement.

14.5.2 The Contractor’s attention is drawn to the restrictions on working area available on Site and shall make his own arrangements to store materials and equipment off-site or at the Depots until such time as they can either be incorporated into the Works or stored within the working area assigned to him.

14.5.3 The Contractor shall co-ordinate with the Designated Civil Contractor for the hoisting points and confirms acceptability before commencing installation. When it is not possible to provide such hoisting points due to its particular location. In such case, the Contractor shall provide suitable hoisting frame, gantries or the like for hoisting. Safe working load of such equipment shall be stated and relevant testing certificates shall be submitted for the “Engineer” Approval.

14.5.4 All other lifting equipment such as lifting tackles, chain blocks etc., required for installation purposes shall be provided and installed by the Contractor.

14.6 Care of Works

The Contractor shall protect the equipment within his own reasonable control, particularly in normal construction site conditions such as dust, dirt, plastering and small particles which may possibly damage the equipment, stainless steel decking and panels, if they are not properly protected. Such damage, if occurring, shall not relieve the Contractor of his responsibility to repair and/or replace these parts, depending on individual conditions, to the satisfaction of the “Engineer”.
14.6.1 The contractor shall provide adequate protection to the Elevators during the Stop Work Period and before handing over of the complete installation to the Employer. The protection shall not be removed unless instructed by the “Engineer”.

14.7 Material Recovery

14.7.1 The Contractor shall remove all redundant materials and cables from Site. The Contractor shall handle all redundant equipment with care and deliver to a location designated by the “Engineer” where it shall be stored in a neat and orderly fashion.

14.7.2 Recovery work shall occur after the completion of every stage of the above mentioned Works and as directed by the “Engineer”.

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CHAPTER 15

PACKAGING, SHIPPING AND DELIVERY
15 PACKAGING, SHIPPING AND DELIVERY

15.1 General
15.1.1 All the stipulations laid down in the GS shall apply.

15.2 Packaging and Shipping
15.2.1 All equipment Goods and materials shall be properly inspected to ensure that there are no defects before shipment. An inspection tag bearing the words “INSPECTION PASSED” giving reference number to the inspection date and details to permit verification of inspection details shall be attached to those items inspected satisfactorily.

15.2.2 The four adjacent sides of each package shall be marked with permanent paint with the following information:

CONSIGNEE
COMMODITY
CONTRACT No
SHIPPING MARK

15.2.3 Appropriate caution notices such as “FRAGILE”, “HANDLE WITH CARE”, “KEEP DRY”, KEEP UPRIGHT” along with visual display symbols internationally accepted shall be conspicuously displayed on the outside surfaces of boxes, crates and packages.

15.3 Delivery
15.3.1 The Contractor shall be responsible for transportation and delivery of materials to site or to the storage space and shall continue to be responsible for its safe storage, handling, erection and commissioning.

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CHAPTER 16

NOT USED
16 NOT USED

END OF CHAPTER
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EMPLOYER’S REQUIREMENTS
TECHNICAL SPECIFICATION

CHAPTER 17

MAINTENANCE REQUIREMENTS
17 MAINTENANCE REQUIREMENTS

17.1 Maintenance

In addition to his obligations under the Conditions of Contract, the Contractor shall provide maintenance services throughout the Defects Liability Period (DLP) and also for the specified period for all the elevators supplied under the Contract. Maintenance work shall include attendance to all service calls, work described in approved Maintenance Schedule, and the followings:

17.1.1 All defects shall be remedied either when observed on the weekly service call or on an attendance to a service call. Service shall include all work necessary to maintain the entire elevator system in good working order at all times.

17.1.2 The Contractor shall maintain adequate quantity of consumable and contingent spare parts as per agreed list at site in order to minimize the shut down time due to repairs and maintenance. All parts rendered defective, including replacement of indicator lamps and programmable circuit board, shall be replaced by the Contractor. The list of these consumable & contingent spares (DLP spares), tools and mandatory spares are enlisted in appendix “E”. Any additional spares, tools and test equipment if required, the same shall be indicated by the Firm in their Technical Offer. The employer may revise the list of spares in proportion to the elevators quantity proposed by contractor at the time of submission of the Preventive Maintenance Schedule (PM) & Corrective Maintenance (CM) procedure, as mentioned in 17.1.10. The Mandatory spares as per the approved list will be handed over by the Contractor to the employer at the time of taking over of equipment / section in proportionate quantity and DLP Spares in proportionate quantity shall be maintained by contractor at contractor’s own store at a location approved by employer during DLP Period. The balance DLP spares (balance after actual consumption, the contractor has to take written permission for using DLP spares from employer otherwise it will be assumed that the contractor has not used DLP spares and shall be liable to return these spares after completion of DLP) shall be the property of the employer and if any additional spares are required the contractor shall arrange the same without any extra payment. Mandatory spares provided to the Employer under the Contract will not normally be released to the Contractor for DLP purpose.

17.1.3 The Contractor shall dispatch competent personnel to rectify stoppages at any time during the day or night when being called on by the Employer within a time of half an hour (maximum). Repairs shall be carried out on a 24 hours per day, 7 days per week basis until the faulty unit / elevator is put back in service.
17.1.4 The Contractor shall carry out periodic testing and examination of equipment safety devices as may be required by the provisions of any enactment in force relating thereto or of any enactment, regulations or by-laws of any local or other duly constituted authority which may be applicable to such tests and to provide such copies of the test certificates, duly signed by a Registered Elevator “Engineer” and Registered Elevator Contractor, as may be required. A master schedule of such planned tests shall be submitted to the Employer at least two months before commencement of the DLP.

17.1.5 The Contractor shall provide quarterly and half-yearly reports on the condition of the equipment in an agreed format. Such reports shall include event logs and performance data collected from the associated indicative panel stored on CD / DVD or other agreed medium, over the reporting period. Such data shall enable offline individual and fleet statistical analysis to be performed on a Personal Computer.

17.1.6 A report in duplicate shall be sent to the Employer immediately following every call out, indicating the time of call out visit, cause, remedial action taken and the time that the service was restored. The monthly summary of failure report along with the analysis giving details of nature of fault, remedial action taken etc in the approved format shall be provided.

17.1.7 Reports on routine visits are not required except where necessary to draw attention to defects of a minor nature, which could not be rectified during the routine visit. Records of each routine visit and call-out visit, together with details of the work done or action taken, shall be entered on a log book which shall be provided by the Contractor and retained in the location as decided by the “Engineer”.

17.1.8 Before the expiry of the Defects Liability Period, the Contractor shall perform a loading test for each elevator to re-confirm that the function of the system is being met and shall undertake corrective adjustment if necessary. This test may be incorporated into the half-yearly equipment survey maintenance works.

17.1.9 The Contractor shall provide a maintenance plan and a major component replacement Programme for review and acceptance by the “Engineer” 90 days before the programmed commencement of the Defects Liability Period.

17.1.10 The Maintenance service shall include all Preventive/Scheduled & Corrective Maintenance. In this context, the Contractor shall submit a PM Schedule and CM procedure for Approval, 3 months before the commencement of the DLP.

17.1.11 In order to ensure that the system will meet the RAM targets and Customer Service requirements using the minimum resources, the Contractor shall conduct a detailed Maintenance Requirement Analysis to derive a complete list of preventive maintenance schedules and procedures under the Contract. The Maintenance Requirement Analysis shall identify for each system function the potential functional
failures, the failure consequences and the appropriate maintenance approach. RAM analysis shall be submitted quarterly during 2 years DLP.

Based on the Maintenance Requirement Analysis, the Contractor shall indicate in the Maintenance Plan, the final preventive maintenance programme, the proposed skill and manning level, spares level and special tools require. The proposal shall be fully traceable to the maintenance Requirement Analysis output. The Maintenance Requirement Analysis shall be submitted as part of the maintenance plan, under the main contract tender submission. However, tenderers will be allowed to defer submission of this Analysis, latest 12 months before the commencement of the Defect Liability Period, by presenting formal written request for such deferral.

17.1.12 **Accommodation for Emergency Service Report Centre**

“An Office of suitable area will be provided by the Employer as the emergency service report centre. The premises will be located at least one place in the Jaipur Metro Network on station as determined by the Employer”.

17.2 **Employer’s Maintenance Strategy**

17.1.13 **Maintenance Strategy**

The Contractor shall ensure that the system designed, installed and commissioned is supportable throughout the service life of the System to address, as a minimum, the following:

- Design errors in the System;
- Operational changes;
- Environment changes; and
- Changes in infrastructure.

According to the maintenance strategy, all equipment and infrastructure supplied for the ‘Project’ must be designed for minimum or no maintenance. Maintenance activities required must be capable of being performed with little or no impact on the train service. In addition, the maintenance work systems shall ensure safety of personnel and equipment.

17.1.14 The Contractor, upon noticing any defects, deficiency in quality and quantity of spares and materials shall without delay, arrange for alternative source of supply and submit his proposal to the “Engineer” for review.

17.2 **Maintenance during DLP**

During the 2 years’ DLP period, the contractor shall carry out all type of preventive and breakdown maintenance. The preventive maintenance would be done during non-traffic hours whereas breakdown maintenance would be done whenever breakdown occurs. The contractor should post his supervisor and maintenance staff
Technical Specifications, Part - A

at key places (4-5 Places in the JMRC metro network) on the stations as determined by the Employer.

The acceptable response & attention time also needs to be mentioned for minor & major breakdowns.

17.2.1 Maintenance Management System (MMS) and Maintenance Arrangement

During non-operation time, sections of line will be closed for maintenance work. The minimum time for possession periods is 6 hours. Ideally, this time shall be the free time available for maintenance.

17.2.2 Competency of Personnel

During the DLP the Contractor shall depute sufficient trained and competent personnel for maintenance purpose.

Such persons shall have their generic competence established and must demonstrate their specific competence and knowledge in the particular systems, environment and procedures.

The Contractor shall provide evidence of specific competence and knowledge, which shall include:

- assessment and certified training in particular applications and operations;
- recording of competence and work in the license holders logbook; and
- receiving or in receipt of sufficient and current exposure to the area of work that the holder is licensed for.

Routine spot checks on licensing may be carried out from time to time by the “Engineer” qualified personnel on the proficiency of the Contractor staff.

In the event of a failure, the Contractor shall undertake the management and investigation necessary to identify and rectify the cause.

17.2.3 Testing and Re-commissioning of System and Equipment

In the event of a failure requiring modifications to the System, the Contractor shall undertake any testing and re-commissioning required. Any such modification shall be submitted for review by the “Engineer”.

17.2.4 Temporary Alterations to Restore Service

The Contractor shall undertake any temporary modifications necessary to maintain service. Any such modification shall be submitted for review by the “Engineer”.

17.2.5 Discrepancies between Installation and Design Records

Should the Contractor discover inconsistencies between the maintenance drawings and documentation and the installed equipment, the Contractor shall correct all such errors within two weeks.

17.2.6 Communications
The Contractor shall ensure that adequate communication facilities are provided to its staff during the DLP.

17.2.7 Location of Staff

The Contractor shall be responsible for locating staff such that the Contractor meets its obligations.

17.2.8 Storage of Equipment and Materials During the Maintenance Period

The Contractor shall ensure that no equipment is stored along the trackside. The Employer will provide defined storage locations for the support of the different levels of Maintenance. The Contractor shall satisfy itself and the “Engineer” that the storage locations for equipment and materials will meet the performance requirements of this TS.

17.2.9 Maintenance Regimes

The Contractor shall produce a maintenance regime for the equipment that shall comprise two constituent parts, corrective and routine/preventative maintenance. Corrective maintenance shall be available 24 hours per day, able to respond to all foreseeable circumstances. The maintenance regime shall cover all parts and equipment of the system designed, installed and commissioned by the Contractor. The Contractor shall take into account the requirements of the operations and maintenance when determining and proposing its maintenance regime.

17.2.10 Scope and Hours of Coverage

The regime and structure of corrective maintenance shall be robust in design. The Contractor shall provide full 24 hour On-Call coverage and shall be such that initial response and rectification of failure are in accordance with the following:

- assistance for first line corrective maintenance within 30 minutes, upon request of first line maintainer;
- Within 24 hour from notification for second line maintenance where spare parts replacement is involved; and
- within 2 weeks including transportation time for third line maintenance where replacement or repair of component from factory is involved. Any extension to this time shall be agreed with the “Engineer” and a replacement provided.

All elements of First Line preventative maintenance shall be carried out and completed during non-traffic hours without interrupting train services. Similarly, all elements of second line & third line maintenance also needs to be completed during non-traffic hours.

17.2.11 Failure Investigations
The Contractor shall conduct failure investigations.

Disputes between the Contractor and other Contractors will be resolved by the “Engineer”.

The Contractor shall make available to the Employer all test and failure data as required.

17.3 Software Support

17.3.1 General

The Contractor shall submit to the “Engineer” for review, the software support plan at least 90 days before commencement of software installation.

Employer will have the right, for multiple use of the Software. Employer at his discretion may download the software on multiple PCs as per the requirement. For this purpose, no specific password, Key Number etc should be required from the Contractor / Software firm.

All changes, bug fixes, updates, modifications, amendments, new versions shall not result in any non-conformance with this Specification.

The Contractor shall submit all new versions to the “Engineer” for review at least 2 weeks prior to their installation.

The new versions of software shall not degrade the operation of the System.

17.3.2 Security Obligations

Within 14 days of the installation of any software into the Permanent Works by the Contractor, the Contractor shall submit to the “Engineer” for retention by the Employer two back up copies of the software, which shall include any specified development tools required for maintenance of the software, including, but not limited to, editors, compilers and linkers.

Any software item delivered by the Contractor to the “Engineer” pursuant to the above Paragraph shall not be translated or modified by the Employer without the prior consent of the Contractor unless:

- the owner of the software becomes insolvent or has a receiving order made against it or makes an arrangement or assignment or composition with or in favour of its creditors (including the appointment of a committee of inspection) or goes into liquidation or commences to be wound up or has a receiver, liquidator, trustee or similar officer appointed over all or any part of its undertaking or assets or if distress, execution or attachment is levied on, or if an encumberancer takes possession of, any of its assets or any proceeding or step is taken which has an effect comparable to the foregoing in any relevant jurisdiction; or

- the owner of the software ceases to trade; or
- the owner of the software assigns copyright in the software and the Contractor fails within 60 days of such assignment to procure in favour of the Employer, a license from the new owner in the same terms as that required by the Contract; or
- The Contractor is in breach of any of his obligations under the Contract.

17.3.3 Error Correction

The Contractor shall inform the “Engineer” immediately when a fault is discovered within delivered software or documentation.

On receipt of a request from the “Engineer” for identification or further diagnosis of a failure or fault, the Contractor shall provide appropriate resources.

The Contractor shall provide written details as to the nature of the proposed correction to the “Engineer”.

17.3.4 Training

The Contractor shall provide training for Employer’s staff to enable the Employer to make proper use of any new versions.

17.3.5 Fixes or Patches

The Contractor shall notify the Employer promptly of any fixes or patches that are available to correct or patch faults.

The Contractor shall detail any effect such fixes or patches are expected to have, upon the System.

17.3.6 New Versions

The Contractor shall ensure that all new versions are fully tested and validated on the simulation and development system prior to installation.

The Contractor shall ensure that all new versions are fully tested and commissioned once installed on the Site.

The Contractor shall deliver to the Employer any new version, together with the updated Operation and Maintenance Manuals.

The Employer shall not be obliged to use any new version and that shall not relieve the Contractor of any of its obligations.

Any effect upon the performance or operation of System that may be caused by a new version shall be brought to the Employer’s attention.

17.3.7 Routine and Corrective Maintenance Procedures

Routine and corrective maintenance procedures shall be supplied for all equipment. The format shall be as follows:

- Uniform format and layout irrespective of equipment supplier;
- Colour coding for each activity;
- Cross referenced to the Operation and Maintenance Manuals; and
- Document control information.

17.3.8 Operation Activities

All operational activities shall comply with the Employer’s safety rules, and requirements of the Operation and Maintenance Manuals. The Contractor shall recommend in detail the frequencies for preventive and corrective maintenance, and what items of work are to be carried, including but not limited to the following:
- Step-by-Step procedure to carry out the task;
- Diagrams and flow charts for illustration, if applicable;
- Precautions for the maintenance personnel to follow; and
- Estimated duration and manpower required.

JMRC shall facilitate Entry/Exit to the contractor staff for attending failures and maintenance during DLP and AMC

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CHAPTER 18

SPARES, SPECIAL TOOLS AND TEST EQUIPMENT
18 SPARES, SPECIAL TOOLS AND TEST EQUIPMENT

18.1 General

18.1.1 The Contractor shall note the requirements stipulated in the General Specification and Spare Policy as provided at Appendix-E of this TS.

18.1.2 The Contractor shall supply all spares, special tools and test equipment to facilitate the maintenance, repair and overhaul of the elevators effectively and efficiently while ensuring their performance to a high standard of safety and reliability consistent with the requirements as detailed in this Specification. The details and policy for various spares, tools and test equipment required has been provided in Appendix – E. Any additional spares, tools and test equipment are required the same may be indicated by the Firm in their Technical Offer.

18.1.3 All spare parts shall be identical to the equivalent installed items and strictly interchangeable, be suitable for use in place of the original parts fitted and comply with this Technical Specification and the tests specified therein.

18.1.4 They shall be suitably marked and numbered for easy identification and shall be packed for long storage in wooden boxes in suitable groups for easy maintenance. While necessary parts shall be coated in protective material to prevent deterioration.

18.1.5 In the event that rectification and/or modifications are introduced to any part of the equipment which are deemed necessary by the “Engineer” in order to comply with the Specification requirement, the Contractor shall modify and replace all spare parts and/or special tools whether delivered or otherwise.

18.1.6 The Contractor shall guarantee that the test equipment supplied shall be well calibrated in accordance with manufacturer’s instruction. Appropriate calibration certificates shall be required by the “Engineer” for checking prior to carry out testing and commissioning.

18.2 Spares

18.2.1 Commissioning and DLP Spares
The Contractor shall recommend and provide a list of commissioning and DLP spares with sufficient quantities to ensure the successful completion of the testing and commissioning activities and covering of DLP. Details are provided in Spare Policy at Appendix-E of this TS.

18.2.2 Mandatory, Unit exchange, Recommended and 10 Years Spares beyond DLP
Details are provided in Spare Policy at Appendix-E of this TS.

18.3 Test Equipment

18.3.1 Not Used.

18.3.2 Portable Test Equipment
Portable laptops computer shall be provided to allow rapid verification of satisfactory operation of a sub-system, assist in trouble shooting and isolating sub-system failures. Portable laptops computer shall not require any mechanical or electrical disconnection to or within the sub-system under tests.

Two numbers of laptops computer for the entire contract specified at clauses 18.3.2 shall be provided by the Contractor. The detailed specifications for Laptop to be got approved from the “Engineer”.

18.4 Special Tools

18.4.1 The Contractor shall supply all necessary tools for normal as well as emergency rescue operation and for maintenance purpose including tools such as brake releasing devices and hand winding devices, all other keys for the key operated switches such as the key to open the Auxiliary Switch Cabinet, 3 set of keys for each elevator shall be provided by the Contractor at the time of handing over to Employer for trial Operations.

18.4.2 The Provision of the special tools used during erection testing and commissioning under this part of the Technical Specification shall be deemed to have been included in the Contract and shall be handed over to the Engineer within One & half year from date of signing of LOA.

18.4.3 Certain items of these special tools shall be fixed on to a shadow board or housed in a container mounted at an approved location. Details of the arrangement will be given to the Contractor by the Engineer during the installation stage.

18.4.4 The Contractor shall supply one complete set of any special tools not covered under Annexure-7 of Appendix E for each type of elevators per station that are necessary for routine maintenance to be carried out. These tools shall be supplied in a suitable hard wood or steel tool box.

18.5 Availability of Consumable Spares during Defect Liability Period

18.5.1 Consumable Spares shall be provided as per Spare Policy given at Appendix-E of this TS.

18.5.2 Not Used

18.6 Not used

18.7 Second Sourcing for Non-Proprietary Items

18.7.1 The Contractor shall identify principal source suppliers that can supply the Mandatory Spares. For non proprietary items the contractor shall submit the list of alternate / second source of suppliers.

18.7.2 The Contractor shall ensure that second-source supplier information is maintained up to date up to a period of 10 years after taking over of whole works. The
Contractor will provide support to the Employer to a reasonable extent regarding the second-source supplier information throughout the service life of the system.

18.7.3 The Contractor shall make the second-source supplier information available to the “Engineer” at the time of submission of the final design and taking over of the works.

18.8 Long Lead Times
18.8.1 The Contractor shall identify the lead times for all spare parts. Parts with long lead times shall be identified in the spares list.

18.9 Routine Change
18.9.1 In the event that any item of the supply requires to be routinely changed or calibrated, regardless of whether it appears in the spares list or not, it shall be identified to the “Engineer” together with the routine change interval.

18.10 Shelf Life
18.10.1 In the event that any of the spares identified have a particular life or storage requirement, this shall be made known to the “Engineer” with the submission of the spares list, including the necessary action for disposal or storage.

18.11 Price of AMC Charges
The Contractor shall furnish price for 3 years AMC rates beyond the DLP. The details shall be provided in statement 4 of BOQ (Pricing Document –Appendix-2 - BOQ)

18.12 Vendor Approval Policy
Refer Appendix-F of this TS for vendor approval Policy.

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TECHNICAL SPECIFICATION

CHAPTER 19

TRAINING AND TRANSFER OF TECHNOLOGY
19 TRAINING AND TRANSFER OF TECHNOLOGY

19.1 General Requirements

19.1.1 This section of the specification covers the requirements for a Training Program to train the Employer's maintenance, operations and training personnel. The training Program shall enable the staff to operate, service, enhance, maintain, and interact with, the hardware, software, and firmware, such that the elevator systems and associated equipment will perform in accordance with the specifications of this contract.

The Contractor shall provide comprehensive training to the Employer’s staff, including Employer’s training Instructors. The Contractor shall provide competent training instructors, training manuals, all necessary aids and materials in support of all training courses. The training manuals shall be submitted in original plus five hard copies and in electronic format.

The training instructors shall be qualified, competent, with sufficient years of practical experience in the relevant fields and possesses good communication skills. The training instructors shall be competent staff of the Contractor, or the subcontractors or the equipment manufacturers.

19.1.2 The training shall be carried out at such locations where the greatest benefit for trainees may be gained. This may be in India, abroad, at place of manufacture, assembly or testing, or at such other locations as may be necessary. All places of training shall be subject to review by “Engineer”.

19.1.3 The training courses and/or sessions shall include system performance requirements and all major equipment and works designed, by the Contractor.

19.1.4 The Contractor shall provide full-time on-Site management and co-ordination of the entire training programme to ensure the continuity of classes, and proper distribution of training materials, and be responsible for interfacing with the instructors.

19.1.5 The training courses shall be delivered to all relevant Employer’s staff, including instructors, operation and maintenance engineering staff.

19.2 Scope of Training

The training shall be provided by the Contractor to the Employer’s personnel in Operation & Maintenance, manufacturing, testing, system architecture and installation practices related to elevators. This will cover training in India and abroad including training at manufacturing facilities.
19.3 Training Programme

Contractor shall submit a training programme for imparting training to JMRC employees with batches of approximately 20 trainees for Elevator systems in following areas:

<table>
<thead>
<tr>
<th>S. No</th>
<th>Description</th>
<th>Total Period (Trainer working days)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manufacturing facilities, Testing methods and procedures, Working MRTS installations. Short Module course on System description, architecture etc, for Elevators.</td>
<td>5</td>
<td>During manufacturing at factory premises and other locations.</td>
</tr>
<tr>
<td>2</td>
<td>Installation and site testing practices for Elevators</td>
<td>5</td>
<td>During installation &amp; commissioning phase</td>
</tr>
<tr>
<td>3</td>
<td>Operation and maintenance practices for Elevators including trouble shooting, fault diagnosis and emergency handling.</td>
<td>15</td>
<td>At suitable locations to be decided by Employer.</td>
</tr>
</tbody>
</table>

19.4 Training Plan

The Training Program shall be prepared and submitted by the Contractor as per requirements of GS.

19.5 Training Courses

19.5.1 The Contractor shall provide Training Courses on all facilities, systems, equipment, hardware, and firmware, software. Each Course shall be specific, and shall consist of classroom, hands-on, or field training as necessary to accomplish the Course Objectives specified in the Training Program Plan.

19.5.2 All station operation & security staff needs to be trained in emergency handling.

19.5.3 All training aids shall be used during training followed by practical & demonstrations.

19.5.4 Trainer’s kit may be used for imparting training in trouble shooting.

19.5.5 The Contractor shall provide training courses for each of the sub-systems, including, but not be limited to:

(i) Elevator Control and Function system
(ii) Elevator drive system
(iii) Elevator Control & monitoring system

Different types of training courses of each subsystem shall be provided for staff from different disciplines. Operations training courses shall be provided for the operations staff. Maintenance courses shall be provided for maintenance staff.
Hands on training shall be provided to maintenance staff by simulating different problems & their troubleshooting. 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 additional staff in future in all aspects of operation and maintenance of the System.

19.6 Training Materials

The Contractor shall provide all Training Aids, Interactive Training Video CD, Training Materials, Training Devices, Special Tools, fixtures, models, or other equipment required to train Course participants.

Training Manuals are a convenient source document for use in the field.

For every lecture hand – outs with Interactive Training Video CD should also be given. The Contractor may prepare Training Manuals bi-lingual (i.e. in Hindi and English both) as per requirement of the project.

Training Manuals shall be separate from Operation and Maintenance Manuals.

The Contractor shall prepare Training Manuals, and submit them to the Employer for review and approval at least 60 days prior to the start of the Training Demonstration.

Throughout the Contract and DLP, it shall be the responsibility of the Contractor to supply the Employer with all changes and revisions to the Training Manuals.

Training Manuals shall become the property of the Employer.

The Contractor shall provide the master and five hard copies of the Training Manual as directed by “Engineer” for each course/subject.

The Employer reserves the right to copy all Training Manuals for use in Training Courses.

The contractor shall give complete training plan for each category of O&M staff well in advance before commencement of training which shall contain training details, training methods, training aids, profile of instructors etc. At least one copy of the training manual shall be submitted 3 months before the commencement of the training.

The Contractor shall, for each course, distribute one set of training handout for each trainee, one sets of trainer’s guide and three additional sets of training handout to the Employer before the commencement of the training course.

All the training materials shall be accurate and match with the actual design of the System. All types of audio/visual aids shall be used during the training. The O&M staff shall be trained to cater all types of emergency situations.
19.7 Transfer of Technology (TOT)

Tenderer shall submit the detailed plan of transfer of technology along with MOU with suitable Indian companies or company having proven track record and are working in related areas for all major systems/subsystems.

TOT shall be essential and shall include system assembly, installation, maintenance and software modification/customization and training of Indian Company’s personnel to cover;

All configuration/application programmes for Elevator system for:

Engineering of extensions and upgradations of stations.

Re-engineering to suit changed application conditions.

Incorporation of additional features.

Incorporation of optional facilities.

Addition /Modifications to equipment and components

Maintenance of Elevators.

Change in parameters of any of the Elevator equipment in stations.

The Transfer of Technology may require involvement of Indian Company’s personnel in design, manufacturing, testing and installation of Elevator Sub-Systems during the Contract period. The Contractor shall undertake to supply or make arrangement with the original manufacturer to supply additional equipment required for replacement or upgradation of the Elevator systems in future. The Contractor shall undertake to provide to the above Indian Company, during the life of the equipment ordered technical assistance in the form of additional drawings, maintenance practices and technical advice.

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TECHNICAL SPECIFICATION

CHAPTER 20

OPERATION AND MAINTENANCE
DOCUMENTATION
20 OPERATION AND MAINTENANCE DOCUMENTATION

20.1 General

20.1.1 The Contractor shall provide Operation and Maintenance manuals bi-lingual (i.e. in Hindi and English), Interactive Training Video CD, As built drawings in AUTOCAD and PDF for use by supervisory, operating and technical staff of Employer.

20.1.2 Requirements of submission have been furnished in Chapter 11 of GS.

20.1.3 Each and every manual shall be divided into indexed sections explaining the subject matter in logical steps. Most manuals shall consist of A4-size printed sheets bound in stiff-cover wear-resistant binders clearly and uniformly marked with the subject matter and reference number. Where alternative sizes are proposed, (e.g. A5/A6 pocket books of schematic wiring diagrams) these shall be submitted for review of Employer’ Representative. The binding shall allow for all subsequent changes and additions to be readily effected.

20.1.4 Information shall be provided in pictorial form wherever possible and shall include step-by-step instructions and views of the particular equipment including exploded views. Programmable equipment shall be supplied with sufficient flow charts and fully documented programmes to enable faults to be quickly identified and system modification to be undertaken at any time.

20.1.5 The Contractor shall provide clarifications and amendments to the Operation and Maintenance manuals as necessary during the Defects Liability Period or in AMC period (if applicable). Updates shall be provided for the originals and all copies.

20.2 Operation Manuals

20.2.1 The Contractor shall provide operation manuals explaining the purpose and operation of the complete system together with its component subsidiary systems and individual item of equipment. The characteristics, ratings and any necessary operating limits of the Equipment and Sub-systems shall be provided. The Operation Manuals shall focus on operation aspects under normal and emergency conditions. The operation manual shall be supplied at the same time when training manuals are supplied.

20.3 Maintenance Manuals

20.3.1 The Contractor shall provide particulars of operating parameters, tools for dismantling and testing, methods of assembly and disassembly, tolerances, repair techniques and all other information necessary to set up a repair and servicing programme.

20.3.2 The manual shall also include inspection/overhaul procedure and periodicity of various inspection/overhaul schedules in detail including the tools, special
tools/plants, and facilities required. The manual shall be subject to review by the “Engineer”.

20.3.3 The maintenance manual shall also include an illustrated parts catalogue of all plant supplied and shall contain sufficient information to identify and requisition the appropriate part by maintenance staff. The catalogue shall comprise 2 sub-sections.

20.3.4 The first shall be an alphanumeric parts list, which shall include the following information:

(i) Part number
(ii) Description
(iii) Name of manufacturer
(iv) Quantity and Unit
(v) Part number of next higher assembly (usually a line replaceable unit).
(vi) Cross-reference to figure number.
(vii) Category: e.g. consumable, line replaceable unit, repairable.
(viii) Life-awaited life, Mean time between failure or mean distance between failure where available.
(ix) General or specific purpose

20.3.5 The second is a series of illustrations to indicate the location of each replaceable item which shall be clear and progressive with exploded views to enable parts to be identified easily by cross-reference with alpha-numeric list

20.3.6 Maintenance Manual shall include the following:

20.3.7 Infrastructure required for the maintenance.

20.3.8 Maintenance check sheets for I line, II line & III line maintenance.

20.3.9 Illustration of lift’s components, sub-assemblies, assemblies etc with a sketch.

20.3.10 Detailed explanation of safety items.

20.3.11 Detailed coverage of trouble shooting.

20.3.12 Reliability Centre maintenance (RCM), Maintenance Requirement Analysis, condition Monitoring based Maintenance & Reliability, Availability & Maintainability data’s.

20.3.13 Check Sheets & scope of work for comprehensive annual maintenance.

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CHAPTER 21

PROGRAMME REQUIREMENTS
21 PROGRAMME REQUIREMENTS

21.1 General

The date of commencement of the commercial services of various section of Jaipur Metro Rail Project are defined in Clause 2.2.1 of Chapter 2.

In addition to the requirements specified in the General Specification, the Contractor shall programme the Works in accordance with a pre-determined sequence to meet various Key Dates and Access Dates so as to meet the Target Dates of commercial opening:

21.2 Key Dates

The work includes a number of stages. These stages are inter-related and essential to the completion of the Elevator works to be achieved within the Key Dates.

The Key Dates indicated in the schedule of Key Dates are mentioned in terms of the time period reckoned from the commencement of the works, and the deliverables for each Key Date shall be achieved by the midnight of the last day of the week mentioned.

If the identified work is not achieved by the stated Key Dates, liquidated damages may become applicable as set out in the Contract.

Each Key Date and its description is given in the Appendix "B"

21.3 Access Dates

The contractor shall require Access to information as well as to various locations at stations / depots / 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 terms of the time period reckoned from the commencement of works, and shall mean guaranteed access by the mid-night of the last day of the week mentioned.

These sequence, timings and extent access within any location will be further refined and reflected in the Master Programme developed by the “Engineer”, based on the Installation Programme from the Contractor and Project Contractors.

The exact timing to access a specific location (or any part of the location) shall then be confirmed by the “Engineer” in weekly Works Meeting during construction stage.

Major installation works in the stations and ancillary buildings which require co-ordination with the Civil Project Contractors shall be followed as per the Co-ordinated Installation Programme to be prepared by the Civil Project Contractors.

The Work Area Access dates in connection with various stages are also given in the Appendix "B" & “C”.

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EMPLOYER'S REQUIREMENTS
TECHNICAL SPECIFICATION

CHAPTER 22

(NOT USED)
22 NOT USED
APPENDIX A - INTERFACE MATRIX FOR ELEVATOR CONTRACT

1) All System Contractors to display interface issues on boards at site in suitable format, so that concerned contractor / department and inspecting officials are aware of the interface requirements.

2) Architect / DDC to ensure that interface requirements are met while issuing GFC drawings. All system contractors are to ensure it & sign off. Interface with concerned contractor is the responsibility of the system contractor. Engineer will provide the contact detail of concerned contractors to system contractor to facilitate timely interface.

### Part-I

<table>
<thead>
<tr>
<th>Civil contractor responsibilities</th>
<th>Electrical Contractor responsibility</th>
<th>Elevator Contractor responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design</strong></td>
<td><strong>Design:</strong></td>
<td><strong>Design:</strong></td>
</tr>
<tr>
<td>• Establish elevator locations and requirement.</td>
<td>• Electrical power, Control Interfaces and system shall be developed.</td>
<td>• Provide Civil Contractor with detailed requirements of shaft size, size of ventilation opening, lifting beams/hooks, water proofing and protection from rain, structural provision etc.</td>
</tr>
<tr>
<td>• Consider &amp; plan water drainage and protection from rain.</td>
<td>• Consider &amp; plan maintenance access requirements.</td>
<td>• Provide E&amp;M contractor with all details of electrical load, shaft lighting and earthing requirements.</td>
</tr>
<tr>
<td>• Consider &amp; plan maintenance access requirements.</td>
<td>• Incorporate elevator monitoring panel location.</td>
<td>• Inform the size of access necessary likely along the passage for moving the elevator for installation.</td>
</tr>
<tr>
<td>• Provide shaft structure with proper drainage &amp; access.</td>
<td>• Construction :</td>
<td>• Co-ordinate fire safety requirement with fire fighting systems.</td>
</tr>
<tr>
<td>• Provide lifting hooks / beams at top of shafts and water proofing in pits.</td>
<td>• Provide three phase power with dual earth duly terminated on a suitable MCCB of the elevator as specified by lift contractor. However MCCB and ELCB is to be provided by the elevator Contractor.</td>
<td>• Furnish design for monitoring and control panel.</td>
</tr>
<tr>
<td>• Provide the load test reports of the hooks and the bracket to hold the Guide rail as per the load requirement of elevator Contractor.</td>
<td>• Construction :</td>
<td>• To provide MCCB and ELCB as per requirement of elevators outside the lift shaft.</td>
</tr>
<tr>
<td>• Ramp for access to ground floor elevators.</td>
<td>• Provide cable tray conduit / trunking from lift controller room to SCR for data cable.</td>
<td>• To satisfy himself with the load bearing capacity of civil structure at location of Guideway support and of the lifting Hooks beams before starting installation.</td>
</tr>
<tr>
<td>• Sun Shade, Rain water protection &amp; prevention from water ingress for elevators to be installed in open area.</td>
<td>• Provide shaft lighting with fire protection measures</td>
<td>• Provide elevator car and all mounting/ guideway support and mechanism.</td>
</tr>
<tr>
<td>• Certificate of shaft strength.</td>
<td></td>
<td>• Provide all exterior finishes and door components for landing doors.</td>
</tr>
<tr>
<td>• Stone work around the facia elevator in all landings beyond the 300 mm widths.</td>
<td></td>
<td>• Provide and install telephone equipment in car, controller and SCR.</td>
</tr>
</tbody>
</table>

### Part-II

<table>
<thead>
<tr>
<th>Civil contractor responsibilities</th>
<th>Electrical Contractor responsibility</th>
<th>Elevator Contractor responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design</strong></td>
<td><strong>Design:</strong></td>
<td><strong>Design:</strong></td>
</tr>
<tr>
<td>• Provide Civil Contractor with detailed requirements of shaft size, size of ventilation opening, lifting beams/hooks, water proofing and protection from rain, structural provision etc.</td>
<td>• Provide Civil Contractor with detailed requirements of shaft size, size of ventilation opening, lifting beams/hooks, water proofing and protection from rain, structural provision etc.</td>
<td>• Provide E&amp;M contractor with all details of electrical load, shaft lighting and earthing requirements.</td>
</tr>
<tr>
<td>• Provide E&amp;M contractor with all details of electrical load, shaft lighting and earthing requirements.</td>
<td>• Inform the size of access necessary likely along the passage for moving the elevator for installation.</td>
<td>• To provide MCCB and ELCB as per requirement of elevators outside the lift shaft.</td>
</tr>
<tr>
<td>• Co-ordinate fire safety requirement with fire fighting systems.</td>
<td>• Furnish design for monitoring and control panel.</td>
<td>• To satisfy himself with the load bearing capacity of civil structure at location of Guideway support and of the lifting Hooks beams before starting installation.</td>
</tr>
<tr>
<td>• To provide MCCB and ELCB as per requirement of elevators outside the lift shaft.</td>
<td></td>
<td>• Provide elevator car and all mounting/ guideway support and mechanism.</td>
</tr>
<tr>
<td>• To provide and install telephone equipment in car, controller and SCR.</td>
<td></td>
<td>• Provide all exterior finishes and door components for landing doors.</td>
</tr>
<tr>
<td>• Provide data cable for control from station control room including requirements of BMS contractor.</td>
<td></td>
<td>• Provide and install telephone equipment in car, controller and SCR.</td>
</tr>
<tr>
<td>• Provide all cabling within lift shaft.</td>
<td></td>
<td>• Provide data cable for control from station control room including requirements of BMS contractor.</td>
</tr>
<tr>
<td>• Supply equipment control &amp; monitoring panel with all accessories.</td>
<td></td>
<td>• Provide all cabling within lift shaft.</td>
</tr>
<tr>
<td>• Minor civil works like cutting of Iron bar/ Granite stone/ Concrete for mounting lift fixtures.</td>
<td></td>
<td>• Supply equipment control &amp; monitoring panel with all accessories.</td>
</tr>
<tr>
<td>• Provide shaft lighting and power sockets from separate single-phase power duly controlled by a switch provided outside</td>
<td></td>
<td>• Minor civil works like cutting of Iron bar/ Granite stone/ Concrete for mounting lift fixtures.</td>
</tr>
</tbody>
</table>
### Technical Specifications

#### Part-II

<table>
<thead>
<tr>
<th>Architect / DDC Responsibility</th>
<th>Civil Contractor Responsibility</th>
<th>Electrical Contractor Responsibility</th>
<th>Elevator Contractor Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before Erection</strong></td>
<td><strong>Before Erection</strong></td>
<td><strong>Before Erection</strong></td>
<td><strong>Before Erection</strong></td>
</tr>
<tr>
<td>• To identify the entrance elevator shaft with lockable arrangement.</td>
<td>• Define installation provisions for elevator assemblies, co-ordinate access and delivery space provisions.</td>
<td>• Provision of Pump in sump for Entrance / Ground elevators.</td>
<td>• Provide proper size wooden block for cutout to civil contractor.</td>
</tr>
<tr>
<td>• To issue structural drawing of elevators.</td>
<td>• Adequate storage area at station / depot / storage yard including proper access to storage area from near by road for carrying elevators by hydra cranes / trailers.</td>
<td>• Single Phase UPS for Intercom in Customer Care Centre / Station Control Room.</td>
<td>• To furnish the design for LED Based RMS system.</td>
</tr>
<tr>
<td>• Cable routing of LED based RMS cable tray in drawings</td>
<td>• Future elevator shafts to be protected suitably.</td>
<td>• Single phase power supply for LED based RMS Panel in Customer Care Centre / Station Control Room.</td>
<td><strong>During Erection</strong></td>
</tr>
<tr>
<td>• Detailed drawing of Phone/alarm/ RMS panel in customer care/SCR.</td>
<td>• Marking for finished floor level at all landings of elevator.</td>
<td>• Adequate lighting fixtures above the Elevator entry point at all landings for proper illumination.</td>
<td><strong>Interface with Civil Contractor and Architect for location of suitable water drainage arrangements.</strong></td>
</tr>
<tr>
<td>• To identify and mark on the drawing the SS Handrail along with Ramp on both side of elevator as per requirement of elevator contractor for Ground level of G to C elevator.</td>
<td>• Cut outs for fixing indicators and for laying of cables at all landings.</td>
<td>• UPS supply at Elevator shaft as per requirement of Elevator contractor.</td>
<td>• Provide and install elevator complete with claddings, finishes and operating mechanism.</td>
</tr>
<tr>
<td>• Identification of location for installation of LED based RMS in CCC / SCR.</td>
<td>• Proper connectivity of drainage hole to nearest sump by suitable GI pipes, drainage pit of elevator should be away from the elevator pit for ease of cleaning.</td>
<td><strong>Testing</strong></td>
<td>• Provide and install LED based Remote Monitoring System in CCC / SCR and Intercom etc. in SCR/MAP/CC.</td>
</tr>
<tr>
<td><strong>During Erection</strong></td>
<td>• Slope of finished floor at the landing of elevator should be away from elevator to prevent entry of mopping water to pit of elevators.</td>
<td>• Fire detectors testing.</td>
<td><strong>Plan elevator section / sizes considering local site conditions to facilitate easy transportation to installation location.</strong></td>
</tr>
<tr>
<td>• Signage at all landings (except in Architraves)</td>
<td>• Epoxy paint in Pit floor.</td>
<td>• Testing of Pump in pit.</td>
<td><strong>The gap between ELCB Panel &amp; MAP Panel and the Architrave sheet to be filled up by the elevator contractor with flexible sealant.</strong></td>
</tr>
<tr>
<td></td>
<td>• Provision of ventilation cutout in shaft.</td>
<td></td>
<td>• Lift number, Job Number &amp; Station Name (in Hindi &amp; English language), Lift capacity plate (in Hindi &amp; English language), Emergency / Safety instruction (in Hindi &amp; English language) License display.</td>
</tr>
<tr>
<td></td>
<td>• Pit Cleaning, PCC work and construction of slope in pit towards drainage hole.</td>
<td></td>
<td><strong>Architrave / Stone work coordination.</strong></td>
</tr>
<tr>
<td></td>
<td>• Primary whitewash /Paint in shaft.</td>
<td></td>
<td><strong>Roof leakage checking/coping</strong></td>
</tr>
<tr>
<td></td>
<td>• Hole in Slab / Wall for cable entry from E &amp; M shaft to Elevator.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th><strong>During Erection</strong></th>
<th><strong>After Erection</strong></th>
<th><strong>Testing</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>PCC filling at entrance sill &amp; sill stone at all landings.</td>
<td>Stone Flaming for making it rough surface.</td>
<td>Drainage Hole Connectivity to Sump Checking.</td>
</tr>
<tr>
<td>Sealing of Rain shelter for entrance elevator / Ground elevator.</td>
<td>Covering of Gap (b/n stone and Architrave) by stone cladding in all landings.</td>
<td>Load testing of structure, Load hooks &amp; beams.</td>
</tr>
<tr>
<td></td>
<td>Filling of gap on elevator shaft on all side &amp; sealing of holes with fire rated material</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Storage area for maintenance purpose.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SS Handrail along with Ramp on both side of elevator as per requirement of elevator contractor for Ground level of Ground to Concourse elevator.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Finishing of patch work with final whitewash / Paint in lift shaft.</td>
<td></td>
</tr>
</tbody>
</table>

**After Erection**
- Ventilation Louver over cutout.
- RMS Cable laying.
- Installation of LED based RMS Panel in CCC / SCR.

**Testing**
- Water sensor testing.
- Contract load & linear speed.
- LUX level & Noise level testing.
- EVA Meter / Ride Comfort testing.
APPENDIX B - KEY DATES

1.0 Key Dates

The following key dates have been stipulated in this Contract:

1.1 Key Date 1 (KD1): Preliminary Design submission

Achievement - The following activities shall have been completed prior to the Key Date:
Submission to the “Engineer” of the Preliminary Design which consists of general equipment layouts including machine room sizes, major cabling routings, proposed architectural materials for public areas, preliminary drawings, elevator equipment details and proposed arrangement, preliminary delivery routes, preliminary design and construction specifications, preliminary installation and testing procedures etc. Submission to “Engineer” of Interface Management Plan.

1.2 Key Date 2 (KD2): Submission of Final Design (Definitive)

Achievement - The following activities shall have been completed prior to the Key Date:
Submission to the “Engineer” of the Definitive Design in respect of the whole of the works, the same being in the opinion of the “Engineer”, a complete and comprehensive submission or submissions which complies with the Employer’s Requirements.

1.3 Key Date 3 (KD3): Delivery to Site of major Elevator components

Achievement - The following work shall have been executed prior to the Key Date:
Manufacture, acceptance of factory testing, shipping and delivery to site of all major equipment and components of proposed Elevators. The delivered equipment shall be unloaded and stored at storage area, which will be subject to agreement by the “Engineer”.

1.4 Key Date 4 (KD4): Installation at Site, Testing and Commissioning of Elevator Systems.

Achievement - The following work shall have been executed prior to the Key Date:
Completion of all installation processes at site for elevators systems. The completion of all testing at site, completion and testing of all remote monitoring and control system, obtaining all licenses and clearances from local authorities and commissioning of elevator systems.

1.5 Key Date 5 (KD5): Completion of whole of the Works and taking over by the Employer.

Achievement - The following work shall have been executed prior to the Key Date:
Completion of whole of the works to facilitate taking over of elevator system by the Employer. Completion of all training related activities for the Employer’s Staff. Submission of all necessary documents including operation and maintenance manuals etc. Supply and handing over of all mandatory spares as required under the Contract.
SCHEDULE OF KEY DATES

Please refer Section -6 of Bid Document

END OF APPENDIX
**APPENDIX D - LIST OF ABBREVIATIONS**

The abbreviations used in this Specification are as follows:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>Alternating Current</td>
</tr>
<tr>
<td>ASTM</td>
<td>American Society for Testing and Materials</td>
</tr>
<tr>
<td>BCC</td>
<td>Back-up Control Centre</td>
</tr>
<tr>
<td>BIS</td>
<td>Bureau of Indian Standards</td>
</tr>
<tr>
<td>BS</td>
<td>British Standards</td>
</tr>
<tr>
<td>CPWD</td>
<td>Central Public Works Department</td>
</tr>
<tr>
<td>DC</td>
<td>Direct Current</td>
</tr>
<tr>
<td>DDC</td>
<td>Detail Design Consultants</td>
</tr>
<tr>
<td>DFT</td>
<td>Dry Film Thickness</td>
</tr>
<tr>
<td>DLP</td>
<td>Defects Liability Period</td>
</tr>
<tr>
<td>DMRC</td>
<td>Delhi Metro Rail Corporation</td>
</tr>
<tr>
<td>JMRC</td>
<td>Jaipur Metro Rail Corporation</td>
</tr>
<tr>
<td>E &amp; M</td>
<td>Electrical and Mechanical</td>
</tr>
<tr>
<td>EMC</td>
<td>Electro Magnetic Compatibility</td>
</tr>
<tr>
<td>EMI</td>
<td>Electro Magnetic Interference</td>
</tr>
<tr>
<td>EMU</td>
<td>Electrical Multiple Unit</td>
</tr>
<tr>
<td>EMR</td>
<td>Elevator machine room</td>
</tr>
<tr>
<td>EN</td>
<td>European Standard</td>
</tr>
<tr>
<td>g</td>
<td>Gravitational acceleration</td>
</tr>
<tr>
<td>GCC</td>
<td>General Conditions of Contract</td>
</tr>
<tr>
<td>GS</td>
<td>General Specification</td>
</tr>
<tr>
<td>IEC</td>
<td>International Electro Technical Commission</td>
</tr>
<tr>
<td>IEEE</td>
<td>Institute of Electrical and Electronic “Engineer”</td>
</tr>
<tr>
<td>IMP</td>
<td>Interface Management Plan</td>
</tr>
<tr>
<td>IS</td>
<td>Indian Standards</td>
</tr>
<tr>
<td>ITB</td>
<td>Interface Terminal Board</td>
</tr>
<tr>
<td>LCD</td>
<td>Liquid Crystal Display</td>
</tr>
<tr>
<td>LED</td>
<td>Light Emitting Diode</td>
</tr>
<tr>
<td>LT</td>
<td>Low tension</td>
</tr>
<tr>
<td>LMR</td>
<td>Lift machine room</td>
</tr>
<tr>
<td>m</td>
<td>metre</td>
</tr>
<tr>
<td>mm</td>
<td>milli metre</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>MCB</td>
<td>Miniature Circuit Breaker</td>
</tr>
<tr>
<td>MCCB</td>
<td>Moulded Case Circuit Breaker</td>
</tr>
<tr>
<td>MMS</td>
<td>Maintenance Management System</td>
</tr>
<tr>
<td>MRT</td>
<td>Mass Rapid Transit</td>
</tr>
<tr>
<td>N</td>
<td>Newton</td>
</tr>
<tr>
<td>NFPA</td>
<td>National Fire Protection Association, USA</td>
</tr>
<tr>
<td>N/m²</td>
<td>Newton per square metre</td>
</tr>
<tr>
<td>N/C</td>
<td>Contactor or relays with normally close contacts</td>
</tr>
<tr>
<td>N/O</td>
<td>Contactor or relays with normally open contacts</td>
</tr>
<tr>
<td>OCC</td>
<td>Operations Control Centre</td>
</tr>
<tr>
<td>TS</td>
<td>Technical Specification</td>
</tr>
<tr>
<td>RAM</td>
<td>Reliability, Availability and Maintainability</td>
</tr>
<tr>
<td>SCC / PC</td>
<td>Special Conditions of Contract /Particular Conditions</td>
</tr>
<tr>
<td>SCADA</td>
<td>Supervisory Control and Data Acquisition</td>
</tr>
<tr>
<td>SCR</td>
<td>Station Control Room</td>
</tr>
<tr>
<td>TOT</td>
<td>Transfer of Technology</td>
</tr>
<tr>
<td>UPS</td>
<td>Un-interruptible Power Supply</td>
</tr>
<tr>
<td>VVVF</td>
<td>Variable Voltage Variable Frequency</td>
</tr>
</tbody>
</table>

END OF APPENDIX
APPENDIX E - SPARES & TOOLS POLICY FOR ELECTRICAL CONTRACTS

1.1 General
The Contractor shall supply the following spares:

1.1.1 Consumable Spares
(i) The ‘consumable spares’ shall include items such as lubricants, oils, greases, sealants, filter Medias, gaskets, lamps and wearable parts etc. whose declared life is less than one year. This will not include the consumables like Diesel Salt etc. required for operation of the equipment.

(ii) The Tenderer shall provide a recommended un-priced list of ‘consumable’ spares in Annexure-1 of this Appendix E on Employer's Requirements as noted above for maintenance and repairs of equipment in technical package. Any consumable item if required but not included in the above recommended list by the tenderer shall be deemed to have been included and shall be supplied as per the provisions of this contract without any extra financial implication to the Employer. Contractor will be required to supply the requisite quantity of spares, as required irrespective of the quantities indicated by the contractor in the recommended list. Employer's decision in determining any particular item(s) as consumable in line with above guideline will be final and binding. In case any changes are required in the supply of consumables on account of changes at design stage, the contractor shall have to supply the required consumables also.

(iii) List of consumable spares furnished in the technical package shall be updated during the execution of Contract and following information as minimum shall be provided.
   a) Names, addresses, telephone numbers and other particulars of manufacturers and their local representatives;
   b) Models and part numbers,
   c) Full description of spares including a note whether it is sealed unit or an assembly or sub-assembly which can be broken down into component parts;
   d) Quantity installed in the system;
   e) Expected consumption rates;
   f) Overall dimensions and weight including minimum packing (if any) for shelf space purposes;
   g) Inter-changeability or otherwise with similar parts;
   h) Normal manufacturing and shipment lead times; and
   i) Shelf life.

(iv) The consumable spares shall be stored at the location agreed to by the Engineer.
Technical Specifications, Part - A

(v) It shall be the responsibility of the contractor to maintain sufficient stock of consumable spares till the end of DLP. These spares will be utilized by the Contractor during the maintenance etc. and its consumption to be countersigned with Operation & Maintenance of Employer and the old replaced parts shall be destroyed in the presence of Employer representative. Unused spares, if any, by the end of DLP shall be handed over to Employer and it will become property of employer.

(vi) Recommended list shall be furnished by the contractor as part of design submission / vendor approval for respective systems and subsystems. (The price of these spares will be part of tender evaluation while assessing the L-1 bidders).

1.1.2 Unit Exchange Spares

The Contractor shall supply the Unit Exchange Spares as listed in the Annexure-2 of this Appendix E on Employer’s Requirements. The Unit Exchange Spares shall be supplied in the Store nominated by the Engineer. These shall be delivered as per the key dates defined (key dates will be informed to the contractor within sixty (60) days of issuing of LOA/NTP). Any delay in this regard will make the Contractor liable for liquidated damages as per tender conditions. This will be part of tender evaluation while assessing the L-1 bidder.

1.1.3 Commissioning And DLP Spares

(i) The Contractor shall submit to the Engineer for review a list of minimum spare parts that he intends to make available during the installation, erection, commissioning and defect liability periods. An indicative list is provided at Annexure-3 of this Appendix E on Employer’s Requirements.

(ii) The Contractor shall keep on Site, at his own cost, throughout the installation, erection, commissioning and defect liability periods, stocks of spare parts, as per the list to enable rapid replacement of any item found to be defective or in any way in non-conformance with the Specification.

(iii) The Contractor shall generally not be entitled to use any of the Employer’s spare parts during the installation, erection and commissioning periods or during the Defects Liability Period.

(iv) Contractor shall not be permitted to remove any working/healthy equipment / components / sub-systems / systems for any reason whatsoever without specific approval in writing from Employer’s Engineer or Engineer’s authorised representative.

(v) Spares as per the agreed list shall be supplied at least three months before ROD. Stocks of such spares as available in Contractor stores will be jointly checked with Engineer every three months. Certificate by Engineer confirming availability of the spares in contractor stores / in Depots as per agreed list will be a pre-requisite for release of interim payments of the Contractor. However, this condition will not be applicable for six months before the expected expiry of the DLP period.

(vi) The Contractor shall include the price of these items in cost of DLP in their financial bid. The price of DLP shall be part of tender evaluation while assessing the L-1 bidder.

1.1.4 Mandatory spares and tools

(i) The Contractor shall supply the Mandatory Spares and tools as listed in the Annexure-4 of this Appendix-E of Employer’s Requirements. The Spares and tools shall be supplied at the location nominated by the Engineer.
price of these spares and tools shall be quoted at actual and will also be part of the evaluation for assessing L-1 bidder.

(ii) No change in quoted price of any spare will be allowed even when there is change in design of any equipment / sub-system during the execution of the contract.

(iii) Contractor will furnish complete details during contract execution (detailed design stage) as noted below for the listed spares;

   a) Names, addresses, telephone numbers and other particulars of manufacturers and their local representatives;

   b) Models and part numbers

   c) Full description of spares including a note whether it is sealed unit or an assembly or sub-assembly, which can be broken down into component parts;

   d) Quantity installed in the system;

   e) Overall dimensions and weight including minimum packing (if any) for shelf space purposes;

   f) Designed and shelf life;

   g) Interchangeability or otherwise with similar parts;

   h) Normal manufacturing and shipment lead times;

   i) Purchase Technical Specification with relevant drawings.

The information as above shall also be given for all other components / equipments etc. which may have to be changed / replaced during maintenance as decided by the Engineer based on the proposed maintenance practices.

1.1.5 Recommended Spares for 3 years beyond DLP

(i) The Tenderer shall furnish priced list of the ‘recommended spares’ not covered under ‘Unit Exchange Spares’, ‘consumables’ and ‘mandatory’ spares but the Contractor expects them to be required during three years after expiry of defect liability period, along with the bid as per format enclosed in Annexure-5 of this Appendix-E of Employer’s Requirements. The prices should be proportionate and reasonable. Employer may decide to procure any number of these spares at quoted / negotiated rates before the end of DLP. The Spares shall be supplied at a location nominated by the Engineer.

(ii) Contractor shall supply all the spares recommended by equipment/sub-system manufacturers within the quoted cost for recommended spares. Contractor shall update list of spares recommended by equipment/sub-system manufacturers at design submission stage.

(iii) This will not be part of tender evaluation while assessing the L-1 bidder.

1.1.6 10 years spares beyond DLP (Purchase of spares from Vendors)

(i) The Contractor shall ensure availability of spare parts for a period of ten years from the last date of taking over of whole of Works. The Tenderer shall furnish an un-priced list of spares for maintenance and repair for a period of ten years from the date of taking over as per format enclosed in Annexure-6 of this Appendix-E of Employer’s Requirements. The spares
shall be in kit form/ items. The Tenderer shall also quote unit prices for the kit / items, spare item with escalation clause in the Financial Package. The Employer at his discretion, during a period of ten years from the date of taking over of the whole works, purchase as many kits / items of spare parts as required by him, at the rates indicated in this schedule.

(ii) If during the period of ten years, the manufacturer / vendor intends to discontinue the manufacture of spare or replacement parts, the manufacturer / Contractor shall immediately give notice to the Employer of such intention. The Employer shall be given the opportunity of ordering at contracted prices such quantities of such spare or replacement parts as the Employer shall reasonably require in relation to the anticipated life of the equipment.

(iii) In the event of Vendor / manufacturer / 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 Manufacturer / Contractor so requires, shall be returned by the Employer to the Contractor in good order and condition (fair wear and tear excepted). Also in the event of vendor / manufacturer / contractor failing to supply the spare parts in accordance with this clause are liable to be blacklisted.

(iv) 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.

(v) The Contractor will, so far as he is reasonably able to bind his sub-contractors / vendors 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 / vendor who will not so conform in which event the Employer may direct the Contractor to seek an alternative sub-contractor/vendor.

(vi) 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)

(vii) In case the Contractor is unable to supply spares in accordance with Clause above, he shall furnish, free of cost to the Employer, the drawings, specifications, and other technical details, to enable the Employer to manufacture parts, or have them manufactured. Such drawings and technical data shall be provided free of any charge or royalty, on the understanding that the Employer will use such data and drawings, only for the manufacture of parts for his own use.

(viii) The foregoing shall hold equally good for the Contractor, any or all of his sub-contractors, and vendors.
Technical Specifications, Part - A

(ix) In the event that technological progress results in improved versions of spares and replacement parts, the latest version shall have the same plug compatibility, and spatial needs of its predecessor, to avoid modifications being required, to accept the up-graded version of the part.

1.2 Manufacture, Delivery and Warranty

(i) The major spare parts ordered under the Contract shall be manufactured, tested and inspected in accordance with the relevant quality system, suitably packed and labeled. All spares shall be subject to inspection by the Engineer. In the event that any item is known to be going out of production, then the Contractor shall give advance notice to the Engineer.

(ii) The warranty period of ‘unit exchange’ and ‘mandatory spares’, delivered shall be:

(a) Either 24 months from the date of acceptance or
(b) Upto expiry of the defect liability period, whichever is later.

1.3 Purchase of Spares from Vendors

(i) The Contractor shall furnish an undertaking that he has no objection whatsoever to and shall not in any way deter or obstruct the Employer, its licensee or its representative from dealing directly with the Contractor’s Vendors for the purchase of the spares during the Contract period. The spares purchased shall be subject to inspection by the Engineer.

(ii) Contractor shall obtain an undertaking from vendors, OEMs etc. at detailed design submission stage that they will deal directly with Employer for supply of spares, equipments and/or sub-systems.

1.4 The relevant list of the spares mentioned above shall be submitted in the technical bids after blanking the prices, where applicable. The financial bid shall have the price details.

1.5 Contractor shall submit technical specifications of the items used in this project for the purpose of purchasing. Engineer’s views, if any, shall be suitably incorporated.
Annexure-1 to Appendix-E of TS

List of Recommended & Consumable Spares

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cotton Waste</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Guide Lube Oil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cotton Spray</td>
<td></td>
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<td>4</td>
<td>3 M Polish</td>
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<tr>
<td>5</td>
<td>Thinner</td>
<td>Bidder to fill</td>
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<td>6</td>
<td>Grease</td>
<td></td>
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<td>7</td>
<td>Rubber Washers</td>
<td>As per requirement</td>
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<td>8</td>
<td>Allen Key Screws</td>
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<td>9</td>
<td>Indication Lamps</td>
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<td>10</td>
<td>Any other item required</td>
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</tbody>
</table>

**Total**

Note:

(i) List is to be provided by the bidder in line with the clause 1.1.1 of Appendix -E (spares policy) of TS.

(ii) Bidder need to submit the un-priced list in the Statement of Price -3A of True copy of the BOQ (with price left blank) with the technical package.

(iii) Priced list shall be provided in Statement of Price - 3A of Bill of Quantity (Section VI) with the financial package only.

(iv) Total quoted Amount of this statement will be considered for tender evaluation while assessing the L-1 bidder.
Annexure-2 to Appendix-E of TS

Unit Exchange Spares

<table>
<thead>
<tr>
<th>S. No.</th>
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<th>Total Amount</th>
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<tr>
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<td></td>
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<td>Foreign Currency</td>
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</tr>
<tr>
<td>1</td>
<td>Complete Motor Assembly</td>
<td>1 of Each Type</td>
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<td>2</td>
<td>Door Assembly</td>
<td>1 of Each Type</td>
<td></td>
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<tr>
<td>3</td>
<td>MAP</td>
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<td></td>
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<td>4</td>
<td>SEP</td>
<td>1</td>
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<td>Guide Rail</td>
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<td>6</td>
<td>V3F drive assembly W/O Regenerative braking</td>
<td>1 No</td>
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<tr>
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<td><strong>Total</strong></td>
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</table>

(i) List is to be provided by the bidder in line with the clause 1.1.2 of Appendix -E (spares policy) of TS.

(ii) Bidder need to submit the un-priced list in the Statement of Price -3B of True copy of the BOQ (with price left blank) with the technical package.

(iii) Priced list shall be provided in Statement of Price -3B of Bill of Quantity (Section VI) with the financial package only.

(iv) Total quoted Amount of this statement will be considered for tender evaluation while assessing the L-1 bidder.
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<thead>
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<th>Item</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Total Amount (for total Qty)</th>
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<td>S. No.</td>
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<tr>
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<td>Lift announcement UNIT</td>
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<td>Door Belt</td>
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<td>3</td>
<td>Brake release wire</td>
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<td>4</td>
<td>Door contact switch</td>
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<td>5</td>
<td>Brake Unit</td>
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<td>6</td>
<td>E-MOTIVE DISPLAY Board</td>
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<td>7</td>
<td>Door Guide Shoe</td>
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<td>8</td>
<td>V3F drive with Regeneration unit</td>
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<td>LCE CAN</td>
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<td>LCE CCB Board</td>
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<td>LCE COB</td>
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<td>18</td>
<td>LCE CPU</td>
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<td>LCE FCB Board</td>
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<td>Light curtain (COL 3D)</td>
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<td>Mono stable switch (for leveling and door zone)</td>
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<td>Rope for synchronisation – car</td>
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<td>Landing call button set</td>
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<td>All type of buttons inside car</td>
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<td>33</td>
<td>Stop Switch</td>
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<td>Synchronisation roller for car door A-1,</td>
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<td>44</td>
<td>Rope for closing weight. Assy.</td>
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<td>Brake opening device</td>
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<td>Control Current Transformer</td>
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<td>Door set complete (car &amp; landing door)</td>
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<td>End Buffer</td>
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<td>59</td>
<td>Fan and stop PCB Assy.</td>
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<td>60</td>
<td>Car fan</td>
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<td>Final Limit Switch</td>
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<td>62</td>
<td>Full lock latch unit / lock roller unit</td>
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<td>63</td>
<td>Guide shoe for CWT</td>
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<tr>
<td>64</td>
<td>GUIDE SHOE ASSY.</td>
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<td>65</td>
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<td>66</td>
<td>Handset Phone (Used in MAP)</td>
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<td>68</td>
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<td>71</td>
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<td>73</td>
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<td>74</td>
<td>LOPCB Board</td>
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<td>LWD device</td>
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<td>Main Motor</td>
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<td>83</td>
<td>Resister box assy.</td>
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<td>84</td>
<td>Safety gear jaw</td>
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<td>85</td>
<td>Safety gear Switch</td>
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<td>86</td>
<td>Shaft door header(Landing top track)</td>
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<td>87</td>
<td>Tension weight switch</td>
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</table>
Note:-

1. List is to be provided by the contractor in line with the clause 1.1.3 of Appendix - E (spares policy) of TS.

2. The list is indicative and not exhaustive. The bidder may indicate substitute / alternative against the above listed items, any additional spares in compliance to Chapter 13 of GS and Clause 17.1.2 and chapter 18 TS, if required the same may be indicated by the Firm in their Technical Offer.

3. If any additional spares are required during the DLP period the same will be arranged by the Contractor, without any Extra Payments.

4. This will not absolve the firm of the responsibility to fulfill the DLP obligations as per relevant clauses of TS.

5. Bidder may review the List & Quantity of spares in view of clause – 6.2.5 of TS.

6. Bidder need to submit the un-priced list in the Statement of Price -6 C of True copy of the BOQ (with price left blank) with the technical package.

7. Priced list shall be provided in Statement of Price -6 C of Bill of Quantity (Section VI) with the financial package only. The price of the DLP spares shall be included in the in statement of Price 1 of Bill of quantity (Section VI). This list is for reference purpose only, and will not be considered for evaluation purpose.
## Annexure-4 to Appendix-E of TS

### List of Mandatory Spares

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<tr>
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<th>QUANTITY</th>
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<td>4</td>
<td>E-MOTIVE DISPLAY BOARD</td>
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<td></td>
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<td>5</td>
<td>DOOR GUIDE SHOE</td>
<td>6</td>
<td></td>
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<tr>
<td>6</td>
<td>V3F DRIVE (WITH REGENERATION UNIT)</td>
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<td>7</td>
<td>AUTOMATIC RESCUE DEVICE UNIT</td>
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<td>8</td>
<td>DOOR COUPLER</td>
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<td>DOOR MODULE CARD</td>
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<td>10</td>
<td>DOOR LOCKING KEY / MAP KEY</td>
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<td>FUSE OF PCB</td>
<td>5 NO.</td>
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<td>13</td>
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<td>16</td>
<td>COUNTER WEIGHT DIVERTER WHEEL</td>
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<td>17</td>
<td>CAR DOOR HEADER</td>
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<td>18</td>
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<td>21</td>
<td>CONTROL CURRENT TRANSFORMER</td>
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## Annexure-5 to Appendix-E of TS

Recommended Spares for three years After DLP

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<td>AMD2 Door module</td>
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<td>4</td>
<td>D Locking Key/MAP Key</td>
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<td>BLOCKING DEVICE SWITCH</td>
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<td>7</td>
<td>Brake Unit</td>
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<td>8</td>
<td>Braking Register ASSY.</td>
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<td>US90-30, DEWHURST BUTTON-RED (as per spec)</td>
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<tr>
<td>10</td>
<td>US90-30, DEWHURST WHITE / GREEN (intercom)</td>
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<td>CAR DOOR HEADER</td>
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<td>14</td>
<td>ELICOM INTERCOM BOX ASSY.</td>
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<td>Control Current Transformer</td>
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<td>COL 3D (Pana-40)</td>
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<tr>
<td>17</td>
<td>Door Belt</td>
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<td>Door GLIDE SHOE</td>
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<td>Door CONTACT BULLET (Beak)</td>
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<td>Door contact switch</td>
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<td>21</td>
<td>Door Guide Shoe</td>
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<td>22</td>
<td>DOOR TRANSFORMER</td>
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<tr>
<td>23</td>
<td>ARD Unit-MX10/11 Machine.</td>
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<tr>
<td>24</td>
<td>Final Limit Switch Siemens Make</td>
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<tr>
<td>25</td>
<td>Full lock latch unit / lock roller unit</td>
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<tr>
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<td>FAN</td>
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<td>27</td>
<td>Fan And stop PCB Assy.</td>
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<td>28</td>
<td>GUIDE SHOE ASSY</td>
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<td>29</td>
<td>Geared Motor</td>
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<td>INSPECTION BOX</td>
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<td>31</td>
<td>TACHO METER / ENCODER</td>
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<td>32</td>
<td>LIMIT SWITCH</td>
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<tr>
<td>33</td>
<td>LWD device</td>
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<tr>
<td>34</td>
<td>LCE CCB Board</td>
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<td>35</td>
<td>LCE CPU</td>
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<td>36</td>
<td>LCE FCB Board</td>
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<td>37</td>
<td>LCE OPT BOARD</td>
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<td>38</td>
<td>LCE REC Board</td>
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<td>LCE-230(ADO/ACL CARD)</td>
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<td>LOPCB Board</td>
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<td>42</td>
<td>Lock Latch Roller unit ASSY.</td>
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<td>43</td>
<td>Monostable switch (sensor 61 U/N &amp; 30)</td>
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<td>Motor MX-10/11</td>
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<td>Photo cell</td>
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<td>49</td>
<td>Rope for synchronisation – car</td>
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<td>Rope for synchronisation - L/D</td>
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<td>Rope for closing weight. Assy.</td>
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<td>Main steel core rope</td>
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<td>53</td>
<td>Safety gear Switch</td>
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<td>54</td>
<td>Shaft door header(Landing top track)</td>
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<td>55</td>
<td>Synchronisation roller for car door A-1,</td>
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<tr>
<td>56</td>
<td>Synchronisation roller for car door A-2,</td>
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<tr>
<td>57</td>
<td>Traveling cable (8 mtr travel height) 16 core</td>
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<td>58</td>
<td>Traveling cable (8 mtr travel height) 8 core</td>
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<td>61</td>
<td>V3F 18 MODULE</td>
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<td>62</td>
<td>WHEEL FOR TACHO METER</td>
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<td>63</td>
<td>WATER SENSOR IN PIT</td>
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<td>64</td>
<td>Battery Sealed Lead acid 12V (ARD &amp; CCB)</td>
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<tr>
<td>65</td>
<td>Hoisting Rope / Coated Steel belt (With fatigue monitoring System) Complete</td>
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</table>

**Note:**

1. List is to be provided by the contractor in line with the clause 1.1.5 of Appendix - E (spares policy) of TS.

2. The list is indicative and not exhaustive. The bidder may indicate substitute / alternative against the above listed items, any additional spares in compliance to Chapter 13 of GS and Chapter 18 of TS, if required the same may be indicated by the Firm in their Technical Offer.

3. Bidder need to submit the un-priced list in the in the Statement of Price - 6 A of True copy of the BOQ (with price left blank) with the technical package.

4. Priced list shall be provided in Statement of Price -6 A of Bill of Quantity (Section VI) with the financial package only.

5. This statement will not be considered for tender evaluation while assessing the L-1 bidder.
### Annexure-6 to Appendix-E of TS

List of Spares for 10 years beyond the DLP

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<td>3</td>
<td>AMD2 Door module</td>
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<td>4</td>
<td>Anti Lift Roller</td>
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<td>Battery Sealed Lead acid 12V / 7Ah (EBD &amp; CCB)</td>
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<td>Bi-stable switch 77U/N</td>
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<td>7</td>
<td>BLOCKING DEVICE SWITCH</td>
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<td>Brake Unit</td>
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<td>Control Current Transformer</td>
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<td>Full lock latch unit / lock roller unit</td>
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<td>TACHO (Radio energy)</td>
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<td>LIMIT SWITCH</td>
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<tr>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>LCE FCB Board</td>
<td></td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>LCE OPT BOARD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>LCE REC Board</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>LCE-230(ADO/ACL CARD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>LOP230 BOARD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>LCE-CIB,PCB Board</td>
<td></td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>LCE COB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>Landing Door Track ROLLER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>56</td>
<td>LOP 230 Fuse 250V 2A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>LOP 230 FUSE 250V 1A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>LOPCB Board</td>
<td></td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>Light Element (MAP light)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>KDS 300 HLG ASSY.- BOTTOM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>KDS 300 HLG ASSY.- TOP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>Monostable switch (sensor 61U/N&amp;30)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>Motor MX-10/11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>OIL CUP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>OSG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>Pit Stop Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>Photo cell</td>
<td></td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>Rope for synchronisation - car</td>
<td></td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>Rope for synchronisation - Landing door</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Rope for closing weight. Assy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>Resister box assy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>Main steel core rope</td>
<td></td>
<td></td>
</tr>
<tr>
<td>73</td>
<td>Safety gear Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>74</td>
<td>Safety gear jaw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>Shaft door header (Landing top track)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>76</td>
<td>Synchronisation roller for car door A-2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>77</td>
<td>Synchronisation roller for car door A-1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>Traveling cable 16 core</td>
<td></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Traveling cable 8 core</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>Synchronisation roller for landing door A-2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>81</td>
<td>Synchronisation roller for Landing door A-1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>82</td>
<td>V3F 18 MODULE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>83</td>
<td>Upper Isolation Rubber Pad</td>
<td></td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>WHEEL FOR TACHO METER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>WATER SENSOR IN PIT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>86</td>
<td>INTERCOM BOX ASSY.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note:

1. List is to be provided by the contractor in line with the clause 1.1.6 of Appendix - E (spares policy) of TS.

2. The list is indicative and not exhaustive. The bidder may indicate substitute / alternative against the above listed items, any additional spares in compliance to Chapter 13 of GS and TS Clause 18.2.2, if required the same may be indicated by the Firm in their Technical Offer.

3. Bidder need to submit the un-priced list in the in the Statement of Price - 6 B of True copy of the BOQ (with price left blank) with the technical package.

4. Priced list shall be provided in Statement of Price -6 B of Bill of Quantity (Section VI) with the financial package only.

5. This statement will not be considered for tender evaluation while assessing the L-1 bidder.
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TOOL BAG</td>
<td>2NO.</td>
</tr>
<tr>
<td>2</td>
<td>SPANNER SET OPEN ENDED (6x7, 8x9, 10x11, 12x13, 14x15, 16x17, 18x19, 20x22, 21x23, 24x27, 25x28, 30x32)</td>
<td>2NO. EACH</td>
</tr>
<tr>
<td>3</td>
<td>RING SPANNER (10x11, 12x13, 16x17, 18x19)</td>
<td>2 NO. EACH</td>
</tr>
<tr>
<td>4</td>
<td>BOX SPANNER (12, 13, 17)</td>
<td>2 NO. EACH</td>
</tr>
<tr>
<td>5</td>
<td>MEASURING TAPE (5 METER)</td>
<td>2 NO.</td>
</tr>
<tr>
<td>6</td>
<td>ALLEN KEY SET (1.5 MM TO 8MM)</td>
<td>2 NO.</td>
</tr>
<tr>
<td>7</td>
<td>COMBINATION PLIERS 8&quot;</td>
<td>2 NO.</td>
</tr>
<tr>
<td>8</td>
<td>NOSE PLIERS</td>
<td>2 NO.</td>
</tr>
<tr>
<td>9</td>
<td>SCREW DRIVER SET (WITH TESTER)</td>
<td>2 NO.</td>
</tr>
<tr>
<td>10</td>
<td>SCREW DRIVER (862, 902, 713)</td>
<td>2NO. EACH</td>
</tr>
<tr>
<td>11</td>
<td>FILLER GAUGE (0.05 MM TO .1 MM, .15 AND 2 MM)</td>
<td>2 NO. EACH</td>
</tr>
<tr>
<td>12</td>
<td>FORCE BOX</td>
<td>2NO. EACH</td>
</tr>
<tr>
<td>13</td>
<td>MULTIMETER</td>
<td>2 NO. EACH</td>
</tr>
<tr>
<td>14</td>
<td>MEASURING TAPE</td>
<td>2 NO. EACH</td>
</tr>
<tr>
<td>15</td>
<td>SCALE (6&quot; AND 12&quot;)</td>
<td>2NO. EACH</td>
</tr>
<tr>
<td>16</td>
<td>PLUMB</td>
<td>2 NO.</td>
</tr>
<tr>
<td>17</td>
<td>WIRE STRIPPER</td>
<td>2 NO.</td>
</tr>
<tr>
<td>18</td>
<td>TORCH (LED TYPE)</td>
<td>2 NO.</td>
</tr>
<tr>
<td>19</td>
<td>RING SPANNER (24x27)</td>
<td>2 EACH</td>
</tr>
<tr>
<td>20</td>
<td>BRUSH (NYLON) ¼ INCH AND ½ INCH</td>
<td>2NO. EACH</td>
</tr>
<tr>
<td>21</td>
<td>LINE TESTER</td>
<td>2 NO.</td>
</tr>
<tr>
<td>22</td>
<td>VERNIER CALIPER</td>
<td>2 NO.</td>
</tr>
<tr>
<td>23</td>
<td>SPIRIT LEVEL</td>
<td>2 NO.</td>
</tr>
<tr>
<td>24</td>
<td>KNIFE CUTTER</td>
<td>2 NO.</td>
</tr>
<tr>
<td>25</td>
<td>ADJUSTABLE SPANNER</td>
<td>2 NO.</td>
</tr>
<tr>
<td>26</td>
<td>GREASE GUN</td>
<td>2 NO.</td>
</tr>
</tbody>
</table>

**SPECIAL TOOLS**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BRAKE TESTING KIT (ELECTRICAL)</td>
<td>1NO.</td>
</tr>
<tr>
<td>2</td>
<td>TORQUE WRENCH</td>
<td>1NO.</td>
</tr>
<tr>
<td>3</td>
<td>MOBILE TEST WEIGHT (FULL LOAD CAPACITY)</td>
<td>1 SET</td>
</tr>
<tr>
<td>4</td>
<td>BARRICADE WITH INSCRIPTION BILINGUAL &quot;UNDER MAINTENANCE INCONVENIENCE IS DEEPLY REGRETTED&quot;</td>
<td>10NO.</td>
</tr>
<tr>
<td>5</td>
<td>EMERGENCY LIFTING TOOL WITH CHAIN PULLEY</td>
<td>1 SET</td>
</tr>
<tr>
<td>6</td>
<td>DIGITAL RIDE COMFORT ANALYSER (FOR READING IN THREE DIRECTIONS AND NOISE)</td>
<td>1 SET</td>
</tr>
</tbody>
</table>

**Note:-**

1. List is to be provided by the bidder in line with the clause 1.1.4 of Appendix - E (spares policy) of TS.

2. The list is indicative and not exhaustive. The bidder may indicate substitute / alternative against the above listed items, any additional spares and tools in compliance to Chapter 13 of GS and Chapter 18 of TS, if required the same may be indicated by the Firm in their Technical Offer.

3. The Employer reserves the right to revise the items & the Quantity in the list based on the experience / performance during the Defect Liability Period, at No extra cost.
Technical Specifications, Part - A

4 bidder need to submit the un-priced list in the Statement of Price - 3 C of True copy of the BOQ (with price left blank) with the technical package.

5 Priced list shall be provided in Statement of Price -3C of Bill of Quantity (Section VI) with the financial package only.

6 Total quoted Amount of this statement will be considered for tender evaluation while assessing the L-1 bidder.
APPENDIX-F - VENDOR APPROVAL

It shall be obligatory for the Contractor to obtain Notice of ‘No Objection’ from the Engineer for the selection of the vendors for all items of work, even if the name of the vendor is specified in the Contractor’s Technical Submission and the works to be done including purchase of materials and equipment is in accordance with the Standards specified in the Contract.

Vendor to be selected who are capable to provide good after sales services available in Jaipur during DLP and thereafter.

Vendor Approval and Selection Procedure

(1) The contractor can send a proposal for the vendor after ensuring that what he proposes at least meets the specifications both, the quality and safety standard of the stipulated makes, the proposed product should be a proven one. He shall also stand full guarantee to his proposal and if at any stage it is found that the material is not suitable or meeting the tender requirement, the contractor shall replace the material and provide the material from the alternate vendor after approval from Employers representative without any additional cost to JMRC. The alternate makes can be used only after an approval accorded by the Employer, whose decision will be final in the matter.

(2) The approval of any equipment or product to be used shall be done in two stages:-

(a) Stage-I
   • Assessment of capability of proposed Vendor to supply a particular equipment or product, with quality and performance requirements, as required by Specifications as well as other contract conditions. The proposed product should be a proven product in service for at least 3 years.
   • Assessment of the financial and functional strength of the Vendor to supply the requisite quantity of equipment and product as per delivery schedule acceptable to contractor and engineer to deliver the project in time.

(b) Stage-II
   Stage-II called as Technical Submission Approval Stage, selection of Equipment or product from the equipment / products manufactured / supplied by the approved vendor will be done. This stage includes thorough technical assessments about the conformance of the offered equipment / product to the Specifications and other requirements.

(c) To obtain Vendor Approval the Contractor must apply with the four sets of the following documents to the Engineer
   (i) Company Profile and Experience of the Vendor
   (ii) Clause wise compliance of the relevant Clauses of Specifications.
(iii) Details of supplies / orders executed in last ten years for the type of equipment / product offered. Supplies / orders executed for Metro Systems shall be specifically mentioned.

(iv) Details of the facilities available at the Works / Manufacturing Unit where the proposed equipment / product shall be manufactured.

(v) ISO 9000 Certification for the Works / Manufacturing Unit where the proposed equipment / product shall be manufactured (The Works / Manufacturing Unit where the proposed equipment / product shall be manufactured must have ISO 9000 Certification).

(vi) Proof regarding compliance to Manufacturer’s Qualifications. The offered products must be proven in service.

(vii) Audited Financial Statements of the Vendor for the last three years.

(viii) Type test certificates/ Performance certificate from accredited laboratories for the proposed type of equipment / products to establish the technical capability of the vendor (In case, specific requirements are mentioned in the relevant sections of Specifications with regard to type testing, same shall also be complied additionally).

(ix) The vendor shall not have been blacklisted by any Govt. Agency in India.

(x) Any other item as required by Employer / Employer’s Representative.

(d) Contractor must certify the check list provided that vendor Proposal is complete and all the above documents are available in the Vendor Proposal. In addition, the Contractor must check / certify compliance to the Specifications before forwarding the same.

(e) Incomplete Vendor Proposal will not be treated as a submission and will be returned.

(f) Engineer will give Approval to the Vendor Proposal (received complete with all the documents mentioned above) expeditiously.

(g) Technical submission shall be accompanied with the calculations / other technical documents to justify the selection of any particular model of equipment / product, detailed technical features / parameters of the selected product, type test certificates from the accredited laboratories for the offered products, any other document required by the Engineer.

(h) Engineer will give Approval to the Technical Proposal (received complete with all the documents mentioned above) expeditiously.

(3) It may be noted that Approval of Vendors as per Point (2) above shall only be done by Employer / Engineer after the award of the work. Vendor submissions shall not be evaluated.
during the tender evaluation. Conditional Tender offers received from Tenderers with particular Vendors for supply of equipment/ products will not be evaluated during evaluation and will be dealt with after award of the work.

(4) It may further be noted that Employer / Engineer shall be under no obligation to accept equipment / products manufactured by the successful Tenderer, unless it meets the entire criterion mentioned above.

For Design and Build Contracts

In addition to above, in Design and Build Contracts the following shall also be ensured for the Vendor Approval and Selection:-

Proven Design

The Contractor shall develop the design based on this specification and on sound proven and reliable engineering practices. The broad design details shall be submitted with technical support data in the technical bid. Detailed calculations shall be submitted to the Engineer during the design process stage for review and approval.

Systems and Sub-Systems

Manufacturer shall have at least 5 years experience of design and manufacturing of similar system. Proposed systems from the proposed manufacturing unit shall have been in use and have established their satisfactory performance and reliability for 3 years in minimum.

All sub-systems, equipments and major components etc. (hereinafter referred as ‘sub-systems’) shall be state-of-art and of proven design.

Proposed Systems/ sub-systems shall have been in use and have established their satisfactory performance and reliability on at least two mass rapid transit systems (including Railway or Airports) in revenue service over a period of three years or more, either outside the country of origin at an average in two different countries or in DMRC. Systems/ Sub-systems/ components used in DMRC do not get automatically qualified for use unless specifically approved by the Engineer for this project. If required by the Engineer, Contractor shall provide certificate of satisfactory performance for a period of five years or more from the Metro operators. Where similar System/ Sub-systems of a different rating are already proven in service as per the above criteria then the supply shall be based on such sub-systems.

All ‘sub systems’ shall be procured from the approved vendors and sourced from only such manufacturing units that have supplied the sub-systems that fulfill the proven design requirements as above.

In case the contractor proposes to use systems or sub-system(s) that do not fulfill the above said criteria then the contractor shall furnish sufficient information to prove the basic soundness and reliability of the offered systems and sub-system(s) for review of the Engineer.
The Engineer’s decision on contractor’s proposal shall be final and binding.

For sourcing the equipment from indigenous manufacturing facilities, following conditions shall be complied:

(i) In case the vendor uses his own facilities for indigenization after part supply of equipment from the approved manufacturing unit, no change in design, component type/make, quality standards, manufacture procedure, etc. shall be made without specific approval of the Engineer.

(ii) In case OEM wants to use manufacturing facilities in India (other than his own) for items for which the OEM has been approved, it shall enter into an agreement with such selected Indian equipment manufacturer and obtain prior approval from Employers representative. No change in composition, rating, type, model no., manufacturing process, quality standards, design, etc. and make of the components used in assemblies/sub-assemblies of such equipment as manufactured by the approved parent vendor shall be made without specific approval of the Engineer.

(iii) In case OEM wishes to change/make/type specifications, etc. of any sub-components for supplies to be sourced from Indian facility, specific prior approval of the Engineer shall be obtained for changes made, model, specification, etc. Responsibility for obtaining such prior approval shall rest solely with the contractor.

Format for submitting the vendor approval request shall be given to the contractor during initial stages and approved format shall be followed throughout the contract.

END OF APPENDIX
Appendix – G

MAINTENANCE REQUIREMENTS

To be read in conjunction with the chapter-17 Maintenance Requirement of TS

1.0 Maintenance

1.1 The Contractor shall provide maintenance services throughout the 2 Years Defects Liability Period (DLP) under the Main Contract and also under the Supplementary Comprehensive Annual Maintenance Contract for the elevators supplied under the Contract.

1.2 The Maintenance work shall include attendance to all service calls, work described in approved Maintenance Schedule, and the followings:-

1.2.1 Service shall include all work necessary to maintain entire elevator system in good working order at all times through Preventive / Scheduled Maintenance (PM) & Corrective Maintenance (CM). Preventive Maintenance can be carried out between 11.00 hrs to 17.00 hrs.

1.2.2 The Contractor shall dispatch competent personnel to rectify stoppages at any time during the day or night when being called on by the Employer within a time of Four hours (maximum).

1.2.3 The Contractor shall maintain adequate quantity of consumable and contingent spare parts as per agreed list at mutually agreed location in order to minimize the shut down time due to repairs and maintenance.

1.2.4 The DLP and Comprehensive AMC includes all spare parts of Elevators including consumables i.e. Car Enclosure, door panels, Ceilings, Car gates, light diffusers, light bulb, florescent tubes, handrails, starters, chokes, Mirrors, floor covering carpets, other Lift architectural features, hoist way enclosure, hoist way gates, door frames, doors, sills, batteries, securing system, external wiring to Elevator and hoist way/ Machine room, Imported components like LED, Plasma Display, EVIAS etc. Securing system, external wiring to Elevator and hoist way/ Machine room, imported components like LED, Plasma Display etc.

1.2.5 Contractor shall carry out periodic testing and examination of Lift safety devices as required by the provisions of any enactment in force relating thereto or of any enactment, regulations or by-laws of any local or other duly constituted authority which may be applicable to such tests and to provide such copies of the test certificates, duly signed by a competent Elevator “Engineer.”

1.2.6 Contractor shall be fully responsible for obtain & ensure timely renewal of relevant safety certificate (s) or license(s) or any other documents required from statutory authorities for operation & maintenance of lifts, during 2 Years Defects Liability Period (DLP) and also during the Comprehensive Annual Maintenance Contract. Nothing extra shall be payable.
1.2.7 Annual Independent Third Party Safety Check including load testing for each elevator and corrective adjustment (if necessary) shall be done by the Contractor. The report format shall be approved by Employer.

1.2.8 Reports

1.2.8.1 The Contractor shall provide monthly, quarterly, half-yearly and yearly reports on the condition of the equipment in a format approved by the Employer.

1.2.8.2 A report in duplicate shall be sent to the Employer immediately following every call out, indicating the time of call out visit, cause, remedial action taken and the time that the service was restored. The monthly summary of failure report along with the analysis giving details of nature of fault, remedial action taken etc in the approved format shall be provided.

1.2.8.3 Reports on routine visits are not required except where necessary to draw attention to defects of a minor nature, which could not be rectified during the routine visit. Records of each routine visit and call-out visit, together with details of the work done or action taken, shall be entered on a log book which shall be provided by the Contractor and retained in the location as decided by the “Engineer”.

1.2.9 Maintenance Service Plan

1.2.9.1 The Contractor shall provide the employer with a maintenance service plan and a Predictive Replacement Plan for the components which are likely to result in failure of elevators. Reference Plan is enclosed as List – A.

1.2.9.2 Maintenance service plan shall include all Preventive / Scheduled & Corrective Maintenance, and must be submitted for Approval, 3 months before the commencement of the DLP.

1.2.9.3 The Employer shall reserve the right to review the “Predictive Replacement Plan” based on actual performance of equipment during 2 Years Defects Liability Period (DLP) and also during the Comprehensive Annual Maintenance Contract. Nothing extra shall be payable.

1.2.10 Failure Investigations

The Contractor shall conduct failure investigations. The Contractor shall make available to the Employer all test and failure data as required. Disputes (if any) will be resolved by “Engineer”.

1.2.11 Contractor shall provide Operation and Maintenance Manuals (in Hindi & English).

1.2.12 Contractor shall provide training to JMRC personnel (a batch of 20 person) in operation & maintenance related to elevators for 15 trainer working days (from 10:00 hrs to 17:30 hrs).
2.0 **Maintenance Performance Requirements.**

2.1 The Contractor shall dispatch competent personnel to rectify stoppages at any time during the day or night when being called on by the Employer within a time of **Four hours** (maximum). Repairs shall be carried out on a 24 hours per day, 7 days per week basis until the faulty unit / elevator is put back in service.

2.2 If elevator is kept out of service for more than 24 hrs due to non-availability of Spares or due to lack of proper attention. Employer shall impose a penalty of Rs. 10,000/- (Rs Ten Thousand Only) per day for each such case. The penalty shall be applicable during DLP and AMC.

2.3 The reliability of equipment should be of level that it does not result in trapping of Lift User in the Elevator due to equipment failure. Any claim / Damage / Compensation claimed by the affected passenger / elevator user on account of equipment failure shall be recovered from the firm. In addition, JMRC shall impose a penalty @ Rs.10,000/- (Rs Ten Thousand Only) per case. The penalty shall be applicable during DLP and AMC.

2.4 The contractor shall ensure that the Maintenance Performance requirements as mentioned below are achieved:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Maintenance Performance Requirement for each Staff Quarter Complex</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Availability % ≥ 99.9%</td>
</tr>
<tr>
<td>2</td>
<td>Maintainability (based on Mean Time To Repair) ≤ 4 hrs.</td>
</tr>
<tr>
<td>3</td>
<td>Call out Ratio (per Lift per Year) ≤ 2</td>
</tr>
<tr>
<td>4</td>
<td>Average Call out Ratio per Year under the contract ≤ 1.5</td>
</tr>
</tbody>
</table>

**Availability** will be calculated as under:-

\[
\text{Availability} = \frac{\text{Availability} \times (365 \times 20 \text{ hrs.}) \times \text{No. of lifts} - \text{Total Unavailability hrs. in one year}}{(365 \times 20 \text{ hrs.}) \times \text{No. of lifts}).
\]

**Mean Time To Repair (MTTR)**

The MTTR time measurement shall include On site diagnostics and rectification of the failure up to point that the system is restored to full functionality. In the event that the failure cannot be rectified, the measurement shall include the time necessary to remove the failed piece of equipment from the system and replaced it with a functioning module.

The maintainability shall measure by fault rectification time, which should not exceed 4 hours since its reporting to contractor’s call centre or his representative by representative of Employer.

2.5 The Contractor shall submit a Quarterly Maintenance Performance Report along with the Payment Invoice, giving the details actual performance achieved on monthly basis in an approved format with specific reasons if any target is not met.

2.6 If the visit of engineer for non schedule maintenance exceeds 2 per lift per year or average call out ratio exceeds 1.5, a penalty of Rs. 10,000/- (Rs Ten Thousand Only) shall be imposed for each such visit. The penalty shall be applicable during DLP and AMC period also (if separate contract will be awarded for AMC after completion of 2 years DLP).
Indicative List of Spares and tools are provided at Annexure-1 to Annexure-6 of Appendix E of TS LIST – A

Predictive Replacement Plan

<table>
<thead>
<tr>
<th>Major area</th>
<th>Item Description</th>
<th>Replacement interval in years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Car</td>
<td>Car Lighting</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Emergency Batteries (UPS, EBD, CCB, BDT)</td>
<td>X</td>
</tr>
<tr>
<td>Doors</td>
<td>Car door contacts</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Car door hanger rollers</td>
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Note:-
1. The above list is considering usage of Lift as 5 Lakh operation / year
2. It can be modified only after approval from Employer.
Procurement of Plant
Design, Supply and Installation
JAIPUR METRO RAIL CORPORATION LIMITED
BIDDING DOCUMENT
for
Procurement
of
NCB No.-JP/EW/1B/E3


PART-II REQUIREMENTS

Section 6 - Employer’s Requirements (ERQ)

Volume – II Technical Specifications

Part-B

JAIPUR METRO RAIL CORPORATION LTD.
Khanij Bhawan, Tilak Marg,
C- Scheme, Jaipur (Rajasthan) PIN-302005
Country: India
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CONTRACT
EMPLOYER’S REQUIREMENTS
TECHNICAL SPECIFICATION

CHAPTER 1

INTRODUCTION
1 **INTRODUCTION**

1.1 **Scope and Purpose**

1.1.1 This specification defines the objectives, guidelines and requirements for the contractor’s design, manufacture, supply, installation, testing and commissioning of the Escalators at Stations of JMRC (JAIPUR Metro Rail Corporation Ltd.) network in JAIPUR and JAIPUR City of Rajasthan State of Republic of India.

1.1.2 The works to be executed under the Contract include the design, manufacture, verification, delivery, installation, testing, including integrated testing and commissioning, technical support, maintenance, training of Employer’s staff and documentation for a complete System necessary to deliver the requirements of this Specification.

1.2 **Relevant Documents**

1.2.1 This Specification should be read in conjunction with the General Conditions of Contract (GCC), the Special Conditions of Contract (SCC), the General Specification (GS), Safety Health and Environment Manual (SHE) and any other document forming part of the Contract.

1.2.2 In the event of a conflict between the GS and this Specification, this Specification shall prevail.

1.2.3 In the event of a conflict between this Specification and any other standards or specification quoted herein, the requirements of this Specification shall prevail.

1.2.4 The order of precedence, with item 1 having the highest priority, is:

1. Technical Specification
2. General Specification
3. Indian Standards
5. Other International Standards
6. Other National Standards.

1.2.5 Notwithstanding the precedence specified in clauses above the Contractor shall always immediately seek advice from the Employer in the event of conflicts between Specifications.

1.3 **Design Service of the Works**

1.3.1 The Contractor shall be responsible for the design service of the Works and shall satisfy himself that the sizes, ratings and quantities of equipment as specified
herein meet the functional and operational requirements of the elevated and at grade stations.

1.3.2 The contract price shall be deemed to include any additional equipment, accessories, assemblies, sub-assemblies, equipment of higher capacities or higher ratings for the systems and sub-systems necessary for the complete, safe, reliable and operable system.

1.3.3 The proposed capacities, sizes, ratings of equipment in escalator system, as a result of the design development shall be demonstrated by a proper design and simulation study and subject to review by the “Engineer”.

END OF CHAPTER
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CONTRACT
EMPLOYER’S REQUIREMENTS
TECHNICAL SPECIFICATION

CHAPTER 2

OVERVIEW OF THE PROJECT
2 OVERVIEW OF THE PROJECT

2.1 General
This Chapter gives an overview of the Project and the information provided in this Chapter is for reference only.

2.2 JAIPUR Metro Rail Project

2.2.1 The JAIPUR Metro Rail Project

Phase-1B is expected to have following Corridors:

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<th>S. No.</th>
<th>Corridor</th>
<th>Expected Revenue Opening Date</th>
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<tr>
<td>1)</td>
<td>Chandpole – BadiChopar</td>
<td>March, 18</td>
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2.3 Key Challenges

2.3.1 The following are the Key Challenges presented to the Contractor.

a) The escalators installed under the contract shall be highly reliable and shall provide the level of service required for Mass transit application.

b) The specified level of reliability, availability, maintainability and safety requirements of these systems shall be achieved and verified by the Contractor by analysis, simulation, testing and commissioning, and system demonstrations as required in this Specification.

c) The Contractor shall carefully study the space layouts allocated for the installation of escalators and plan for transportation, unloading, assembly and installation of escalators taking all the constraints into account and to ensure that all relevant safety clearances and rules are complied with and performance requirements are fully met.

d) The space requirement given in the tentative layouts of various stations shall be critically reviewed by the Contractor to economise on space and also to provide a layout amenable to good maintenance and operation practices, to achieve an overall economic design.

e) Various interfacing issues with other designated Contractors are required to be resolved to ensure timely completion of the Works. Whilst some of the interface issues have already been addressed, some of them are yet to be identified or finalised. It is the Contractor’s responsibility to ensure that all interfacing issues are clearly defined and agreements sought from all other Contractors as well as from the local authorities in accordance with the GS and the interface requirements.

f) The System Design shall meet the specified performance and operational requirements stipulated in this Technical Specification. The Contractor shall conduct
Simulation Studies in early design stage, to ensure that the system capacity and equipment design meet the Employer's Requirements.

g) The entire Scope of Works shall generally meet design requirements of fire safety in accordance with NFPA –130 Standards for Fixed Guide-Way Transit System, with latest versions / amendments, except where amended by this TS.

h) The entire installation shall meet the protective provisions relating to electrical safety and life safety described under various standards.

END OF CHAPTER
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CONTRACT
EMPLOYER’S REQUIREMENTS
TECHNICAL SPECIFICATION

CHAPTER 3

SCOPE OF WORKS
3 SCOPE OF WORKS

3.1 General

This Specification establishes requirements for the design, manufacture, delivery at Site, installation, testing and commissioning, operating and maintenance manual preparation and training of maintenance/operation personnel of the Escalator system at stations of JMRC Network in JAIPUR.

The Contractor shall be required to interface closely with the Detail Design Consultants appointed by the Employer and Designated Contractors working on Corridors. The Contractor shall also be responsible for obtaining clearances from statutory authorities, whenever required.

3.2 Scope

The Contract shall include but not be limited to the following Works:

a) Provision of escalators in stations for passenger movements.
b) All minor civil works or modifications required for installation of the equipment and restoring to final finishes.
c) Transportation of materials and equipment for installation purposes.
d) Spare parts, special tools, testing and diagnostic equipment and measuring instruments.
e) Training and Transfer of Technology.
f) Documentation.
g) Control and monitoring system for Escalators.
h) Maintenance for specified period.
i) Services.
j) Obtaining approvals / licence (if required) from the statutory authorities.

The details of the above works are given in the relevant Chapters of this Specification.

3.3 Services

The Services to be performed by the Contractor shall include, but not be limited to, the following:

a) Design, manufacture, supply, system quality management, installation, testing including integrated testing and commissioning of the complete system as brought out above;
b) Presentations, reviews and audit support as specified in this Specification;
c) Interface management as specified in this Specification;
d) System operations and maintenance support services;
e) Training for Employer's staff;
f) Decommissioning, removal and/or disposal of temporary works;
g) Prototyping;

h) Defects liability of Permanent Works after commissioning as stipulated in the General Conditions of Contract (GCC) and Special Conditions of Contact (SCC); and

i) Obtaining statutory clearances / licence (if required) for the commissioning of escalators from authorities if necessary.

3.4 Documentation

The documentation to be delivered by the Contractor shall include, but not be limited to, the following items:

3.4.1 Design Stage

a) Description of general design philosophy;
b) System reliability, availability, maintainability and safety evaluation reports;
c) Automatic fault identification and isolation arrangement;
d) Determination of equipment ratings;
e) Determination of space requirement;
f) Design and proving protection devices/ systems and its validation,
g) Type test reports for equipment selected;
h) Detailed design drawings and reports;
i) Detailed interface reports and interfacing design drawings;
j) Hazard identification and control documentation.

3.4.2 Construction Stage

- Construction and Installation Plan including site safety plan;
- Factory Acceptance Test Plan for equipment;
- Quality Plans and RAMS Plans;
- Installation, operation and maintenance instruction of all equipment;
- Operation and Maintenance Manuals;
- Records and drawings of equipment installed;
- All other records of construction, including hidden parts;
- Site test report of equipment;
- As built drawings including interface drawings in AUTOCAD and PDF format and
- Other documentation as required, by the Employer.

3.5 Other statutory requirements

3.5.1 The Contractor shall be fully responsible for obtaining relevant safety certificate or any other document required from statutory authorities for commissioning the regular operation of Escalators.
3.5.2 The Contractor shall submit the relevant safety and clearance certificates obtained for each equipment from the statutory authorities to the “Engineer”.

3.5.3 The Contractor shall provide adequate signage and graphics as being statutory requirements, for the safe and proper utilisation of each equipment, in adequate number exhibited at required locations.

3.6 Key Dates and Access Dates

The ‘Key Dates’ and ‘Access Dates’ applicable to this Technical Specification are given in Chapter 21 of this Specification.

3.7 Provision of Works Areas

The Designated Contractor shall provide the Contractor specified Works Areas at designated locations during construction period. The locations, specified area and probable date of access will be informed 30 days after Notice to Proceed (NTP). The Contractor shall hand over back the Works area to the designated Contractor after the expiry of specified period, reinstatement.

3.8 Items of Work Excluded from Contract

The following items of work associated with the System will be provided by other Contractors and are excluded from the Contract. However, the Contractor shall provide timely inputs such as necessary drawings, instructions, hardware and materials to the relevant other contractors and co-ordinate fully with them in all matters pertaining to present contract as and when required under intimation to the Employer.

3.8.1 The relevant Civil Contractors will provide Major Civil Works including access roads, escalator pits and notches, escalator controller room, fences and building services.

3.8.2 Earth mats and earth electrodes will be supplied and installed by the respective Electrical Contractors.

3.8.3 The incoming LT cable from LT switchboard up to the Escalator controller room / Enclosure shall be provided by the respective Electrical Contractors. From there it’s extension to escalator will be in the scope of escalator contractor, however, the required cable trays/race ways/conduits will be provided by the electrical contractor. The lighting as well as ventilation requirements in the escalator Controller / Enclosure and fixing of the Control Panel of escalators are in scope in the Escalator Contractor. The fixtures and cables will be got approved from the Employer.

END OF CHAPTER
CHAPTER 4

DESIGN AND PERFORMANCE REQUIREMENT
4 DESIGN AND PERFORMANCE REQUIREMENTS

4.1 General

4.1.1 The design, manufacture, supply, installation, testing and commissioning of the Escalators shall meet the design and performance requirements within the design environments specified in this TS.

4.2 Design Environment

4.2.1 Climate Conditions/Operating Environment stipulated in clause 1.12 of General Specification shall apply.

4.2.2 Isokeraunic level: Average 30 thunderstorm days per year as per latest edition of IS 2309:1989

4.2.3 The stations are exposed to extreme weather conditions such as heat, dust and high humidity and occasional seepage. The system design shall, take into consideration these conditions and ensure that performance of the system remains unaffected due to such conditions.

4.3 Basic Design Philosophy and Requirements

4.3.1 Proven Design

- The Contractor shall develop the design based on this specification and on proven and reliable Engineering Practices. The design details shall be submitted with technical data and calculations to the “Engineer” for review and approval.

- The System, including all Sub-systems and Equipment shall be of proven design.

- The Escalator Sub-systems and Equipment proposed by the Contractor shall have been in use and have established their performance reliability on at least two Mass Rapid Transit Systems in Revenue Service over a period of at least two years during past ten years. The performance certificate from the client/User of the system is to be submitted.

- Where similar equipment or Sub-systems of a different rating are already proven in service, then the design shall be based on such equipment. In case these stipulations are not fulfilled, the Contractor shall furnish sufficient information to prove the basic soundness and reliability of the offered Sub-system.

The design philosophy should meet the following criteria:

- Application of state-of-the-art Technology,
- Service proven design,
- Design life 30 years,
- Minimum life cycle cost,
- Low maintenance cost,
- Use of interchangeable, modular components,
g) Extensive and prominent labelling of parts, cables and wires,
h) Use of unique serial numbers for traceability of components,
i) High reliability,
j) Low energy loss,
k) System safety,
l) Adequate redundancy and factor of safety,
m) Fire and smoke protection,
n) Use of fire retardant materials,
o) Environment friendly,
p) Adherence to operational performance requirements,
q) Maximum utilisation of indigenous materials and skills, subject to quality conformity.

4.3.2 Adequate margin shall be built into the design particularly to take care of the higher ambient temperatures, dusty conditions, and high seasonal and general humidity, etc. prevailing in JAIPUR.

4.4 Design Management and Control

4.4.1 In order to ensure that the requirements of this Technical Specification are met, the Contractor shall establish and maintain documented procedures using ISO 9001 to control and verify the design of the System and all its equipment. These procedures shall be subject to review by the “Engineer”.

4.4.2 The Contractor shall establish and maintain a systematic, documented, comprehensive, and verifiable system integration process throughout the execution of the Contract.

4.4.3 This process shall ensure that interfaces and interaction between System, infrastructure, sub-systems, software, and operating and maintenance requirements have been identified and engineered to function together as a system.

4.5 System Integration Process

4.5.1 The Contractor shall systematically identify and formally document all design, manufacturing and operational interfaces between equipment within the System, and between the System and external systems, facilities, operations and the environment likely to affect or be affected by the System.

4.5.2 A mechanism and assigned project responsibility for interface management and control shall be provided, such that every identified interface has a defined resolution process that can be monitored.

4.5.3 The Contractor shall define methods to confirm compatibility between System equipment and carrying out integration tests at different stages of the design and interface management process to demonstrate that all equipment functions perform properly, both individually and as part of the complete System.
4.5.4 The Contractor shall ensure that performance, availability and safety requirements are addressed in the design process and that the reliability and maintainability of all equipment will enable the service performance to be met.

4.5.5 The system integration process shall be capable of audit by the “Engineer”.

4.6 Interface Management Plan

4.6.1 The Contractor shall submit to the “Engineer” for review an Interface Management Plan (IMP) and Detail Interface Documents, in accordance with the General Specification, which defines how the Contractor will systematically identify and document technical interfaces. This will not absolve the contractor of the ultimate responsibility for ensuring timely & appropriate interface.

4.7 Design Submission Requirements

4.7.1 The Contractor shall perform his designs for the Contract in accordance with the requirements of this TS and the GS. The Contractor shall submit to the “Engineer” for his review, relevant design information as identified under each stage. Such submissions shall incorporate the relevant Standards applicable.

4.7.2 The design submission requirements are detailed in the General Specification.

4.8 Performance Features Required

4.8.1 The Contractor shall provide built-in diagnostics and remote monitoring functions for each microprocessor-based equipment and module of the systems such that the performance requirements can be demonstrated.

4.8.2 The reliability and maintainability processes and procedures shall be planned, integrated and developed in conjunction with the operating environment, and the design, development and production functions to permit the most effective and economical achievements of the systems and equipment design objective. The Contractor shall prepare RAM analysis report based on the approved Escalator Design, which shall be validated by the contractor as per the actual performance data obtained during Defect Liability period. In case the contractor is not able to achieve specified / provided target of RAM, the contractor shall take necessary corrective measures either by way of change of design of the relevant equipment / component or software modification at his own expenses to meet the RAM requirement.

4.8.3 The systems shall meet or exceed the requirements for safety and reliability as specified in National or International Standards for such mass rapid transit system. The reliability of the systems designed, supplied and installed is the principal element for availability. It is essential that the System reliability is as high as reasonably practicable.

4.8.4 A high design standard incorporating redundancy if practicable, flexible system arrangement, together with good quality products, and adherence to strict construction standards, are required to ensure high reliability of systems installed for smooth operation of train services.
4.9 Reliability Requirements

4.9.1 The Reliability requirements of this TS shall be subsidiary to the Availability and Maintainability requirements of this TS.

The reliability of equipment should be of the level that it does not result in harm or injury to passenger in the Escalators due to equipment failure or poor design or poor workmanship of work. Any claim / damage / compensation claimed by the affected passenger / escalator user on account of equipment failure or poor design or poor workmanship of work shall be recovered from the contractor. In addition, Employermay impose a penalty of INR10,000/- (INR Ten Thousand Only) Per case. This penalty is applicable during Defect Liability Period (DLP) and Annual Maintenance Contract (AMC) Period.

The Reliability measure for the Escalators shall be the Mean Time Between Maintenance Action (MTBMA).

The Escalators shall achieve a MTBMA of not less than 7 days. Each day means 24 hours. MTBMA shall be calculated for each calendar month separately and MTBMA calculation shall be done based on the total number of escalators operational on 01st day of that applicable month.

4.10 Availability

Service Availability Targets

- Quantitative targets have been set for the System availability to ensure that the reliability of the Systems does not jeopardise the reliability of services of the MRTS.
- The Systems shall be designed to ensure that failure of any major equipment, caused by an external accident or negligence of internal staff, will not lead to unavailability of the whole System, other than temporary outage of the failed equipment.
- All elements of the systems shall be able to be maintained during out-of-traffic hours to avoid interrupting passenger train services.
- If escalator is kept out of service for more than 24 hrs due to non – availability of spares or due to lack of proper attention, Employer shall impose a penalty of INR10000/- (INR Ten Thousand Only) per day, for each such case. This penalty is applicable during Defect Liability Period (DLP) and Annual Maintenance Contract (AMC) Period.
- The Employer will assess the reasons for the equipment not being in service, accordingly the penalty will be imposed. The Employer decision shall be final.
- The measure for Availability for the Escalators shall be based on failure reported.

\[
\text{Availability} = \frac{(365 \times 20 \text{ hours}) \times (\text{Number of Escalator population in a section}) - (\text{Total unavailable hours in one year})}{(365 \times 20 \text{ hours}) \times \text{Number of Escalator population in section}}
\]

The Escalators shall achieve minimum availability of 99.9% calculated as above.
• For the purposes of availability calculation, the Contractor shall assume that the service operating hours are 20 hours per day (04:00 hours of morning to 00:00 hours of midnight or as decided by Employer), for 365 days a year for the design life.

4.11 Maintainability

4.11.1 The Contractor shall undertake maintainability analysis to assess the preliminary maintainability targets of the systems.

4.11.2 The Contractor shall state the maintainability requirements, and demonstrate that System maintainability is sufficient to support the claimed System reliability and availability performance. The Contractor shall demonstrate that maintenance errors have been considered, and, as far as is practicable, the risk of maintenance-induced faults has been mitigated by the appropriate design.

4.11.3 The equipment to be supplied by the Contractor must be designed for minimum or no maintenance. Maintenance activity required must be capable of being performed with minimum or no impact on the train service.

4.11.4 Maintenance activities may be classified into two areas, routine/ preventative and corrective, both of which affect service availability. Other maintenance strategies such as condition monitoring may be incorporated.

4.11.5 Routine/preventive maintenance periods shall be limited to non-operational maintenance hours during the night or if essential during off peak periods.

4.11.6 To optimise speedy corrective maintenance, techniques employing automatic diagnostics test points, and rapid repair facilities shall be provided.

The MTTR (Mean Time To Restore) time measurement shall include on site diagnostics and rectification of the failure up to the point that the system is restored to full functionality. In the event that the failure cannot be rectified, the measurement shall include the time necessary to remove the failure piece of equipment from the system and replaced it with a functioning module.

The maintainability shall be measured by fault rectification time which should not exceed 4 hours since its reporting to contractor call centre or his representative by Employer.

Failure : Escalators not available for more than one hour for passenger service shall be registered as a failure provided:

(1) Failure is attributable to –
   (i) Design defect
   (ii) Equipment failure / replacement
   (iii) Manufacturing defect.
   (iv) Poor workmanship during erection or installation or maintenance
   (v) Maintenance lapse (during DLP & AMC by the contractor)

   OR

(2) “Accident” resulted because of any or all of the above defect.

There should not be more than 02 (two) service engineer visits per year on anyone escalator for the failures as defined above for non schedule maintenance. The average call out ratio should not exceed 1.5 for all Escalators provided by the contractor under this contract on the concerned section or corridor as defined by Employer. The period one year will commence from date of Revenue Operation / Taking over whichever is later. If the visit of service engineer for non schedule maintenance exceeds 2 per Escalators per year or limit of 1.5 average call out
ratio is exceeded, a penalty of Rs. 10000/-(INR Ten Thousand Only) shall be imposed for each such visit. This penalty is applicable during Defect Liability Period (DLP) and Annual Maintenance Contract (AMC) Period.

Penalties as specified in the respective paras shall be applicable from the date of Revenue Operation

4.12 Safety

4.12.1 Safety Requirements
- The installation design shall incorporate measures to avoid presenting safety hazards to people.
- The Systems design shall incorporate measures to provide for its safe management and operation.
- The Systems shall not give rise, or be subject to, dangerous interactions within the railway or with other systems.
- The installation shall meet the fire safety requirements generally as per NFPA-130.
- The design of the earthing system shall conform to IS 3043 : 1987

4.12.2 Safety Targets
- The Contractor shall show that the Systems can be maintained safely. The Contractor shall prepare a Quantified Risk Assessment (QRA) to model the risk to (a) travelling public and (b) maintenance and operations staff. The QRA may be based on a comparison of System features and operating practices with other elevated metro systems for which risk levels are known.
- The Contractor shall demonstrate that the Systems have been designed to minimise the risk due to operator and maintainer error, considering both the ergonomic aspects of the System design to reduce the likelihood of error, and protective measures adopted to mitigate the consequence of such error.
- The Contractor shall demonstrate that risk to passengers, members of public, including trespassers is as low as reasonably practicable.

4.13 Conformity with Governing Specifications and other Statutory Requirements

4.13.1 The work shall be carried out in accordance with the following governing specifications and other statutory rules:
- Central Electricity Authority Regulation 2010 with latest amendments.
- Indian Electricity Act 2003 with latest amendments.
- Rules and Regulations prescribed by local authorities as applicable.
- Provisions of Applicable Lift and Escalator Act.
- Relevant, Indian Standards, IEC Standards, British Standards, and other National/International standards as applicable.

4.13.2 The Contractor shall furnish information asked for by a statutory body (e.g., Inspector of Escalators, Commissioner of Railway Safety, etc.) in particular format as directed by “Engineer”.
4.14 Functional Requirements - Escalators

Escalators shall be provided in the stations to facilitate the movement of commuters between the different levels of the stations from Ground Level (GL) to the Concourse (C) or from Concourse (C) to Platforms (P) or the levels as specified by Employer. The Contractor shall verify the number of escalators, vertical rises, lengths, travels, stops, delivery routes and all other relevant information by co-ordination with the respective Civil Contractors or DDC or Architect as applicable etc.

4.15 Escalator Schedules

Tentative requirement of the escalators under this contract is as under.

<table>
<thead>
<tr>
<th>Height of Travel or Rise (In Meters)</th>
<th>4 meters</th>
<th>5 meters</th>
<th>6 meters</th>
<th>7 meters</th>
<th>8 meters</th>
<th>9 meters</th>
<th>10 meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximate Quantity</td>
<td>4</td>
<td>0</td>
<td>8</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Note:**
1. The payment will be made as per the applicable Band range of vertical rise defined in BOQ.
2. The Balustrade of escalator shall be either of Stainless Steel or of Glass.
3. 4 meters of travel height = 3.5 < travel height ≤ 4.5 m and so on for other rises

4.16 Not used

4.17 Codes and Regulations

4.17.1 Local Codes, Regulations and Standards

Unless otherwise stated herein, the design, installation, testing and commissioning shall comply with the latest edition of all applicable standards issued by the Bureau of Indian Standards and other relevant local regulations applicable.

- Additional requirements imposed by statutory or government authorities not listed above shall be complied with.

4.17.2 Additional Standards

Escalators (public service application) shall comply with the requirements of the heavy duty type for Mass Transit application in accordance with latest edition of British Standard BS EN 115, and European Standard EN115: Safety rules for the construction and installation of escalators.
The Contractor shall also comply with the requirements of the latest edition of NFPA – 130 (Fixed Guide way Transit Systems).

4.18 Abbreviations

The abbreviations used in this Specification are listed in Appendix - 'D'.

END OF CHAPTER
CHAPTER 5

DESIGN CRITERIA AND PERFORMANCE REQUIREMENTS - ESCALATORS
5. DESIGN CRITERIA AND PERFORMANCE SPECIFICATION - ESCALATORS

5.1 Definitions

The following words and phrases used in this Specification shall bear the meanings given below.

a. Angle of Inclination - the angle at which a passenger travels with respect to the horizontal.

b. Anti-Slide Device - A device to be installed on the decking between the handrails of the adjacent escalators, or on the decking between the handrail and the adjacent wall, to prevent people or objects from sliding down on the decking.

c. Balustrade - The enclosure at sides of the moving steps, consisting of decking, inner and outer panels, and skirts.

d. Ceiling Intersection Guard - A guard provided at the intersection of escalator decking and ceiling or soffit.

e. Comb - The pronged portion of the comb plate at the landing which meshes with the step tread grooves.

f. Comb plate - The plate supporting the combs at the landings.

g. Control Equipment - The components by means of which motion, direction of travel, speed and stopping are controlled.

h. Deck, decking and decking extension - The portion of the balustrade outside the moving handrails that are transversely horizontal. This shall include anti-slide devices where applicable.

i. Driving Machinery - the motorised power unit for driving the escalator.

j. Electro-mechanical Brake - A brake consisting of friction shoe(s) applied to a brake drum or disc by means of springs that are electrically released.

k. Handrail - A power driven moving rail for passengers to grip whilst using the escalator.

l. Handrail Guard - A guard for the moving handrail at the point where the handrail enters or leaves the balustrade.

m. Landing - The stationary areas at the entrance to or exit from an escalator.

n. Landing Plate/Floor plate - The portion of floor plate next to the comb plate at the landing.

o. Newel - The portion of the balustrade on the landing at the end where the moving handrail changes direction.

p. Number of Flat Steps - Flat steps shall be measured from the point at which the first step emerges from under the comb plate in a horizontal direction to the first exposure of the riser of an adjacent step, both at the upper and lower landings.

q. Panel - The portion of the balustrade occupying the vertical space between the top of the decking and the moving stairway excluding space occupied by the skirts.
r. Skirt - The portion of the balustrade immediately adjacent to the moving stairway, occupying the vertical space between the steps and the deck or inner panel.
s. Step - The unit which forms the moving stairway.
t. Step Chain - The main chain to which the steps are attached.
u. Step Roller Track - The track on which the step roller runs.
v. Step Tread - The horizontal portion of the step grooved in the direction of travel and on which the passengers are carried.
w. Step Roller - The rollers attached to the step and supporting the step.
x. Truss - The supporting structure on which the various components are mounted.
y. Working Point – The intersection of the escalator step nose line and the projection of the escalator floor plate level.
z. Constant length – The horizontal distance between the escalator working point and the end of escalator support.

5.2 General Requirements

5.2.1 Escalators shall be heavy duty with proven design of energy efficiency with VVVF (Variable voltage variable frequency) drive, reversible type and capable of operating safely, smoothly and continuously in both directions for a period of not less than 20 hours a day, seven (7) days a week with an alternating passenger load reaching 100% of Contract Load (120kg per step, including all horizontal steps) for 01 hour and 50% of Contract Load for the following 02 hours and so on for 20 hours a day, seven days a week within the environmental conditions as stated in the General Specification and at the location where the escalators are to be installed. The heavy duty escalator should be a proven, tested and sustainable product for MRTS applications in terms of technology and design, as defined in clause 4.3.1 of TS.

5.2.2 Escalators shall be designed for installation and operation at an angle of inclination of 30°.

5.2.3 Operating speeds of the escalators shall be as follows:

(a) Service (rated) Speed - Nominal speed 0.65m/s and 0.5 m/s.
(b) Maintenance / Idling / Crawling Speed - Less than 0.2m/s.

5.2.4 Step width shall be at least 1000 mm.

Four flat steps shall be provided at both upper and lower landings.

5.2.5 Safety factors used in the design shall, as a minimum, conform to the following:

(a) Trusses – As per EN 115 (as applicable for Public Service Escalators)
(b) Step roller tracks and steps - 8.
(c) Driving Machinery - 8 for steel and bronze components; 10 for cast iron parts.
(d) Chains – 8.
(e) Any other item (if not specified elsewhere) – As per EN 115 (as applicable for Public Service Escalators).

5.2.6 Ceiling intersection guards and anti-slide devices shall be provided where necessary. The anti-slide devices shall be constructed from 1.2 mm stainless steel of grade 304. They shall be located not more than 1.8m apart along the decking, where
(a) The outer edge is more than 300 mm from the centerline of the handrail.

(b) The distance between centerline of handrails of two adjacent escalators is more than 400 mm.

5.2.7 Heavy duty Escalators shall be self-contained units consisting of truss, tracks, step drive units, steps, step chains, comb plates, handrails, landing plates, driving machines, controllers, safety devices, balustrades and all other components required to provide a complete installation. Materials used shall be non-combustible and selected to achieve a fire-resistant installation. The design of the escalators exposed to outdoor conditions shall take into account the adverse effects due to the inclement weather conditions in JAIPUR.

5.2.8 Heavy duty Escalator design shall be such that no major repair shall be necessary for a period of at least fifteen (15) years from the date of issue of ‘Certificate of Taking Over’, assuming that regular inspection and maintenance are carried out in accordance with the manufacturer’s recommendations. Major repairs shall consist of repairs to the major components like steps, track system, step chains, main drive system, traction machines, landing plates and tension carriage due to causes other than those attributable to normal wear and tear.

5.2.9 Escalator design shall give consideration to fire prevention, elimination of dust and oil trapping configurations, ease of handling, access into the station and easy accessibility for routine maintenance. There shall be provision for passenger guidance through audio system. Speakers shall be provided at suitable location in the escalators itself or at location as specified by employer during approval stage. The volume of the instructions is adjusted so that the instructions are clearly audible to the passengers on board at the time when no train arrived/standing at the station. The instructions shall be provided on “Chip”. The “Chip” will be in the scope of the contractor. Speaker’s location/layout will be finalized during design stage. It shall be possible to increase or decrease the number of audio instructions to be played or modify the audio instructions as per requirement of Employer however contractor will not be liable for any extra payment on this account during the life time of escalator.

In addition the escalator contractor shall provide passenger guidance / Do’s and Don’ts for the use of escalators in suitable video format which can be played on the screen provided in the station public areas. Details of the playable format will be finalized during design stage.

5.2.10 In the case of adjacent escalators, it shall be possible to remove or replace all components of one unit, without stopping or interfering with the operation of the adjacent unit.

5.2.11 Not Used

5.2.12 Escalator components shall be protected against corrosion as follows:-

(a) Truss, tension carriage, main drive, floor plate and comb plate supporting structure and backing: - Hot-dip galvanized, minimum thickness 85μm (Tension Carriage and Main Drive may be provided with alternative Anti – corrosion treatment (like 3 layers Painting) subject to review & acceptance during Design Stage.)

(b) Tracks and Handrail Guide: - Zinc plated with stainless profiles or Stainless steel.
(c) Step chain :: Special protection during installation to be provided.

(d) Steps :: Corrosion proof materials

(e) Floor plate infill :: Corrosion proof materials

(f) All bolts, nuts, shims and Other and hardware :: Zinc plated

(g) Balustrade supports and all other parts :: All parts constructed from steel or sheet steel shall be either galvanized by hot-dipped process complying with BS 729 or fabricated from hot galvanized sheet steel or with epoxy powder coated finishes. Cast iron assemblies shall be cleaned and painted with corrosion resistant paint.

(h) Balustrade profiles, decking panels, skirt panel, outer cladding panels, Decking extension. :: 2.0mm thick for skirt panels, & 1.6mm thick for decking panels, decking extension, inner cladding and minimum 1.0 mm thick for outer cladding panels, grade stainless steel in accordance with ASTM A182-61T or F-304H or ASTM A167-61T T-304 or DIN 1.4301 or equivalent.

(i) Interior balustrade panels :: Refer to clause 5.3.8

5.2.13 All electrical equipment supplied and installed shall at least have the following class of protection.

Machine : Protection IP Class 55.
Controller : Protection IP Class 55.
Isolating Switches : Protection IP Class 55.
All safety switches : Protection IP Class 55.
and interface boards

5.2.14 The elongation of the main drive chain and handrail drive chain shall not exceed 2% of the length of chain during its design life as mentioned in these specifications.

5.2.15 All key switches used shall have the same type of switch cylinder and the key shall be common to all escalators. The cylinder used shall be unique to this Contract. Details of Keys for different applications shall be finalized during Detailed Design Stage.

5.2.16 The lower pit of all escalators shall be provided with detection device, such as float switch / flooding sensor, to stop the escalators if the pit is flooded.

5.2.17 Except for those items where use of PVC unavoidable all items should be non-PVC type. All cable should essentially be fire retardant low smoke zero halogen type. In a nutshell, use of PVC should be minimized as far as possible.
5.2.18 If any intermittent obstacle such as intersecting floor slab, is less than 600mm from the center line of the nearer handrail, a intersection guard fabricated by light weight material reviewed without objection by the “Engineer”, shall be provided in accordance with EN115.

5.2.19 It shall be possible to reverse any escalator manually irrespective of the direction of travel. After being reverse, the escalator shall run smoothly in the desired direction without adjustment and under any passenger load conditions.

5.2.20 All similar parts, elements, sub-assemblies and assemblies shall be totally interchangeable between escalators of same type and duty.

5.2.21 All ball or roller bearings whether or not sealed for life time greasing shall have a working life of at least 110,000 operating hours under operating conditions as laid down in Clause 5.2.1.

5.3 Mechanical Requirements

5.3.1 Structural truss shall be of sufficient strength to carry the dead weight of the escalator which shall include any exterior claddings and decking extensions plus passenger load. Passenger loading shall be assumed as 5000 N/m² (load carrying areas = nominal width of escalator x distance between supports). The truss shall be designed to retain the steps and the running gear should the track system fails. The truss shall also be designed to support an additional load of the outer cladding panels and truss claddings up to a maximum load of 200 N/m².

5.3.2 Truss shall be supported at both ends (top and bottom supports), no intermediate support shall be provided for rise up to 5500 mm and one intermediate support shall be provided for 5500 mm < Rise ≤ 9500 mm in consultation with civil contractor with resilient supports and bearing plates. The provision of bearing plates and resilient supports shall be included in this Contract but shall be co-coordinated with the respective Civil Contractors. Resilient supports shall be designed for the purpose of preventing the transmission of noise and vibration to the station structure. The truss shall be designed to support the dead weight of the escalator plus the passenger load. Considering the passenger load, the maximum calculated deflection shall not exceed the limit/value prescribed by EN 115 (Latest Edition).

5.3.3 The lower constant lengths from the edge of support to escalator working point will be assumed as 3347mm while the pit sizes will be assumed as 1750mm (W) x 1450mm (D) x 6500mm (L) for the preparation of civil works. The upper constant length will be assumed as 4500 mm for all vertical rises up to 15m. The Contractor shall coordinate with the Civil Contractor for all interfacing requirement. In the event that there are some civil constraints such that the “Engineer” may or may not required to revise the escalator shaft dimensions either as a whole or in part, the Contractor shall provide the escalator(s) with the truss so designed to suit the civil structure as directed by the “Engineer” at no cost to the Employer.

5.3.4 Track system shall be designed and fabricated to support and retain the steps, running gears and prevent step up-lifting continually or intermittently during operation of escalator, under all load conditions at design speeds. The design shall allow installation and removal of mechanical components without dismantling the structure. The track system shall be constructed of steel. The track surface shall be straight and smooth. All joints, where possible shall be diagonal across the width of the running surface. The maximum deflection of the track system shall not exceed 1.00 mm between any two adjacent track supports under 6000N/m².
Radii of the upper and lower transitional tracks shall be equal to or GREATER than the following:

(a) Upper - 2.6m
(b) Lower - 2.0m

5.3.5 Non-slip, ribbed aluminum surfaced comb of galvanized stainless steel with yellow – coloured diecast. The alternatives like coloured fiber, for the Comb plate is subject to the Employers acceptance at the design stage. Corrosion resisting aluminum alloy comb teeth shall be provided at both landings of each escalator. The comb plate structure shall withstand a load of 6000N/m² with a deflection not exceeding 2.0 mm. The teeth of the combs shall properly mesh with the cleats on the step treads and shall be designed to permit simple replacement in sections. The green colour light in the pits shall be provided to demarcate the moving and the non-moving parts of the escalators. The escalator Contractor shall make suitable provision in escalator panels for the UPS power connection from the station UPS for comb light, pit light, etc.

5.3.6 The comb sections shall be so designed such that when a foreign object is caught between the comb teeth and the step tread surface, the comb teeth shall either deflect, whilst remain matching with the grooves of the tread surface, or break. The load which may cause a comb tooth to break at its tip shall be not less than 700N nor more than 1900N. In the event that a foreign object caught between the comb teeth and the step tread surface cannot be removed as mentioned above, and is likely to cause damage to the steps, comb plate or its supporting structure, the comb plate safety switch as specified in Clause 5.8.10 shall be actuated and shall cause the escalator to halt.

5.3.7 Escalator landings shall be provided with easily openable, hinged landing plates suitable for access to the drive mechanism with some locking arrangement. There should be antitheft provision in the landing plates of SS balustrade escalators whose design should be reviewed at design stage. Landing plates shall have a non-slip Etched stainless steel surface to facilitate sectional replacement or of grooved aluminum. Lifting handles shall be provided to facilitate opening of the landing plate. Means, such as hydraulic cylinders, shall be provided so that the force required to lift the floor plate is not more than 200N. The floor plate shall withstand a uniformly distribution load of 6000 N/m² over its entire area, the deflection shall not exceed 4mm during load application and there shall be no permanent deformation after the load is removed.

5.3.8 Escalators shall be provided with balustrade as specified in the Escalator Schedule in the form of tender. Balustrades shall consist of handrail decks, inner panels, outer cladding panels, skirts and lighting installation as given below:

(a) Handrail decks profile : 1.6mm thick stainless steel and hairline finish (Grade 304). The balustrade decking should be covered by hairline finish stainless steel (grade 304) of 1.6mm thickness.

(b) Inner panels : For stainless steel panels, 1.6mm thick stainless steel, hairline finish (Grade 304), with reinforcement and sprayed-on fire resistant vibration/ sound attenuating backing subject to the acceptance of the "Engineer".

(c) Outer cladding panels : Minimum 1.0mm thick stainless steel with hairline finish (Grade 304) in Visible as well as Non – visible section as per approval of “Engineer”. Panels shall be with reinforcement
and sprayed – on fire resistant vibration / sound attenuating backing material subject to the acceptance of the “Engineer”. The cladding shall be provided on all three sides including bottom side.

(d) Skirt panels : Minimum 2.0 mm thick stainless steel, grade SS-304 hairline finish, with a material of low coefficient of friction such as Teflon or equivalent as reviewed without objection by the “Engineer” applied on the surface.

(e) Lighting : LED comb lighting. Power supply shall be supplied from the UPS, to be supplied by the E&M Contractor.

Measures other than frictional or gravitation methods shall be provided to prevent the inner panels from dislodging during normal operation. The fixing method shall be subject to the acceptance of the “Engineer”.

5.3.9 (a) The distance between the inner decking immediately below the handrail shall not be less than 1200 mm.

5.3.9 (b) Horizontal clearances between skirt and the steps should be kept as per EN 115.

5.3.10 Where necessary, all outer sides of the balustrades and truss shall be provided with reinforced claddings. The gap between escalators and the sides of escalator and the adjoining walls/ parapet walls/ stairs shall be provided with decking extensions. The Contractor shall allow a gap of approximately 15mm between the deck and the adjacent walls/ parapet walls. The gap shall be filled up by the Escalator Contractor with flexible sealant subject to review without objection by the “Engineer”. The claddings and decking extensions shall be fabricated from stainless steel (thickness to be as per TS Clause 5.2.12 and 5.3.8) with hairline finish (SS 304). The inner surface shall be reinforced to prevent warping. It shall be sprayed with fire resistant vibration/sound attenuating backing material to the acceptance of the “Engineer”. The claddings and decking extensions shall have tight butt joint and be fastened to the truss with concealed stainless steel bolts, nuts and washers. The joint line shall be perpendicular to the escalator step nose line without any longitudinal joints. All joint lines of interior decking, exterior decking/decking extension shall be aligned and staggered in arrangement in line with the joint line of interior panel. The design and the fixing details are subject to the acceptance by the “Engineer”.

5.3.11 The balustrade shall withstand the loading without permanent deformation after removal of loading as specified in EN115.

5.3.12 Glass Balustrade shall meet the following requirement:

a. The glass balustrade shall be fabricated of tempered safety glass with minimum thickness 10mm and sufficient mechanical strength and rigidity in accordance with EN115 as a minimum.

b. Glass and glazing shall gently comply with BS 952 Part 1, BS 5713, BS 6206 and BS6206 and BS 6262.

c. All glass shall be capable of easy replacement.

d. The balustrade shall be glazed at the entire section from upper to lower newel ends.
e. The glass balustrade shall be self-supporting without mullions and the edges of the glass panels shall be bevelled and polished with joints perpendicular to the escalator step nose line rather than the horizontal.

f. Handrail drive system of escalators with glass balustrades shall be designed such that the drive system is below the passenger side and cannot be seen in the glazed portion.

g. All glass shall be manufactured and processed in a factory where the Quality Control Procedures comply with ISO 9000 and are independently maintained.

h. The thickness and safety design of the glass shall be the responsibility of the Contractor, having due regard to the performance requirements of this Technical Specification and the location where they are installed. Written confirmation from the glass manufacturer in respect of these matters shall be submitted for review without objection by the “Engineer”.

5.4 Handrail and Handrail Drive System

5.4.1 Balustrades shall be provided with smooth and continuous handrails moving in the same direction and at the same speed as the steps with tolerance of -0% to +2% of the speed of the steps as per EN-115. The handrail shall have a service life of at least four(4) years under operating conditions as stated in clause 5.2.1. The color of the handrails shall be black. Appropriate uniform horizontal clearance throughout the direction of travel(minimum 80 mm) shall be provided from the outer edge of the handrail to the walls and other obstacles.

5.4.2 All handrails shall have inserts and sliding surfaces of endless construction designs, synthetic materials, traction type, with a single, smooth, vulcanized joint. Both the inserts and sliding surfaces shall be made from synthetic material. The minimum braking strength of the joint shall be GREATER than 85% of the minimum breaking strength of the handrail. The hardness of the outer stock shall not be less than Shore 70° ± 5A°. The handrails shall run on specially formed guides except when in contact with a tension device. Appropriate action shall be taken to prevent the buildup of static electricity in the handrail. Hand and finger guards shall be provided at the point where the handrail enters the balustrade. The clearance between the guard and handrail shall not exceed 3.0 mm to prevent trapping.

5.4.3 The handrail drive system shall be provided with guides immediately before and after the drive wheel. The returning portion of the handrail shall be supported by guide roller shaving bearings at not more than 2m interval. Adequate provisions shall be provided to maintain proper tensioning throughout the service life of the handrail and prevent tightening/loosening and excessive heating up of the handrail during operation. The temperature rise of the handrail during operation shall not exceed 6°C above station ambient temperature.

5.4.4 The handrail shall overlap sufficiently with the handrail decking (top deck), to prevent pinching and trapping fingers or hands due to running clearance. The lips at the handrail shall be of sufficient rigidity to prevent the handrail being easily removed from the handrail guides by a force of 300N.

5.4.5 Lifetime greases packed roller bearings of manufacture reviewed without objection by the “Engineer” are preferable for all newel wheels. However, if non-lifetime bearings are used, greasing nipples for the wheel bearings shall be accessible without necessitating removal of balustrade panels from the passenger side.
5.4.6 The newel stands shall be of sufficient rigidity and suitably braced to the main structure of the truss to prevent undue distortion. Provision shall be made to permit checking of alignment of the newel wheels on site.

5.4.7 Stainless steel / glass hand raling on the sides of the escalator shall be provided at the landings to guide the passenger movement. SS Railing shall be provided by Civil / Architect Contractor. Escalator contractor is required to interface with the designated contractor for provision of the same and to finalize location of the commuter instruction board at both landings.

5.5 **Steps and Step Chains**

5.5.1 Each step shall be supported on four wheels, two of which shall be the step chain wheels and shall be capable of carrying the basic load with the safety factor as per clause 5.2.5. Individual step loading shall be assumed as 6000N/m². The design of the mounting of all wheels on the step shall ensure that the centre line of the wheel shall remain perpendicular to the running track under all load conditions. Step dimensions shall have a tread width of at least 400 mm deep and not more than 210 mm high.

5.5.2 The step shall be one piece, pressure die-cast, high wear and corrosion resistant aluminum alloy. The step casting shall bear a marking, which clearly indicates the month and the year of manufacture. The ingot materials for die-casting of steps shall be new and not previously used. Certificates of origin and chemical composition for the material shall be provided when required by the “Engineer”.

5.5.3 Both sides and the rear edge of each step shall be painted with yellow demarcation lines of at least 20mm wide and the paint shall be applied on the entire surface of the step riser and the grooves of the step tread except the walking surface shall remain unpainted in natural aluminium finish.

5.5.4 Step riser shall be of a cleat-and-groove type. The grooves shall be painted black and dull finish except those area specified in Clause 5.5.3 above.

5.5.5 Step chains shall be of the endless roller type located on both sides of the moving step. The chains shall be provided in matched lengths and be of high quality steel construction incorporating links, pins, bushes, axes and rollers with three pitches between adjacent rollers. The step rollers and chain rollers are permitted to be located inside the chain link up to escalators rise of 11 meters and these rollers shall be located outside the chain links for escalators rise above 11 meter with relieving curve at four locations (top top – right, top bottom – left and top – bottom right) and shall be easily replaceable without dismantling the links. All chain pins shall be circlipped. Each step chain shall be provided with an automatic tension device to ensure proper tension under varying load conditions. A method shall be provided to shorten the chain by one step to compensate for chain elongation.

5.5.6 The design of the fixing of the step to the step axle including detail of bushing, pin or any other means, shall be of proven design and have been in used for an extended period in existing mass transit system(s) at a speed of 0.65m/s. The fixture shall permit quick and easy removal of step without dismantling any part of the step chain and the balustrade.

5.5.7 **Step Chain Pin Pressure**

The step chain pin pressure of all escalators shall not exceed 20N/mm² with a design life of at least 110,000 operating hours.

5.5.8 The step shall be type tested according to EN-115.
5.5.9 The chain rollers/wheels shall have durable elastomer materials bonded to a metal or Poly Urethane die case hub. The shore hardness of the tyre materials shall be 92°A to 98°A when cured. The bond shall have sufficient strength to avoid de-tyring under all load conditions.

5.5.10 The minimum diameters of the chain roller and the trailer rollers shall be 100 mm for outside step chain link rollers and 75 mm for inside step chain link rollers. The rollers shall have a minimum width of 20 mm however service of rollers shall be as mentioned in TS Clause No. 8.1.1.

5.5.11 The step chain tension device shall be designed and constructed to maintain the step chains at correct tension automatically and continuously under varying load conditions by means of compression springs. The tension device shall be located at the lower landing, mounted within the truss and supported on truss members, with adjusting bolts of the compression springs readily accessible and easily adjustable.

5.6 Drive Mechanism

5.6.1 Each escalator shall be independently driven by a traction machine.

5.6.2 The traction machine shall be of the suitable geared type with the proven and established design. Each traction machine shall be mounted within the truss or the machine pit/room and connected by chain or directly coupled to the main drive shaft of the escalator.

5.6.3 Traction machines shall be easily removable from the truss i.e. without dismantling the machines. Suitable lifting points shall be provided.

5.6.4 The traction machines shall be provided with mechanically applied and electrically released brakes. The brake shall automatically bring the escalator to a halt whenever the power is interrupted, or any of the operating and safety switches is operated. If more than one brake is provided, all brakes shall operate simultaneously. The minimum and maximum stopping distances for the various conditions as per EN-115 are as follows:

<table>
<thead>
<tr>
<th>Nominal speed of escalator</th>
<th>Stopping distance between</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.50 m/s</td>
<td>0.20m-1.00m</td>
</tr>
<tr>
<td>0.65 m/s</td>
<td>0.30m-1.30m</td>
</tr>
</tbody>
</table>

5.6.5 A device shall be provided to prevent the starting of the escalator if the brake does not operate properly. An indicator to indicate the wearing of the brake lining shall also be provided.

5.6.6 A data plate indicating the brake torque, in Newton-metres shall be provided. Provision for testing the brake torque shall be provided.

5.6.7 Where chains are used to connect the traction machine to the main drive shaft, an additional brake (auxiliary brake) shall be provided which will operate automatically on the main drive shaft should the chains fail.

5.6.8 Provisions for hand winding and the necessary tools to effect the hand winding shall be provided for each escalator. As per EN-115, corresponding instructions for use shall be available in the vicinity and the direction of travel of the escalator shall be indicated clearly.
5.6.9 Where possible, self-lubricating maintenance free sealed bearings shall be used in the traction machine. Where regular greasing of the bearings is required, this must be accomplished without removing any part of the traction machine and yet provide adequate lubrication. If face-to-face roller bearings are used, matched pairs with provision for greasing of each bearing shall be provided.

5.6.10 The design of the traction machine shall ensure that there shall be no oil leakage from any part of the machine under normal operating conditions. Synthetic oil shall be used in the gearbox. Use of circulation pump for gear oil will not be accepted.

5.6.11 The gear system of the machine shall comply with relevant international standard.

5.6.12 The starting current shall not exceed 3.5 times full load current. The starting current characteristic and the speed/torque characteristic for different duty ranges shall be submitted for the acceptance by “Engineer”.

5.6.13 The overall efficiency of the combined motor and gearbox shall not be less than 82% at full load which shall be demonstrated by the contractor during Prototype testing.

5.6.14 Suitable provision for monitoring oil level in gear box shall be provided. An inspection plate shall be provided to check the condition of the gear.

5.6.15 Vibration isolation for drive units and switching must be sufficient to ensure no measurable increase in noise levels in local occupied areas during operation of the escalators.

5.6.16 Operation of auxiliary brake:–Auxiliary brake shall always operate or close short time after closing of service brake and releases short time before the releases of service brake. If there is a conflict between operation of auxiliary brake as per this requirement and EN 115-1: 2008 +A1: 2010 then requirement of EN 115 -1 : 2008 +A1: 2010 shall prevail.

5.7 Lubrication System

5.7.1 Automatic means shall be provided to lubricate the main drive chains, step chains and handrail drive chains efficiently and economically. Lubricants shall be selected on the basis of maintaining the highest possible flash point consistent with effective lubrication. The duration between two successive lubrications shall be adjustable from 15 to 150 hours of operation of the escalator. The duration for lubrication for each individual chain shall also be adjustable according to operational requirements. A low oil detection device based on the principle of ‘oil level detection’ or ‘oil pressure detection’ shall be provided to prevent the re-starting of the escalator after a predetermined time as recommended by the manufacturer’s but is no case more than one week when low oil is detected. Grease shall not be used for chain lubrication. Detailed proposal shall be submitted for review and approval of the “Engineer”.

5.7.2 Corrosion resistant, oil tight drip pans of galvanised sheet of not less than 2.0 mm thick shall be provided for the entire length of the truss and shall be of sufficient rigidity to support the weight of workmen. Drip pans shall be designed to collect and drain off both oil from the machines and water that may enter through the landings, floor plates, exposed portions of escalators or from fire suppression systems. All gaps shall be properly sealed to prevent leakage. Means shall be provided to drain and collect any excess lubricating oil from the chains to removable container(s) at the lower landing machine pit for easy removal and cleaning.

5.7.3 Guards shall be provided at the truss adjacent to the main drive chain, handrail drive chain and step chain to reflect oil splatters from the chains back to the oil drip pan. No oil splatter shall be allowed to get onto the truss, the back of the outer cladding.
panels, the outside of the truss and brakes. There shall be no oil spillage through the outer panels, claddings or the truss to the surrounding areas. Proper mean reviewed without objection by the “Engineer” shall be provided to prevent the problem of oil spillage onto machinery spaces, step risers and step surfaces.

5.8 Operating and Safety Devices

Operating and safety devices conforming to the following requirements shall be provided:

5.8.1 Starting Switch

Spring-return key operated starting switch with running directions marked on the face plate shall be provided at both ends of the escalator. These switches shall be positioned to enable the operator, when using the key to start the escalator, to see the entire escalator. The key shall be removable only in the neutral position.

Restarting of Escalator after stopping due to Emergency conditions, Fault or due to disruption of Power supply shall not be automatic. Restarting of Escalator should be on “NO – LOAD” as per EN 115.

5.8.2 Service Stop Switch

Service switches shall be provided within the machinery spaces at both ends of the escalator. The switches shall be conspicuously and permanently marked, and located such that switching can be accomplished without passing or reaching over any part of the machinery. The operation of these switches shall disconnect electrical power to the controller and the drive mechanism and shall activate the brakes. The switch shall be rated to interrupt the starting current of the motor and the fuses shall be rated for the available fault current at the switch. Inspection run shall also be prohibited.

5.8.3 Emergency Stop Switch

Recessed type, momentary pressure, emergency push button stop switches with extended sleeve to protect against accidental operation shall be provided on each escalator. A minimum of one switch shall be located in conspicuous and accessible positions at the incline section as well as at the newel at both ends of the escalator. The switch provided at the incline portion shall have protection from the dust ingress which may join its operation. The distance between the switches shall not exceed 15m for the escalators, otherwise, additional switches shall be provided. The operation of these switches shall disconnect electrical power to the drive mechanism and activate the brake(s). It shall not be possible to start the drive mechanism by the use of these switches. Proper signage shall be displayed so that the location of the switch can be easily identified.

5.8.4 Speed Governor

Speed governor shall be provided which disconnects electrical power to the drive mechanism and activates the brake, should the speed of the steps exceed the rated speed by more than 20%.

The speed governor is not required in cases where alternating current induction driving motors are used, provided the slip does not exceed 10% and the motor is directly connected to the drive mechanism.

5.8.5 Broken step Chain Safety Device

Devices shall be incorporated as part of each tension carriage which shall disconnect electrical power to the drive mechanism and activate the brake if the step chain breaks,
or if the tension on either chain drops below (or exceeds) a predetermined value, or if the motion of a chain is interrupted.

5.8.6 Broken Drive Device

Where the drive mechanism is connected to the main drive shaft by chains, a device shall be provided which will disconnect electrical power to the drive mechanism and shall activate both the operational brake, and the additional brake in the event if the driving chains fail or excess sagging.

5.8.7 Non-Reversing Device

A device shall be incorporated to detect reversal from the pre-set direction of motion and activate the operational and auxiliary brakes to stop the escalators.

5.8.8 Handrail Finger Guard Safety Device

Detection devices shall be provided at points where the handrails enter the escalator newels. These devices shall disconnect electrical power to the drive mechanism and activate the brake in the event of an object entering the gap between the handrail and newel.

5.8.9 Step and Skirt Safety Devices

Detection devices shall be provided in escalator skirting panels in close proximity to the upper and lower comb plate tips, on the track system at the upper and lower curves and at 7.5m intervals along the incline of each escalator. Electrical power to the drive mechanism shall be disconnected and the brake(s) applied should any one of these devices be activated due to the skirt panels being forced away from the steps.

5.8.10 Comb plate Safety Device

Safety devices shall be incorporated at both sides on the comb plates at each landing, which shall disconnect electrical power to the drive mechanism and activate the brake should any object become wedged between the comb and the step. The device shall be able to operate in the vertical and horizontal direction.

5.8.11 Step Lowering Device

Devices shall be provided which will disconnect electrical power to the drive mechanism and activate the brake, should a step be lowered due to excessive load or breakage. The detection shall be effective at the left, centre and right side of the step. The device shall be located near the top and bottom curves for the escalators. These shall be located such that the lowered steps stop in front of the comb in order to prevent further damage.

5.8.12 Normal Stop Switch

Normal stop switch in the form of a key switch shall be provided at each landing to stop the escalator without activating the fault (trip) signal. Proper signage shall be displayed so that the location of the switch can be easily identified.

5.8.13 Inspection Control

Inspection control complying with EN-115 shall be provided at both landings.

5.8.14 Missing step detection device

Detection device(s) shall be provided to stop the escalator before the missing step opening appears on the passenger side of the escalator. In case a ‘step’ gets damaged then there should be provision of a device which ensures that the escalator shall stop before the damaged ‘step’ reaches the landing.
5.8.15 Handrail Speed Detection Device

Each handrail shall be fitted with a device, which shall stop the escalator in the event of a handrail speed deviation of more than -15% to the actual speed for more than 15 s while the escalator is in motion.

5.8.16 Broken Handrail Device

Each handrail shall be equipped with a mechanically operated electrical safety device of Approved design to detect undue tension, excessive elongation and handrail failure.

5.8.17 Floor Plate Safety Device

Safety switch of Approved design shall be provided underneath each hinged floor plate at both the upper and lower landings. The escalator shall stop when the floor plate is opened unless under maintenance / inspection mode.

5.8.18 Step Up-thrust Device

Safety device of Approved design shall be provided at the upper and lower landings to stop the escalator should a step be lifted or displaced against the “up – thrust” track at the transition curve from incline to horizontal in the passenger carrying side of the track system.

5.8.19 Dress Guard

Double layer Brush type deflector device shall be provided along the step nose line on the skirt panel to keep feet and loose clothing clear of the possible trapping point. The brush bristles shall be made of fire resistant nylon filaments with split ends to give a soft face.

5.8.20 Brake Lining Safety Switch

Safety device of design review without objection by the “Engineer” shall be provided at each brake shoe of the machine brake to monitor the lining thickness and to detect any abnormal or uneven wear of brake lining.

5.8.21 Phase Protection Device

A phase protection device shall be provided in the control cubicle to prevent setting in motion or to stop the escalator in the event of phase failure or phase sequence reversal of the power supply. An illuminated visual indicator shall be provided on the control cubicle to signify actuation of this device due to phase failure or phase sequence fault. The indicator shall remain illuminated until the fault is rectified.

The Contractor shall provide necessary equipment i.e Surge protection, power filters and other necessary equipments to avoid failure of escalator equipments on account of quality of incoming power supply.

5.8.22 Motor Overload Device

a. The driving motor shall be protected against excessive current due to either overloading or short-circuiting by means of a suitable device to be submitted for review without objection by the “Engineer”. Such protective devices shall be provided for each phase of the motor winding. After the intervention of this safety device, the power supply to the motor shall be disconnected and it shall only be possible for a competent person to reset it back to its normal working condition.

b. If the detection of excessive current depends upon a temperature increase in the motor winding, such a device may be automatically reset after the fault is removed
and the winding cooled down sufficiently, but shall not restart the escalator automatically.

c. Built-in type thermal protection, if offered, shall conform to BS 4999 Part 72.

5.8.23 Earth Leakage Protective Device

An earth leakage protective device, or Residual Current Device, to be submitted for review by the “Engineer” shall be provided such that any dangerous earth leakage to the escalator metalwork shall cause the immediate stopping of the driving machine and disconnection of the power supply. The return to service to shall not be possible except reset manually by a competent person.

5.8.24 Not Used

5.9 Monitoring and Fault Diagnostic System

5.9.1 A micro-processor based monitoring and fault diagnostic system to provide information on the operation, identification and display of all faults that have caused the escalator to stop including emergency stops shall be provided. The system shall be able to record at least 100 events in their order of occurrence and display them sequentially in a last-in first-out sequence.

5.9.2 An alpha–numeric display unit indicating the fault code and fault message shall be installed at an easily accessible and protected location on the handrail decking at both the landings.

The display of the last fault can only be re-set, after the fault causing the stop is cleared but the historical record shall remain in the micro-processor.

Faults that do not require the attendance of the maintenance staff shall be easily identified to enable the operator to re-set and re-start the escalators.

5.9.3 The system shall capture, display and retain the following information,

a. Record number
b. Fault/status code/alphanumeric display
c. Date
d. Time at which fault started
e. Time at which fault cleared
f. Direction of operation with starting time
g. Total operation hours with break down for “Up” and “Down” operations.

5.9.4 An LCD display panel and means for programming the system shall be provided at the controller.

In addition, serial interface output ports shall be provided at the controller to allow the system to be connected to a Notebook computer for downloading the historical data for trend analysis. Suitable compatible driver software has to be provided to download data for analysis and presentation by Microsoft office software.

Suitable arrangement for downloading the historical / fault data in a Hard Disk / Pen or Flash Drive to be made in escalator control panel itself. There should be provision of an independent data downloading port.
5.9.5 Remote Monitoring System (RMS) shall be provided by the Escalator Contractor for the monitoring of Lift and Escalators. Detailed requirement for the same is enclosed at Appendix H of TS.


5.10.1 The Contractor shall provide LED based Remote Monitoring System Panel (Audio Visual Indication Panel) for Remote Monitoring of Escalators in the Station Control Room (or any room designated by Employer) which is generally located at one side of the station at a distance of approximately 250m from the escalator. (No additional payment on account of any variation in distance will be made to the contractor). The LED based RMS shall provide continuous monitoring of the escalators.

5.10.2 The following monitoring function shall be provided for LED based RMS.

a) Power available in the form of green color LED for ‘On’ and red color LED for ‘Off’ status indicator.

b) Running Up (escalators) direction indicator in green color LED.

c) Running Down (escalators) direction indicator in green color LED.

d) Under Maintenance in the form red color LED.

e) Under Fault in the form of red color LED

f) Emergency Stop Pressed in red color LED

The LED based RMS shall have following arrangement.

**Escalators Monitoring Panel**

<table>
<thead>
<tr>
<th>ESCALATOR PARAMETERS</th>
<th>E-1 C-P</th>
<th>E-2 C-P</th>
<th>E-3 G-C</th>
<th>.........</th>
<th>.........</th>
<th>E- N</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER AVAILABLE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNNING UP</td>
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<tr>
<td>RUNNING DOWN</td>
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<td></td>
</tr>
<tr>
<td>UNDER FAULT</td>
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<tr>
<td>UNDER MAINTENANCE</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>EMERGENCY STOP PRESS</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

The following monitoring function shall be provided:

- **POWER AVAILABLE**
  - Red LED for ‘Off’ status indicator.
  - Green LED for ‘On’ status indicator.

- **RUNNING UP**
  - Green LED indicator.

- **RUNNING DOWN**
  - Green LED indicator.

- **UNDER FAULT**
  - Red LED indicator.

- **UNDER MAINTENANCE**
  - Red LED indicator.

- **EMERGENCY STOP PRESS**
  - Red LED indicator.

The LED based RMS shall have following arrangement.
5.10.3 The Contractor shall be responsible for the provision of all, cabling and interface terminal board (ITB) for the installation & commissioning of the LED based Remote Monitoring System (Audio Visual Panel) in SCR / or any other room as per directions of Employer including wires from the Escalator Controller.

5.10.4 The above scheme shall be implemented on SS 304 grade panel of 1.6 mm thickness sheet, the width of the panel will vary according to the numbers of escalators on a particular station.

5.10.5 Audible buzzer suitable to indoor requirement should operate whenever LED of parameter “Under Fault” and “Emergency Stop Pressed” become “ON”. The audible buzzer will become off with the press of “Alarm Accept Button” however visual indication should persist till the fault is cleared. The buzzer should not sound during maintenance.

5.10.6 Each color LED should be circular in shape with a minimum diameter of 20 mm and text should be in black color with Arial Font of size 20 or as suitable subject to the approval of Engineer.

5.10.7 Down direction indication will illuminate when escalator is running in “down direction” but in case of stoppage of escalator due to any reason or fault, the illumination of “down direction” LED will become off.

5.10.8 Availability of Maintenance Log, Maintenance Schedule, Non-Maintenance Alarm, Monthly Report, results should be available in ECP.

5.10.9 “Fault” and “Emergency Stop” LEDs’ should be in the last two rows and both should be encircled through a red strip of 3 mm thickness with black-background.

5.10.10 10% spare terminals are to be provided for incorporation of LEDs’ in case terminal gets spoiled.

5.10.11 Details of panel indications and operating instructions are to be arranged in a laminated sheet to be pasted or placed at the rear side of front door of LED based RMS panel.

5.10.12 Size of the panel should be reduced to optimum level without reducing the size of LED, size of push buttons and distance between them.

5.10.13 Locking arrangement should be provided in addition to the present latch arrangement.

5.10.14 All LED, push buttons, transformer, ELCB to be provided in the panel should be proven vendor with minimum maintenance requirements.

5.10.15 Residual Current Circuit Breaker (RCCB of indigenous make) instead of MCB should be provided.

5.10.16 All LED should glow simultaneously whenever LED test button is pressed.

5.10.17 All cables and wires should be FRLSZH type for Underground Stations and FRLS type for elevated stations and grade stations.

5.10.18 No PVC component should be used anywhere in LED based panel. In case if it could not be avoided then prior approval of the employer must be taken.

5.10.19 Screened cables shall be used for the connection between the communication as described in contacts in clauses 5.10.2 & 5.10.3 above.
5.10.20 Escalator Control Panel (ECP) shall have data down loading facilities for fault diagnostic through RS – 485 port and USB Port. Fault data logging in ECP should have date & Time stamping facilities of 500 events. There should be provision of resettable type counter for recording fault codes of escalator failure. Also there shall be provision of elevator data transfer including number of operations, energy consumption i.e. energy consumed, from open source protocol either BACNET or MODBUS inside LED based RMS Panel through RS 485 or TCP / IP Port to Centralized Monitoring System by which Employer can access the data. Flexible controller to be provided for Communication whose setting can be changed.

5.10.21 In addition to above, contractor will provide facility to transfer Fault Data / Log of Escalators through Short Message Service (SMS) to designated Contact Numbers also. Details of the scheme shall be finalised during Design stage. Cost of SIM Card shall be borne by Employer.

5.11 Energy Saving Device

An energy saving device to conserve energy when the escalator is operated at no load and light load shall be provided such as by means of provision of speed reducing, load sensor and timer. When operating in the energy saving mode the device must not cause abrupt change in speed or jerk in normal operation. The devices shall cause minimal harmonic distortion in the power supply system or emit electromagnetic interference to other systems. OEM shall also provide suitable harmonic filters to eliminate harmonics in ‘Energy Saving Device’. Provision shall be made to allow the escalator to be operated without this device. The Contractor shall submit the detail calculation of saving of energy for following options considering the MRTS load

i. On no load after certain time (depend upon the travel time on escalator) escalator should come to crawling speed and then stop.

ii. On no load after certain time (depend upon the travel time on escalator) escalator should come to crawling speed and remain at crawling speed of 0.2m/s.

When the escalator is operating at no load, the quantum of energy saved with this device should not be less than 30% as compared to operation without this device.

Data and calculation shall be provided to substantiate energy savings claimed by the Contractor for various loading on the escalator.

There shall be provision of Digital Energy Meter (Hour meter) to record consumption of Energy in all Escalators Panels, with the recording of energy per equipment with Time of Day (TOD) facility. Suitable provision shall be provided to record and generate Energy consumption log on the basis of working hours i.e scheduled non-working hours, breakdown hours, waiting time/hours for attention of breakdown, actual period during breakdown maintenance done and period during which the equipment was kept working for monitoring but not offer for service with further differentiation as per TOD.

5.12 Machine Rooms/Pits and Closets

5.12.1 The space required for machinery and other accessories shall be provided by the Civil Contractors in accordance with the co-ordinated requirements of the Contractor. Controllers and other accessories such as incoming isolators, ITBs, switches, shall be housed outside the truss in Enclosure of controller below the escalator inclined section or in wall recess/closet besides the upper landing. Further wiring work excluding conduits/
trunking from the incoming isolators to escalator equipment shall be provided by the Contractor.

The Contractor shall co-ordinate with Civil contractor for the layout of the equipment in the wall recess/closet.

5.12.2 Each machine pit and controller enclosure shall be provided with suitably protected permanent light fixtures, electrical outlets, mechanical or natural ventilation and suitable access as part of this Contract. The lighting, electrical outlets and mechanical ventilation (if required) shall be independent from the power supply to the escalator machine and may be fed either by a separate cable or a branch cable which is connected before the main switch of the escalator.

5.12.3 The Contractor shall provide a 15A single phase switched socket outlet and a protected permanent lighting in the lower landing machine pit/returning station pit, upper landing machinery space and escalator control panel.

5.13 Electrical Requirement and controller

5.13.1 Escalators shall be designed to operate on power supplies of 415 V AC +10%-15%, 3 phase, 50Hz, 4 wire, or 240 V AC +10% -15%, single phase, 50Hz. All electrical components shall be rated to these voltages. The control circuit shall be so designed that quality of power supply (surges, harmonics, voltage variations, frequency, etc) shall be properly maintained. Escalator power supply shall be provided by designated contractor. The Contractor shall co-ordinate with them for the appropriate electrical requirements to be terminated with suitable fused isolators-switches installed within each controller enclosure / closet next to the controller. Suitable provisions shall be made for protection against single phasing, unbalance loading and any other abnormal condition.

5.13.2 Cables, trunkings, conduits and conduit fittings necessary for the power, control and lighting circuits shall be installed in accordance with the latest edition relevant BIS standards.

5.13.3 Trusses, machines, motors and all other non-current carrying metal parts and components shall be effectively earthed by the Contractor to the incoming earth in the isolator provided by designated contractor.

5.13.4 Electrical safety switches and controllers shall be suitably enclosed to provide protection against accidental contact.

5.13.5 Motors shall be of ample capacity and rated to continuously operate the escalators efficiently, quietly and smoothly under all conditions of load as specified. The motor insulation and temperature shall comply with minimum class ‘F’ standard in BS2757.

5.13.6 Controllers shall be provided to control starting, rotational direction and stopping of escalator motors. The controller shall bring escalators to a stop in the event of activation of any safety device, power failure, or normal shut down. Controllers shall be provided with the double door arrangement such that the LCD and reset buttons are accessible to through the small door for the normal operation of escalator and larger door is for the maintenance purpose only. The controllers shall be designed in such a way that power and control circuit is physically separate, so as to ensure safety of the maintenance staff. The control and electric wiring diagram to be laminated and provided on the controller. A copy of main diagram and Maintenance manual shall be provided in the controller.

5.13.7 Controllers shall incorporate power supply switches (3 phase, 3 pole and one phase one pole), main switch, selectable manual/auto resetting thermal overload, inherent low voltage release, unbalanced and reverse phasing protection and earth leakage protection. The Main switch for ON/OFF to be provided in Escalator Control Panel should have provision for Auto OFF through Timer.
5.13.8 Control circuits shall be protected by fuses or equivalent means independent of the protection for the main circuits. All electronic components and relays shall be protected against starting and voltage surges by appropriate surge suppressers / surge arresters.

5.13.9 Control system shall not depend upon the completion or maintenance of an electrical circuit for the interruption of the power supply to the drive mechanism or brake.

5.13.10 All switches, relays, timers, and all auxiliary apparatus shall be of accepted design and labeled for identification.

5.13.11 The power and control wiring shall be laid out neatly and terminated with suitable cable termination sleeves. All terminals and cables shall be labeled and marked for identification. All power wiring shall be with the color coding for the phases i.e Red, Yellow, Blue: and Black for Neutral and Green for Earth. All live terminals from other sources shall be properly protected and identified with yellow warning signs.

5.13.12 The escalator controller shall be housed in an IP55 spray painted, 1.5mm thick galvanised sheet (with minimum 85µm thick Galvanising) metal cabinet with hinged door, lockable with a dedicated key. The operating buttons / switches etc shall be provided in lockable enclosure to restrict access to authorized person only. The size of the controller cabinet shall be suitable for mounting into a wall closet of maximum dimensions 2000 mm (width) x 2000mm (height) x 500 mm (depth) with doors and shall be suitable to house the incoming power supply isolators and ITBs. The contractor will have to suitably design the layout after due interfacing with other designated contractors and with the approval of “Engineer”.

Generally the distance between Escalator and Escalator Control Panel (Controller Cabinet) shall not be more than 30 meters. However, depending on Site conditions, it may vary and No additional payment on account of any variation in distance will be made to the contractor.

5.13.13 Escalators controller shall be fixed properly. Fixing Arrangement details to be submitted during design stage for approval of “Engineer”.

5.13.14 The Controller equipment shall be designed as per design environment specified under clause 4.2.

5.14 Special Cable Requirements

All cables used except those within the enclosed controller shall comply with the following requirement:

5.14.1 All control and power cables used shall be rated for minimum voltage grade as per relevant IEC.

5.14.2 The conductor shall be of stranded conductor composed of plain annealed copper wire complying with IEC 228, Class 2.

5.14.3 The insulation shall consist of an extruded layer of cross-linked polyethylene complying with IEC 502.

5.14.4 All cables shall be manufactured from fire retardant, low smoke, Zero halogen materials.

5.14.5 Fire retardant, low smoke, materials shall meet the following requirements:

(a) London Transport Executive Three Metre Cube Smoke Emission Test, using optical measuring instruments. The maximum value of absorbance AO (ON), AO (OFF) shall be 0.8 & 1.2 respectively.

(b) The US National Bureau of Standard Smoke Chamber Test, used to evaluate plaque samples of materials of constant thickness. (NFPA-258 Smoke Generation of Solid Materials 1982). The maximum specific optical density shall be 170 under the non-polluted condition.
(c) The flame propagating criteria of US IEEE Standard 383, with a minimum test short circuit time of five minutes, in the IEEE Standard 383 test.

(d) IEC 332 Parts 1 and 3, Category B, tests on single and bunched cables under fire conditions.

(e) Limiting Oxygen Index of at least 30, to ASTM D-2863.

(f) A temperature index (TI) of 260°C to ASTM D-2863.

(g) All insulation is to be moisture and heat resistant, with temperature ratings appropriate to the application conditions, and in no case lower then 90°C.

(h) When a sample of the cable is subjected to a combustion test for the determination of the amount of halogen acid gases (other than hydrofluoric acid) as set out in IEC 754 - Part 1 the halogen acid evolved shall not exceed a maximum of 0.5%.

Fire retardant materials shall meet the requirements of item (c), (d), (e), (f) and (g) only.

5.14.6 The above requirements shall be met without compromising the anti-termite, pest-resistant, mechanical and electrical properties of the cables both during and after installation to meet the other requirements of this Specification.

5.15 Interface with Fire Protection Systems

All the escalators (only in underground Stations / areas) shall be equipped with a sprinkler system, Sprinkler heads (outlets) in the landing pits/ machine rooms and sprinkler pipes along the Truss. The Escalator Contractor shall provide sprinkler pipes and heads inside truss for the Escalators. The locations of the sprinkler heads shall be finalized during design stage. The Escalator contractor shall co-ordinate with designated Contractors and make adequate provision to incorporate all the required fire protection equipment and to get the sprinklers provided in the landing pits and machine rooms connected to the main Fire Sprinkler / Suppression system. Extension of water supply connection to the Sprinkler pipes of Escalator from the nearest Fire Hydrant / Sprinkler hydrant will be done by the Fire Hydraulic / E & M Contractor, for which necessary Interface will be the responsibility of Escalator Contractor.

All the escalators shall have provision of smoke detection system in the escalator system at appropriate positions like in machine room, controller, etc. Provision of smoke detection system shall be in scope of Escalator Contractor. Escalator Contractor is responsible for demonstrating working of the Fire Alarm system in the escalator to the statutory authority (as and when required).Escalator Contractor shall arrange these smoke detection signals in the form of potential free contacts at each escalator control panel to E&M Contractor for displaying in station fire alarm control panel system.

5.16 Lighting

5.16.1 Lighting for areas surrounding escalators will be provided by others and contractor will interface with designated E&M contractor for sufficient illumination over the escalator and escalator landings. The minimum lighting level is 50 lux (under normal conditions) at the center of the floor plate between the balustrades. The Contractor shall co-ordinate with designated Contractor to provide adequate lighting.

5.16.2 The comb lighting, pit lighting inside each machine room and step gap lighting shall be provided by the escalator contractor. All lighting shall be of LED type complete with all operating circuitry. The step gap lighting shall be of green color. The step gap lighting shall be provided so that the passengers can adjust there feet on the step and it shall be provided under the steps near the comb plate at each landing.
The lighting level of the comb light shall not be less than 50 lux at the center of the comb. All the lightings shall be completely water and dust proof and shall be provided by the Escalator Contractor.

5.17 Noise Generation

5.17.1 Equipment shall be designed to operate quietly and smoothly. The sound level should not exceed 70dBA at a distance of one meter from the surface of the machinery at a height of 1.6 m from floor plate as per EN115. as measured by a slow response sound level meter. The required acoustic treatment shall be supplied and fitted as necessary to meet this requirement.

5.18 Fault Diagnosis Procedures and Circuit Diagrams

Fault diagnosis procedures and circuit diagrams down to component level of the printed circuit boards, detail information software and technical data shall be provided to assist in trouble-shooting for breakdown during normal operation and maintenance. The Escalator contractor shall supply interactive O&M and Training manuals in hard and soft copy.

5.19 Escalator Signage’s and Interface with Station Signage Contractor

5.19.1 The contractor shall provide signage’s and user instructions on each escalator as per EN115. This design shall be subject to review by “Engineer”.

5.20 Data Plate

A data plate of durable material containing all relevant technical information essential for maintenance and replacement of parts such as rise, length, part number, etc, shall be provided in the machine pit of the escalator.

5.21 Accessories

Each escalator or stated otherwise shall be provided with the following accessories:

(a) Two sets of maintenance barriers per station.
(b) Three sets of starting keys.
(c) One hand-winding tool per escalator (if applicable).
(d) One set of hand lamp.
(e) One set of inspection boxes with cable per escalator.
(f) One set of floor plate opening tools.
(g) Two sets of inner panel opening/removal tools per station.
(h) Two sets of keys for controllers.
(i) Two sets of keys for each type of by-pass switch.
(j) Screen – printed Commuter Instructions on both Landings (both should be on Steel frame) the design shall be finalized during approval stage.

The contractor will submit the sample of all above material for the approval of Engineer before actually delivering them in mass quantity.

5.22 Maintenance Barrier

A barrier shall be provided for both escalator landings, which shall prevent people for entering the pits and escalator. The barrier shall be painted yellow, made from aluminum
and be of minimum height 900mm. The barrier should be easy to handle and shift over a distance of 100 meters, with maximum 2 persons. The design of maintenance barrier shall be approved by the engineer before it is delivered at site.

5.23 Variable Speed Control/Drive

Variable speed control/drive shall be provided. The control shall be integrated with the escalator control. It shall be able to operate the escalator at nominal speed of 0.65 m/s and reduced service (rated) speed of 0.50 m/s, with all other requirements and performance remain unchanged. An easily accessible manual change-over switch, with clear label to the “Engineer” acceptance, for selecting the normal and reduced speed, shall be provided in the controller.

If there is no movement of passenger for adjustable predetermined time (say 3 minutes) (Adjustable between 1-5 minutes) the escalator shall operate at crawling speed 0.2 m/s and further if there is no passenger movement for 10 minutes (adjustable 2-30 minutes) the escalator will stop.

When commuter approaches the escalator, it will start and attain nominal speed.

When escalators detect no load or light load under a predetermined period, the service speed shall decrease to the idling speed (0.2 m/s) or stop after pre-determined time (Adjustable time).

To meet the above requirements, the drive shall be capable of Operating as follows:

(a) Service (rated) speed - Nominal 0.65 m/s and 0.5 m/s
(b) Maintenance / idling speed - < 0.2 m/s.
(c) Stop, if No Load for predetermined time (Adjustable from 2 to 30 minutes)

OEM shall also provide suitable harmonic filters to eliminate harmonics. Ceiling limit for total harmonic distortion (THD) shall be as per IEEE 519-1992.

5.24 Earthing System

All the escalator equipment, structures and other metallic parts shall be suitably earthed with the station earthing system as per the standard practices. The station earthing system shall be provided by the Designated E&M Contractor up to Escalator Controller and the Escalator Contractor shall make necessary arrangements to extend the earthing connections up to other escalator system. Interfacing and co-ordination with the Designated Contractor will be in the scope of Escalator Contractor.

5.25 Additional feature for fully Outdoor Escalators

Contractor shall note that the Stainless Steel escalators are assumed to be installed in fully outdoor environment. The contractor shall take necessary measures while designing, manufacturing and installing such escalators so that ingress of water or dust shall not deteriorate the performance and reliability of escalators and the finish/properties/strength of the escalators’ exposed parts. The contractor shall also incorporate necessary additional safety devices for these escalators.
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CHAPTER 7

QUALITY ASSURANCE AND
SYSTEM ASSURANCE
7 QUALITY ASSURANCE AND SYSTEM ASSURANCE

7.1 General

A Quality Assurance programme shall be developed and implemented as a means of determining compliance with the Employer’s Requirements. This programme shall comply with the requirements as set out in ISO 9000. The programme shall include but not be limited to the procedures necessary to ensure that all equipment, materials, systems and sub-systems are properly specified, designed, purchased, recorded, inspected, installed and tested at all appropriate stages. The procedure shall also ensure that handling, storage and delivery arrangements are satisfactory.

7.2 Quality Assurance Programme

The Contractor’s quality assurance programme shall include as a minimum, the following functions:-

7.2.1 Inspection System: A system for in-process inspection of work operations and manufacturing as well as installation processes, including observations, measurements and tests, to ensure conformance with the requirements of the Contract.

7.2.2 Calibration System: A system for periodic calibration and control of the accuracy of precision instrumentation and gauges.

7.2.3 Record System: Data and records essential to the operation of the quality programme shall be maintained by the Contractor and made available to the “Engineer” in every Month during the DLP. These records shall include work performance, inspection and testing observations and the number and type of deficiencies found. In addition, records shall be maintained for monitoring work performance, inspection and testing which indicate the acceptability of work or products and the remedial action taken in connection with deficiencies.

7.2.4 Supplier Control System: A system for ensuring that all supplies and services procured from suppliers (subcontractors and vendors) conform with the requirements of the Contract.

7.2.5 Manufacturing Control System: A system for providing necessary control over manufacturing operations to ensure that the final product conforms with all requirements of the Contract. This system shall include controls for the following areas:

(a) Materials

Suppliers’ materials and products shall be subject to inspection to demonstrate conformance with the technical requirements.

(b) Production Process and Fabrication

The Contractor’s quality assurance programme shall ensure that all machinery, wiring, batching, shaping and basic production operations (of any type) together with all processing and fabricating are accomplished through documented work instructions. These instructions shall be the criteria for acceptable workmanship.

(c) Completed Item Inspection and Testing

The quality programme shall ensure that there is a system for final inspection and testing of completed products. Such testing shall provide a measure of the overall quality of the completed product and be performed so that it simulates, to a sufficient degree, product end use and functioning.
(d) **Statistical Quality Control and Analysis**

Statistical methods may be utilised for planning, analysis, tests and quality control whenever such procedures are suitable for maintaining the required control of quality. Sampling plans shall be subject to the acceptance of the “Engineer” prior to use.

(e) **Indication of Inspection Status**

The Contractor shall maintain a positive system for identifying the inspection status of products. Identification may be accomplished by means of stamps, tags, routing cards, move tickets or other control devices acceptable to the “Engineer”

7.2.6 **Installation Control System**

A system providing necessary control, monitoring, inspection of the progress, quality of work and protection of equipment, to ensure that the equipment is installed according to the requirements of the contract.

The system shall include but not be limited to the following, which shall be subject to the acceptance of the “Engineer” prior to use:

(a) **Shop Drawings**

All layout and shop drawings giving detailed layout of equipment, structural cut-outs, supports, openings, all dimensions, tolerances setting, etc.

(b) **Assembly Procedures and Drawings**

This shall show details of all installation and assembly procedures, including tolerances, tightening torque, alignment, precautions, etc.

(c) **Inspection Checklist**

Checklists giving all items to be checked and inspected with tolerances setting, etc.

7.2.7 **The Contractor shall submit checklists to demonstrate compliance with all applicable standards.**

7.3 **Systems Assurance**

The Tenderer shall demonstrate a clear understanding of all the requirements of this Clause in his tender submission.

7.3.1 **General**

a) The Contractor shall develop and implement the requirements for Systems Assurance. These requirements shall be applied also to subcontractors and suppliers and shall be carried out during the design, manufacture, installation, testing and commissioning phases of the Works.

b) The Contractor shall prepare and submit for review and acceptance by the “Engineer” a Systems Assurance Plan thirty days after Contract Award.

c) The System Assurance Plan shall define the Contractor’s approach, procedures and schedules for conduct of Safety Engineering, Reliability Engineering and Maintainability Engineering. Human Factors Engineering is an integral part of Systems Assurance and shall be considered and reflected within the Systems Assurance Plan.
d) The Contractor shall pro-actively engineer the systems to meet the safety, availability, reliability and maintainability performance requirements listed below and demonstrate that the requirements have been met by the system installed.

e) In the process the potential hazards to safety, availability, reliability and maintainability performance should be further minimised where design options permit.

f) The deliverables listed below are intended to provide the “Engineer” with a sound basis for acceptance of the safety, availability, reliability and maintainability performance; progress information; confidence that the design is proceeding with a low risk of failing to meet the performance requirements; information that will aid the planning of work schedules; and part of the foundation of the safety case for operation of the line.

7.3.2 Systems Assurance Plan

a) The Systems Assurance Plan shall be developed specifically for this Contract and shall address in particular the following items:

i) Safety engineering which shall provide analyses for the minimisation of the magnitude and seriousness of those events or malfunctions which could result in injury to passengers or staff and damage to equipment or property; and must eliminate category I and II hazards which are defined latter in this Clause.

ii) Reliability, maintainability and availability engineering analysis which shall ensure a high degree of failure free operation and minimise down time during routine maintenance and failure repair.

b) The Contractor shall formulate and document criteria to satisfy the requirements for systems assurance through the Works.

c) The Contractor shall produce a Systems Assurance Plan that integrates the systems assurance elements in all phases of the Works and incorporates a disciplined approach to evaluate the escalator system design. The Contractor shall prepare hazard identification, assessment and resolution; prediction of unreliability; and determination of degree of maintainability. At a minimum, this shall include:

i) Organising the Systems Assurance Plan to include specific sections for the disciplines of safety, reliability and maintainability engineering.

ii) Describing the procedures to perform the specific tasks necessary to meet safety, reliability and maintainability requirements.

iii) Clearly defining the responsibilities of personnel directly associated with systems assurance policies and implementation of the programme.

iv) Describing the systems assurance organisation.

v) Identifying the authority dedicated to the systems assurance organisation and the relationship between the assurance organisation and other organisational components.

d) The Contractor shall co-ordinate results of systems assurance analysis with design disciplines, particularly as the results affect design and hardware development. The Contractor shall make recommendations for redesign or modifications necessary to assure compliance with specified requirements including installation of test points, built-in test capabilities and self diagnostics;
utilisation of in-service status displays to enhance fault isolation and test; the utilisation of high reliability components with easy accessibility and quick disconnect connectors; and, the use of mechanical keying to reduce errors during installation and repair.

e) The Contractor shall document instances where evaluations or analyses indicate an unresolved problem area and formulate appropriate recommendations as well as maintain records which show that follow-up action has been taken to resolve the problem.

f) The Contractor shall ensure participation of his systems assurance organisation in all design reviews.

g) The Contractor shall maintain documentation of systems assurance throughout the design and make it available to the “Engineer” for examination.

h) During consideration of precedence in the control of system hazards, the Contractor shall take account of human limitations as a design constraint. The Contractor shall take actions to satisfy requirements in the following order of precedence:

i) Incorporation of fail safe or vital features which would allow the system to transfer from a high loss or risk mode to a lower loss or risk mode upon the occurrence of a critical failure.

ii) Reduction of the probability of occurrence of a failure by increased component reliability or by provision of supervised redundant components.

i) The Contractor shall use safety devices to reduce the magnitude of the loss or risk once a hazardous mode has been entered; and ensure that the safety device does not introduce an additional hazard or system malfunction.

j) The Contractor shall use warning devices and systems which are audio/visual portion of a vital system in which the human is the responder.

k) The Contractor shall recommend special equipment operating procedures to reduce the probability of a hazardous event.

7.3.3 Safety Engineering

a) The Contractor shall as part of the safety engineering activity prepare analyses of identified potential hazards to ensure resolution of hazards. The following analyses shall be prepared and submitted by the Contractor:

i) Subsystem Hazard Analysis (SSHA)

ii) Interface Hazard Analysis (IHA)

iii) Operating and Support Hazard Analysis (O&SHA)

iv) Quantitative Fault Tree Analysis (FTA)

v) Failure Modes, Effects and Criticality Analysis (FMECA)

b) The Contractor shall compile a list of critical/ catastrophic hazard items identified as a result of hazard analyses, or by other means. This Safety Critical Items List (SCIL) shall be updated as required and carried forward throughout implementation until final resolution of identified hazards is achieved.

c) The qualitative measures of hazard severity are defined as follows:
Hazard Category I - Catastrophic: Operating conditions such that personnel error, environment, design deficiencies, subsystem or component failure or procedural deficiencies may cause death or system loss.

Hazard Category II - Critical: Operating conditions such that personnel error, environment, design deficiencies, subsystem or component failure or procedural deficiencies may cause severe injury to personnel, severe occupational illness or major system damage.

Hazard Category III - Marginal: Operating conditions such that personnel error, environment, design deficiencies, subsystem or component failure or procedural deficiencies may cause minor injury to personnel, minor occupational illness or minor system damage.

Hazard Category IV - Negligible: Operating conditions such that personnel error, environment, design deficiencies, subsystem or component failure or procedural deficiencies will not result in injury to personnel, occupational illness or damage to the system.

d) The Contractor shall prepare a Fire Safety Design Report for review and acceptance by the “Engineer”. At a minimum, this report shall contain documentation of the specific fire hardening and life safety features and attributes the Contractor has incorporated in the escalator design; especially those relating to:

i) Structural fire resistivity

ii) Choice of electrical wiring and insulation for vital safety critical circuitry.

iii) Flammability, smoke emission, and toxicity characteristics of selected materials.

e) Further, the information presented by the Contractor shall be supported by the history of tests conducted and by approved test certificates from accredited laboratories which attest to the materials’ characteristics and behaviour.

7.3.4 Reliability, Availability and Maintainability (RAM) Engineering

a) Reliability, Availability and Maintainability requirements and goals shall be developed in terms of Mean Time Between Maintenance Action (MTBMA), Mean Time between Failures (MTBF) and Mean Time to Restore (MTTR) respectively.

b) Final Reliability, Availability and Maintainability predictions shall be verified by testing after system design has been completed.

c) The subsystems and equipment shall be designed to maximise system availability during traffic hours, to minimise the amount of maintenance required and to ensure that any maintenance can be easily and quickly carried out at minimum cost.

d) The Contractor shall perform Reliability, Availability and Maintainability analyses up to the point of interface with other systems.

e) Reliability block diagrams shall be developed which show each equipment element that is essential to the performance of the system, including element interrelationships. Block diagrams shall be revised to keep current with design iterations.
f) The Contractor shall develop a reliability model consisting of reliability block diagrams and probability of success equations. The model shall show the relationships required for system success. The Contractor shall revise the model to keep current with design iterations.

g) The Contractor shall provide RAM prediction and apportionment in accordance with established techniques or standard or properly documented and verifiable field failure data for identical or similar equipment. The standards used or the source of field data shall be identified.

h) Quantitative RAM assessments to all significant functional levels of the system, subsystems or equipment shall be allocated. Maintainability analyses during design, development and testing shall be used to evaluate the degree of achievement of the Maintainability requirements. The Contractor shall identify the standards by which these allocations are made.

i) The Contractor shall develop predictions to judge the adequacy of the proposed design to meet quantitative RAM requirements and shall identify design features requiring corrective action during early stages of design and development.

j) The Contractor may submit existing analyses which are properly documented and verifiable for equipment and applications which are identical or manifestly similar. The documents used for calculating the Reliability, Availability and Maintainability shall be certified by the Customer whose data's are used. Existing data need not conform to the agreed format but shall contain the same data presented in a neat, concise and logical manner.

7.3.5 Reliability, Availability and Maintainability Demonstration Tests

a) The Reliability Demonstration Testing (RDT) shall be carried out after commissioning the escalators. All equipment shall be included in the RDT and shall be fully operational. The Contractor shall perform failure/incident data analyses, component analyses and provide corrective action designs and tests. The Contractor shall submit weekly status reports, which shall include as a minimum a statement of failures, status of failure dispositions and achieved MTBMA for each subsystem.

b) The Maintainability Demonstration Testing (MDT) shall be conducted on assemblies, components and subsystems jointly selected by the “Engineer” and the Contractor. The “Engineer” reserves the right to settle any disputes in the selection of subsystems to be tested.

7.3.6 Submissions

a) The Systems Assurance Plan shall be submitted 30 days after Contract Award for acceptance by the “Engineer”.

b) The Preliminary Systems Assurance Report shall be submitted for acceptance as part of the Preliminary Design submission.

c) The Final Systems Assurance Report shall be submitted for acceptance as part of the Pre-Final design submission.

d) The Reliability, Availability, Maintainability and Safety Demonstration Test Plans shall be submitted for acceptance as part of the Final Design submission.

e) Reliability, Availability, Maintainability and Safety demonstration test results shall be submitted for acceptance 30 days after completion of the demonstrations.
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CHAPTER 8

DESIGN SERVICES
8 DESIGN SERVICES

8.1 Design Requirements

The Contractor shall perform all design functions necessary for the development, manufacture, installation and site testing of escalators as described in this Specification.

8.1.1 The design of each component shall achieve the minimum service life given below. The failure rate of the components shall not exceed 5%. Failure rate is defined as the number of failures (during the service life) divided by the total quantity of the components in of that section.

<table>
<thead>
<tr>
<th>Escalators</th>
<th>Service Life (In Years)</th>
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<tbody>
<tr>
<td>(i) Steps</td>
<td>15</td>
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<tr>
<td>(ii) Relays, timers and control gear</td>
<td>8</td>
</tr>
<tr>
<td>(iii) Handrail drive system</td>
<td>15</td>
</tr>
<tr>
<td>(iv) Step chains and step axles</td>
<td>15</td>
</tr>
<tr>
<td>(v) Tension carriage assembly</td>
<td>15</td>
</tr>
<tr>
<td>(vi) Main drive assembly</td>
<td>15</td>
</tr>
<tr>
<td>(vii) Emergency brake assembly</td>
<td>15</td>
</tr>
<tr>
<td>(viii) Step and chain rollers</td>
<td>8</td>
</tr>
<tr>
<td>(ix) Handrail</td>
<td>4</td>
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</tbody>
</table>

The Service life of other equipments / Parts shall be defined in the design submission.

8.1.2 The Contractor shall prepare and submit drawings, which clearly illustrate details of equipment down to sub-assembly and component level, equipment locations and configurations. Drawings shall indicate plan views, elevations, sections, charts, tables, schematics and diagrams with legends, dimensions, part numbers, tolerances, setting clearances, materials, etc., as required to cover the facilities being provided under the Contract. Drawings shall also be prepared showing circuit wiring for each of the systems included in the Contract in AUTOCAD and PDF format.

8.1.3 The Contractor shall prepare and submit specifications to provide a clear description of the functional requirements such as, loading, materials, clearances, tolerances, of all equipment and its components planned for use in the Contract. The specifications shall indicate acceptable levels of performance, the expected normal life span, and the mean time between failures (MTBF) for the equipment, materials and workmanship, with due consideration given to the service and environment to which such equipment will be subjected. The Contractor shall identify, by manufacturer and model or part number, each component, which he plans to install under the Contract.

8.1.4 The Contractor shall prepare and submit a Quality Assurance programme in accordance with requirements contained in the Specification.

8.1.5 The Contractor shall submit all applicable data, criteria, standards, directives and information used as a basis for the design of the escalators.

8.1.6 The Contractor shall comply with the drawings and graphic standards identified in the Employer's Requirements.

8.1.7 The Contractor shall submit the design calculations for the following, to demonstrate how the operational requirements are achieved.
(a) Structural loading and deflection of the escalator truss (with and without intermediate support).

(b) The loading of the following escalator components: -
   
   (i)  bearings
   
   (ii) drive chains
   
   (iii) step chains
   
   (iv)  steps
   
   (v)   motor/machines
   
   (vi)  brakes
   
   (vii) handrails
   
   (viii) Combiplate
   
   (ix)  track system

(c) Power requirements and efficiency of motor/machine.

(d) Escalator brake torque and stopping distances under no load and full load condition.

(e) Any other information necessary or asked by the Employer

8.1.8 The Contractor shall submit catalogues and samples for all parts and components used in this Contract. During the design stage some of the samples of the equipment can be asked by the Employer for review and acceptance without any extra cost. The samples will be released to the Contractor after commissioning of the equipments.

8.1.9 The Contractor shall prepare equipment layout plans and other documents necessary to facilitate the design interface co-ordination with other System-wide and Designated Contractors. These plans shall, (if necessary) be incorporated in design drawings but they must be prepared at appropriate times and in sufficient detail to permit successful co-ordination of space provisions for the escalators.

8.2 Endorsement Requirement

All drawings, calculations, test certificates, technical information, data and analysis submitted in this Contract shall be endorsed by the Contractor’s registered Professional Engineer.

8.3 Co-ordination with Designated Contractors

The Contractor shall co-ordinate with the Designated Contractors, shall finalise and agree with the Designated Contractors all relevant matters relating to the equipment including but not limited to the following:

(a) space requirements, including tolerances for construction of the civil works.

(b) fixing requirements

(c) loading

(d) interface with architectural finishes

(e) cabling routes, including providing information to the Designated Contractors.

(f) information on embedded parts, box-outs, etc. to enable the Designated Contractors to provide the necessary works.
(g) equipment access route and temporary lifting requirements. (In this connection, it may be noted that no provision of lifting hooks has been made in the civil engineering structure. As such, the contractor shall arrange his own alternative method for installation of escalators at site.)

(h) lighting requirements

(i) power requirements

(j) ventilation requirements

(k) fire protection

(l) Interface with NP-SCADA system (if any).

(m) Fire Detection requirement

8.4 NOT USED

END OF CHAPTER
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CHAPTER 9

INSTALLATION
9 INSTALLATION

9.1 The Contractor shall be responsible for the timely and proper setting out of the Works, which shall include verifying the positions, levels, dimensions and alignment of escalators, machine pits, supports, walls and floor openings, etc. Any error in the civil construction in so far as they relate to the Works shall be immediately brought to the attention of the “Engineer” and the Designated Contractor to allow prompt rectification by the Designated Contractor so as to avoid delays to the Works. The Contractor shall not be entitled to claim for any additional costs incurred by him arising out of such errors in the civil construction if such additional costs could reasonably have been avoided had the Contractor carried out timely and proper setting out of the Works. The method adopted for installation shall be in accordance with relevant standards with latest versions/amendments stated at Clause 4.17 of this specification.

9.2 The Contractor shall be responsible for all aspects of the Work required to install the equipment, including the provision of all lifting facilities such as frames, etc. wherever the provision of hooks is not possible. The Contractor shall co-ordinate with the Designated Contractors on the necessary precautions to be taken by both the parties to prevent damage to any part of the civil works during installation, including transportation of various part of escalators on rubber typed wheel and handling these with proper equipment so that floor finishes are not damaged by the Contractor during erection of Escalators at the stations. In case any finish is damaged by the Contractor the same shall be made good by the Contractor in full panel/area at his cost, so as to maintain uniformity.

9.3 All equipment shall be fully protected against the ingress of grit, dust and moisture during delivery, storage and installation.

9.4 The equipment shall be delivered to Site in accordance with an accepted installation programme with a minimum temporary storage period to avoid damage.

Access into the station will be either by train or by road depending on site environment and constraints.

9.5 The Contractor shall design the equipment to comply with the Site access restrictions and shall ensure that the largest piece of equipment can be brought into the station through the access opening/entrances and passage ways. Method Statement of Installation shall be submitted for Employers review and approval at least 30 days prior to the starting the installation.

9.6 Under normal circumstances where the civil structure does not prohibit the provision of lifting facilities, such facilities in the form of lifting point will be provided by the Civil Contractors at the upper and lower landings and along the incline section of the escalator well ways for ease of installation. The contractor shall verify and satisfy themselves in respect to the loading capability of the lifting point/ hooks. The load test, if Contractor feels necessary/required, can arrange in co-ordination with Civil contractor.

Where, the structure does not permit the provision of lifting points, the Contractor shall make his own arrangements to provide the required lifting facilities such as “A” frames or similar to carry out installation work at no extra cost.

9.7 The Contractor shall be responsible for providing fencing and barricades to protect his working areas during the installation period for the safety of his workers and other personnel working in the station until the equipment is handed over to the Employer.
9.8 The Contractor shall provide protection, such as plywood board etc., to protect the landing plate, handrail and balustrade etc from being damaged until the equipment is handed over at no additional cost. Any damages to the equipment are the sole responsibility of Contractor and shall replace the damage part without any extra cost. The equipment in full will be inspected and tested at the time of taking over of the equipment.

END OF CHAPTER
CONTRACT

EMPLOYER’S REQUIREMENTS
TECHNICAL SPECIFICATION

CHAPTER 10

TESTING AND INSPECTION
10 TESTING AND INSPECTION

10.1 General

10.1.1 As part of the preliminary design submission the Contractor shall submit to the “Engineer” for acceptance a schedule of tests giving full details of all tests to be carried out.

10.1.2 Tests at places of manufacture to be witnessed by the “Engineer” shall be grouped together so far as can be arranged so that as many tests as possible can be witnessed on each visit.

10.1.3 The Contractor shall prepare and forward to the “Engineer” an original and four copies of all Test Reports as soon as practicable after completion of each test whether witnessed by the “Engineer” or not. All test data shall be certified by the Contractor’s Professional Engineer.

10.2 General Requirements for Type Tests and Acceptance Tests

10.2.1 The Tenderer shall provide details of any type and acceptance tests, which have been carried out on equipment offered, or any additional tests he recommends.

10.2.2 In general, certificates of previous type tests may be accepted at the discretion of the “Engineer”, provided that they are for identical equipment and conditions. Where appropriate, new and/or modified components to meet the requirements of this Specification shall be made available for type testing.

10.2.3 Type tests on equipment shall be carried out strictly as specified in the Specification.

10.2.4 The “Engineer” shall have right to witness tests and inspections on individual materials, components, or sub-assemblies, and details of these shall be agreed between the Contractor and the “Engineer”.

10.2.5 At the conclusion of all type tests, the Contractor shall compile all the test data together with any observations made during the tests, file them into a type test binder and submit it to the “Engineer” for acceptance and record.

10.3 General Requirements for Tests during Manufacture

10.3.1 The Contractor shall carry out tests during manufacture as specified and propose any additional tests to be carried out. These tests shall be subject to the acceptance of the “Engineer”. Routine tests shall be integrated with the manufacturing programme. The “Engineer” or “Third Party Inspecting agency” appointed by Employer will, at his discretion, witness the routine tests during the period of manufacture, or accept the records of the Contractor’s in-house quality control scheme, where appropriate, as sufficient evidence for the execution of the routine tests.

10.3.2 Routine tests shall be carried out strictly as specified in the test specification as outlined in Clause 10.4.

10.3.3 On completion of the manufacture of items or sub-assemblies, and following completion of the manufacturer’s own tests and inspection, the “Engineer” shall be invited to witness such tests as he deems appropriate. The Contractor shall schedule the routine tests to meet the manufacturing programme, whether or not the “Engineer” or “Third Party Inspecting agency” appointed by Employer will be present at the tests, provided advance notice has been served to the “Engineer” in accordance with Clause 9.8 of GS.

10.3.4 The “Engineer” will determine and advise the Contractor of those tests where certification by the manufacturer may be acceptable in lieu of witnessed tests.
10.3.5 Before equipment is dispatched, the “Engineer” will signify his acceptance by signing certificates releasing such equipment from the place of manufacture or test.

10.3.6 Methods of packing and shipping shall be as specified in the Employer’s Requirements, the “Engineer” reserves the right to visit the manufacturers’ or packers’ premises to ensure that accepted methods are employed.

10.4 Test Specification

10.4.1 The Contractor shall submit for acceptance by the “Engineer”, test specifications for type tests, routine tests, tests on site, final acceptance tests and commissioning. The specifications shall detail the methods of conducting the tests, the tools and instruments used. Reference to the accepted documents and drawings shall be included in these specifications. The records/results shall be tabulated in a prescribed format applicable to this Contract.

10.4.2 Nothing in this Specification shall prevent the “Engineer” from calling for extra tests.

10.4.3 These test specifications shall include the design values of all quantities to be verified, with allowable tolerance or limits. Summary drawings or diagrams shall be included with the test specifications to show the dimensions and tolerances of all structural assemblies and sub-assemblies. In the case of welded fabrications, key diagrams giving all weld data shall be provided to enable systematic inspection to take place.

10.4.4 Verification of accuracy shall be required for all tools, apparatus, testing jigs, measuring instruments and ‘go’ or ‘no go’ gauges used for the purpose of routine tests.

10.4.5 All test instruments shall be calibrated not more than one year prior to their use. The Contractor shall submit calibration certificate or other documents for proof of Compliance.

10.5 Testing of Materials and Details

10.5.1 Where materials or components used in this Contract are not covered by separate test specifications, samples of such materials, or up to two per cent of such components shall, if desired by the “Engineer” be tested at the Contractor’s expense at an approved laboratory.

10.5.2 The Contractor shall supply the material required for testing free of charge and shall supply and prepare the necessary test pieces, labour and appliances for making all tests, and for carrying out all gauging and weighing on his premises in accordance with the terms of this Specification. If the Contractor is unable to provide approved facilities at his own factory for making the prescribed tests, the Contractor shall bear the cost of carrying out the tests elsewhere, at a place subject to the “Engineer” acceptance.

Such radiographic examination of welds or castings as the “Engineer” deems necessary shall be carried out.

10.6 Escalator Prototype Tests

10.6.1 One complete average rise escalator which is generally representative of all types shall be available for the commencement of witness testing after Contract Award.

10.6.2 A complete escalator system including truss, track, chain, rollers, steps, controller, handrails, balustrade, monitoring and fault diagnostic system, electrical wiring, safety devices, supporting systems etc. shall be built at the Contractor’s works to undergo a comprehensive running and functional testing in accordance with the approved test specification to verify compliance with the Specification.
The tests shall include the following as a minimum:

a)  Truss deflection shall be recorded under full load conditions;

b)  Carry out a full escalator assembly inspection as specified in Clause 10.10.13.

c)  Verify the functionality of the monitoring and fault diagnostic System, all safety devices and all other electrical switches.

d)  Inspection to verify that the balustrade complies with the Specification and is aesthetically pleasing.

e)  Insulation resistance and pressure testing of all power and control circuits.

f)  Carry out a 24 hours continuous running test, 12 hours in each direction, without stopping except to change direction.

e)  Record the noise levels to verify compliance with the Specification.

f)  Braking Tests.

g)  Motor Gear Combined Efficiency Test.

10.7  Not used

10.8  Escalator Type Tests

10.8.1  Driving Mechanism

One unit selected by the “Engineer” for each range of duty of the driving machines provided for this Contract.

Scope of Tests

a)  Dimensional Checking

   Dimensionally check gear assembly backlash and shaft end float as follows:

   i)  Backlash with four consecutive 90° turns, in the same direction, of the input shaft.

   ii) Backlash with four consecutive 90° turns, in the same direction, of the output shaft.

   iii) Input shaft end float where applicable.

   iv) Eccentricity of shafts on ground section adjacent to glands or oil seals.

   v)  Output shaft end float.

b)  Dynamic Tests

   The gears shall be “blued”, with non-oil soluble ink, in addition to the assembly in order that the transfer mark for the contact area can be determined. The input shaft shall be turned a sufficient number of revolutions to establish the position of the contact area prior to the dynamic tests.

   The test machine shall be run at simulated full load conditions at contract speed continuously for 8 hours, 4 hours in each direction.

   The following temperatures are to be recorded prior to the run, during the run, at 30 minute intervals and on completion of the run: -

   i)  Oil

   ii) Input shaft bearing (drive end)
iii) Input shaft bearing (non-drive end)
iv) Output shaft bearing (output side)
v) Output shaft bearing (non-output side)
vi) Gear casing
vii) Motor casing
viii) Ambient

The temperature of the rim on the gear of the output shaft shall be recorded prior to the run and immediately on completion in each direction.

The contact area of the gears shall be checked on completion of the run in each direction. This shall demonstrate that the wear pattern is forming in a correct manner.

The machine shall also be run under no load and at test load conditions at full speed in each direction for a sufficient period to record the maximum vibration amplitudes at:

i) Mounting points
ii) Bearings

b) Verification of Efficiency

The overall efficiency of the machine shall be verified by calculation from the results of the tests.

10.8.2 Motor

Frequency of Tests

One unit selected by the “Engineer” for each range of motors supplied for this Contract.

If the quantity of the same range of motor exceeds forty, an additional motor shall be selected from the second batch by the “Engineer” to repeat the same tests described below.

If a separate motor is used for achieving maintenance speed, the same requirements shall also apply to the maintenance motors.

In general, all tests shall be conducted in accordance with the relevant parts of BS 4999.

Scope of Tests

a) Insulation Test

i) Insulation resistance of windings using 1000V Megger shall not to be less than 200 M ohm.

ii) Insulation resistance of thermistors subject to 1000V for 5 seconds shall not be less than 200 M ohm. Windings shall be earthed.

iii) Main and slow speed winding shall each be pressure tested to 2000V r.m.s. for 60 seconds. During this test, thermistor wires shall be grounded to earth.

iv) Cold resistance of both high and low speed windings shall be recorded.

b) Dynamic Tests
i) No load current and speed shall be recorded at rated voltage and frequency for both high and low speed windings.

ii) Full load, 75%, 50% and 25% load tests shall be carried out on both high and low speeds at rated voltage and frequency. Current and speed shall be recorded for each. Input power, efficiency, slip and power factor shall be established and recorded for each. For Load Test (as per EN 115) the Escalator shall be started at No Load and subsequently the Load will be increased incrementally to test the Motor for different loads.

iii) Temperature rise test on full load shall be carried out on high speed windings only. Voltage shall be 415V. Frequency shall be as rated.

iv) Ambient, air outlet, casing, output power and temperatures shall be recorded at 15 minute intervals for the first two hours and 30 minute intervals subsequently until temperature levels off.

v) Voltage, current, frequency, output power and temperatures shall be recorded at 15 minute intervals for the first two hours and 30 minute intervals subsequently until temperature levels off.

vi) When the temperature has levelled off, the motor shall be switched off and the winding temperature rise shall be established using the resistance method as specified in BS 4999 Part 101.

vii) A momentary overload of 200% full load shall be applied for 15 seconds. The motor shall not stall or abruptly change speed.

viii) A locked rotor test shall be carried out at rated voltage and frequency for both high and low speed windings. Current and torque shall be recorded in both cases.

ix) The speed/torque characteristic and the starting current characteristic shall be produced from the results obtained.

10.8.3 Main Drive Shaft

Frequency of Tests

Depending on the number of different types of main drive shaft to be provided for this Contract at least one for each of the high and low rise range of main drive shaft shall be selected to undergo the type tests. The “Engineer” will determine if the intermediate range is required for the tests.

Scope of Tests

a) Dimensional Checking

Ten main drive shafts selected by the “Engineer” shall undergo a comprehensive checking and testing which includes but is not limited to the following:

i) Dimensional checking of the shaft to verify conformance of the manufacturing tolerances.

ii) Check alignment of sprocket position and parallelism of sprockets.

b) Radiographic checks or other approved non-destructive testing on the welds shall be carried out on the shaft after the checking in a) i) above have been
completed. A certificate of the welder's qualifications shall accompany the report to be submitted.

10.8.4 Steps

Frequency of Test

One step shall be required to undergo the type tests as described below:

Scope of Tests

a) Static Test

The testing procedures shall conform to the requirements as described in EN115 Clause 8.2.2.1 as a minimum.

b) Dynamic Test

The testing procedures shall conform to the requirements as described in EN115 Clause 8.2.2.2 as a minimum.

10.8.5 Step Chain

Frequency of Test

One sample of each range of step chain provided in this Contract shall be required to undergo the type test.

Scope of Tests

a) A destructive test to verify the tensile breaking strength of the chains.

b) Dimensional checks on the test sample to check the link plates, step axles and chain pin, and to verify compliance with the manufacturing tolerance of the components.

c) Evidence of the heat treatment of the link plate, if applicable, shall either be provided or verified by test.

d) The method of protecting the chain for shipment shall be inspected for conformity with the correct approved procedures.

10.8.6 Wheels

Frequency of Test

Three samples each of the chain wheel and trailer wheel from the first batch of production shall be taken for the test.

Scope of Tests

a) Dimensional Checking

The dimensions of the test sample shall be checked to determine compliance with the manufacturing tolerance.

b) Hardness of the Bonding Material

The same samples as used in (a) above shall be used to determine the hardness of the bonding material.

c) Bonding Strength

The purpose of this test is to determine the bonding strength between the tyre and aluminum hub under a Tensometer.
i) A full depth section of tyre of sufficient length shall be removed to insert a cutting tool and detach the bond.

ii) The wheel shall be held by a pin at the stationary end of the Tensometer and the wheel shall be free to rotate.

iii) The detached end of the tyre shall be clamped firmly between the jaws of the operating end of the Tensometer.

iv) The load shall be applied gradually until a load of 1 kN is achieved. The rotation of the wheel shall not be more than 40°.

d) Dynamic Test

The test sample shall be mounted on test jigs and subject to simulated load conditions to test their working life. Accelerated speed and increased loading to shorten the testing period may be acceptable, but full details of supporting calculations shall be provided.

10.8.7 Controller

Frequency of Test

One of each type of controller shall be type tested.

Scope of Tests

a) Physical Construction Checking

The construction of the control cubicle shall be checked against the approved drawings. Facilities to padlock incoming fused isolator shall be checked. Verification of the protection classification to IP55 shall be conducted and/or provided.

b) Pressure Test

i) Earth leakage circuit breakers shall be tested on both poles. The current and time required to trip shall be recorded. Similarly, the dc earth leakage unit shall be tested and values to be recorded.

ii) Pressure testing at 2000V ac r.m.s. for 60 seconds between: phase to phase and phase to earth.

iii) Control wiring shall be pressure tested at 1,500V ac r.m.s. for 60 seconds between control/auxiliary wiring and frame. Insulation tests shall be carried out before and after the above tests by a 1000V insulation tester. The insulation resistance thus measured shall not be less than 200M ohm.

iv) All protection on electronic circuits shall be tested.

Wiring to all electronic components shall be megger. Megger setting shall be at the discretion of the “Engineer”.

v) Verification of the protection circuit shall be carried out in accordance with the approved procedures.

c) Functional Tests

Functional testing of the completed control cubicle shall be carried out by simulation of the escalator operation to verify compliance with the Specification.

Temperature rise during the tests shall be recorded and verified.
10.8.8 Tension Carriage

Frequency of Test

One sample from each range of tension carriage (if different types are provided), shall be selected to undergo the type tests.

Scope of Tests

a) Dimensional Check

The test sample assembly shall be checked thoroughly to ensure that all the dimensions comply with the manufacturing tolerances.

Check alignment of sprocket position and parallelism of sprockets.

b) Radiographic Check

The welds on the same sample shall be checked by radiographic examination or any other approved non-destructive method. A certificate of the welder’s qualifications, who performed the welding of the tension carriage, shall accompany the report to be submitted.

10.8.9 Driving Chains

Frequency of Test

One of each type of driving chains shall be required for the type tests.

Scope of Tests

Each chain selected shall undergo destructive tests to prove its breaking strength.

10.8.10 Handrail

Frequency of Test

One sample selected from the first batch of production shall be made available for the tests. If the mould for vulcanisation is changed due to any reason during the subsequent manufacturing period, the same test shall be repeated, if so desired by the “Engineer”.

Scope of Tests

a) Physical Checking

The inner element of the test sample shall be checked against the approved drawings before vulcanisation. The vulcanised sample shall be checked to confirm the dimensions and manufacturing tolerances.

The inner layer shall be tested to confirm its water-repellent property. The rigidity of the lips shall be tested to verify compliance. Two samples of the outer stock shall be taken from the test sample and checked to verify their Shore Hardness.

b) Breaking Strength

The same sample shall be tested to confirm the minimum breaking strength. A factory prepared joint shall also be tested to verify that its breaking strength is not less than 85% of that of the test sample.

c) Ozone Aging Test

The rubber sample shall be tested to prove its ozone aging resistance in accordance with the test specification.
10.8.11 Braking System

Frequency of Test

One of each type of brake provided shall be required to undergo type testing.

Scope of Test

A full dimensional check shall be carried out to verify compliance with the manufacturing drawings and a full functional test shall be carried out. A demonstration of brake adjustment and setting shall be carried out.

10.9 Not used

10.10 Escalator Routine Tests

The following are the minimum requirements of the routine tests.

10.10.1 Main Drive Shaft

100% Check:

Thorough dimensional checking against the accepted drawings and manufacturing tolerances shall be conducted for every main drive shaft produced. This shall include checking of the alignment of the sprockets on both sides of the shaft.

Random Check:

Ten main drive shafts will be selected to conduct the radiographic examination or other approved non-destructive testing on the welds.

10.10.2 Driving Machines

Random Check:

Each set of worm and gear shall be checked to verify that the backlash and contact area is in conformity with the accepted test specification. Test results shall be recorded for inspection.

Verification of the insulation resistance of the windings using a 1000 Volts megger test. A high voltage test to 2000 Volts r.m.s. for one minute of the stator winding shall be conducted.

A dynamic test for every driving machine shall be conducted for a period of 4 hours continuously without stopping, except for changing of direction, 2 hours in each direction, at contract speed and 25% load conditions. The test is to ensure no undue vibration or abnormal temperature rise occurs in any component.

10.10.3 Step Chain

100% Check:

The assembled chain shall be checked for its overall dimensions and manufacturing tolerance, in accordance with the accepted test specification.

Random Check:

The link plates, chain pins and step axles shall be checked at random by using a “go” or “no go” gauge. Evidence of checking shall be verified on the checklist, if required by the “Engineer”.

10.10.4 Wheels

Random Check:
All wheels and bearings shall be checked at random in accordance with the accepted test specification, to confirm the dimensions and manufacturing tolerances.

Up to two percent of the total wheels for this Contract, if required by the “Engineer”, shall be tested to prove their bonding strength in accordance with the same procedures as for type tests mentioned above.

A failure from the first two percent samples shall necessitate a further two percent sample to be tested. A failure during further test shall render the complete batch to be unacceptable.

10.10.5 Tension Carriage

Random Check:

The carriage shaft shall be checked against the accepted shop drawings to verify the dimensions and manufacturing tolerances. The alignment of the sprockets on both sides of the shaft shall be checked at the same time.

10.10.6 Handrail

100% Check:

All factory prepared joints shall be checked before vulcanization, in accordance with the accepted drawings.

Random Check:

The physical dimensions after vulcanization shall be checked three times a day for, at the beginning, mid-day and before closing of work. The lip strength shall be checked to confirm its rigidity.

10.10.7 Floor Plates

Random Check:

Selected floor plates shall be checked to confirm their dimensions and manufacturing tolerances, in accordance with the accepted drawings.

10.10.8 Comb Sections

Random Check:

The comb sections shall be checked to confirm their dimensions and manufacturing tolerances, in accordance with the accepted drawings. The accuracy of the holes for the fixing screws shall be checked with a gauge.

If required by the “Engineer”, a destructive test shall be conducted to verify the breaking strength of the comb teeth, in accordance with the accepted test specifications.

10.10.9 Steps

Random Check:

The tread and cleated riser dimensions shall be checked against the accepted drawings.

10.10.10 Handrail Drive

Random Check:

The alignment of the sprockets on both sides of the shaft shall be checked against the accepted drawings.

10.10.11 Control Cubicle

100% Check:
Verification of the insulation resistance of the control wiring and electronic components shall be conducted in accordance with the accepted test specifications.

Each control cubicle shall be checked with a simulator to test for correct wiring and termination, and the correct function of the electrical switches/relays.

10.10.12 Truss

100% Check

All truss work welding shall be subjected to a visual examination to ensure there is no surface porosity, undercuts or any other defects. Non Destructive Testing shall be carried out on structural welds and on 10% of the remaining welds.

10.10.13 Escalator Assembly

The Contractor shall develop his own inspection checklist for the manufacturing process and for the checking of the assembled escalator. The results shall be properly recorded for the inspection by the “Engineer” or his designated representative during factory visits.

All the components inside the truss, such as the main drive shaft, tension carriage, tracks, wiring, safety switches, steps, and skirt panels shall be installed in position prior to the tests.

100% Check:

All items shall be checked for correct positioning and any measurements taken shall be recorded in the checklist. In particular the following shall be checked to ensure conformity with the Specification.

i) Step to skirting

ii) Riser to skirting

iii) Step to guide at comb

iv) Comb to tread cleat

v) Step to step

vi) Skirt to step

vii) Carriage tension setting

viii) Carriage scale plate reading

ix) Alignment of the truss joints shall be checked in accordance with the accepted test specifications. Through bolts shall be fitted after correct alignment and any shims used shall be marked and identified.

x) All track joints shall be checked for alignment and smoothness. Sliding tracks shall be fitted correctly, in accordance with accepted shop drawings.

xi) After checking of alignment and correct squareness to the centre line, the housing of the main drive shaft bearings and the tension carriage bearings shall be drilled and fitted with through bolts.

xii) The partially assembled escalator shall be run under power to check for proper clearance throughout the entire escalator.

xiii) Wiring of the in-truss switches shall be completed and properly terminated.

xiv) For low rise escalators, the handrail may be coiled in the upper landing and properly secured.
xvi) When the assembled escalator is ready for dismantling and packing, the step chains and steps shall be anchored to prevent them from movement during transit.

xvii) A list shall be prepared for parts dismantled and will be shipped together with the escalator sections. Those parts to follow shall be clearly shown on a separate list.

xviii) Before shipment can be effective, the “Engineer” shall sign and issue a clearance certificate after he is satisfied with the packing procedures.

10.11 Not used

10.12 Escalator Site Checking and Inspection

A test and inspection specification shall be prepared for each of the following critical phases of work. Forty eight hours notice is required prior to completing these phases to enable the “Engineer” to carry out any checks he deems necessary. The following are the minimum requirements:

a) Definition of datum and installation of bearing plate
b) Alignment of truss and end supports
c) Alignment of drive and reverse station
d) Alignment of track brackets
e) Alignment of incline tracks
f) Installation and alignment of upper and lower newel wheels
g) Alignment of skirting brackets and panels
h) Installation of step chain and steps
i) Installation of balustrade steelworks
j) Alignment of handrail tracks
k) Installation of top decking panels, inner panels, skirting returns and kick plates.
l) Installation of upper and lower comb plates and access floor covers.
m) Alignment of “over speed” / “under speed” detection unit drive chain, handrail and countershaft drive chains.

n) Installation of switches and wiring.
o) Installation of lubrication system
p) Installation of wiring and cabling
q) Earthing and bonding checks
r) Installation of controller
s) Installation of escalator cladding and decking extension.

10.13 Not used

10.14 Escalator Commissioning and Acceptance Tests

After installation, each escalator shall be tested by the Contractor in the presence of the “Engineer”. The tests shall include but not limited to the following:
10.14.1 Final Electrical

Each escalator shall be subject to a rigorous electrical testing which will prove the functionality of the escalator control, safety and support systems.

a) The overspeed protection devices shall be tested by operating the escalator at rated speeds and tripping the overspeed device. The device shall have been separately tested and set in the factory to operate at escalator speeds called for in this Specification.

b) The handrail tension malfunction devices shall be tested manually.

c) The broken chain protection shall be tested by operating the escalator at rated speed and tripping the broken chain device by hand.

d) The device providing against sudden and unusual strains on the step chains shall be tested by operating the device by hand.

e) All push buttons, starting switches, relays, interlocking, controls and features required in connection with the work shall be inspected and tested to prove that the complete escalator functions properly under any and all conditions of operation within the limits specified.

f) All conductors shall withstand a 1000V megger test with the voltage being applied between each conductor and ground. Each conductor shall show an insulation resistance to earth of not less than 3 Mohms.

10.14.2 Weight Test

The weight test for each escalator including verification of braking distances shall be conducted when the site testing of the escalator has been substantially completed. Details of the requirements shall be as follow:

a) The escalator shall be run under a series of test load conditions.

b) In line with EN 115, the Escalator will be started at No Load and its Starting Current measurement. Thereafter, the following readings shall be taken under no load, 25%, 50%, 75% and full test load, and no load after adjustment at full test load;

   i) Running current
   ii) Supply voltage
   iii) Motor speed
   iv) Braking deceleration measured as slip through the brake
   v) Escalator and handrail speed

c) A tripping switch shall be provided to enable accurate measurements of braking distances to be made.

d) The stopping distance versus the operation brake spring settings diagram shall be obtained by determining the following points.

   i) Brake spring setting at lower limit of stopping distance at no load.
   ii) Stopping distance at full load at brake spring at d) (i).
   iii) Brake spring setting at upper limit of stopping distance at full load.
   iv) Stopping distance at no load at brake spring setting at d) (iii).
e) It shall be demonstrated that the brakes can be adjusted to meet the requirements of the Specification under all conditions of load and the brake torque checked and recorded.

f) Testing weights shall be supplied, placed in position and removed from site after use, by the Contractor

10.14.3 Final Mechanical

The purpose of this test is to ensure that all site test specifications are complete, all “snagging” faults have been rectified and accepted and there is no damage to any part of the step band following the Weight Test. In addition to the verification that all barriers, signs and notices are provided.

10.14.4 Twenty Four Hour Run

Each escalator shall be subjected to a 24-hour continuous running test, 12 hours in each direction, without stopping except to change direction. This test is to ensure that there shall be no undue noise, vibration or abnormal temperatures arising from any component during the testing period. If any of these occur, the escalator shall be shut down for checking and/or repair and the same tests shall be repeated.

10.14.5 To ensure proper commissioning of escalators, testing shall be done using EVA meter.

10.15 Not used

10.16 Interface and Integrated Tests

The Contractor shall co-ordinate and carry out interfacing and integrated testing together with other System-wide Contractors to ensure that the all integrated systems function as desired.

10.17 Certificate of Taking Over

The final acceptance tests of each item of equipment shall be undertaken in the presence of the “Engineer”, in accordance with the test specification. Any defects and/or deviations discovered without prior written approval during the tests shall be rectified at the Contractor’s own expenses. These shall be entered into a defects list agreed between the Contractor and the “Engineer”. The Certificate of Taking Over will not be issued until these tests have been completed and the defect list substantially reduced to such an extent that the “Engineer” considers that the equipment is safe for operation.

10.18 Certification

Upon completion of each escalator the Contractor shall submit to the Employer, a Certificate of Supervision issued by the Contractor’s Professional Engineer, in a format acceptable to the “Engineer”.

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CHAPTER 11

ELECTROMAGNETIC COMPATIBILITY REQUIREMENTS
11 ELECTROMAGNETIC COMPATIBILITY REQUIREMENTS (EMC)

11.1 General

The requirements stated below must be read in conjunction with the other EMC requirements mentioned in GS.
The EMC plan shall include measures to reduce conducted, induced, and radiated emissions, especially the levels of harmonics, to acceptable values as specified by the relevant international standards or by the concerned statutory authority.

11.2 Not Used

11.3 Inter-System EMC

11.3.1 The various electrical systems installed on the Railway under Construction will after installation interact with each other by mutual coupling and all plant and systems shall be designed so that there is no malfunction due to interference.

11.3.2 The Contractor shall ensure that all equipment supplied shall have minimum Radio Frequency Interference introduced onto the main network and comply with the Electromagnetic Compatibility (EMC) requirements of the following standards:

- EN 50081-1: EMC Generic Emission Standard
- EN 50082-2: EMC Generic Immunity Standard
- BS EN 12015: Electromagnetic compatibility- Product family standard for lifts, escalators and passengers conveyors- Emission
- BS EN 12016: Electromagnetic compatibility- Product family standard for lifts, escalators and passenger conveyors- Immunity

11.4 Harmonic distortion

The total harmonic distortion (THD) caused by the escalator equipment to the supply mains at the power supply input terminals of the escalator shall not exceed the following values when the escalator is in no load:

<table>
<thead>
<tr>
<th>Rated load Current ($I_L$)</th>
<th>THD (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200A ≤ $I_L$ &lt; 400 A</td>
<td>&lt; 12.0</td>
</tr>
<tr>
<td>20A ≤ $I_L$ &lt; 200A</td>
<td>&lt; 15.0</td>
</tr>
<tr>
<td>$I_L$ &lt; 20A</td>
<td>&lt; 20.0</td>
</tr>
</tbody>
</table>
11.5 Installation and Mitigation Guidelines

IEC1000-5 series of guidelines must be observed wherever applicable.

11.5.1 Earthing

An earthing system should be designed to assure personnel safety and protection of installations against damage. It should also serve as a common voltage reference and to contribute to the mitigation of disturbances.

To achieve the primary goal of assuring personnel safety and damage control, a low impedance path must be made available to large currents generated due to lightning or power system fault. The potential differences (touch and step voltages) between any two points must be as low as possible. Safety considerations also require the chassis or enclosure to be earthed to minimise shock hazards to passengers and the maintenance staff.

To achieve the secondary goal of providing protection for sensitive and interconnected electronic and electrical systems, earthing should 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 potentials.

Earthing shall also be designed to accomplish the following minimum requirements:

i) Protect personnel and equipment from electrical hazards, including lightning, where practical.

ii) Reduce potential to system neutrals.

iii) Reduce or eliminate the effects of electrostatic interference and electromagnetic interference arising from within the system.

iv) Provide a single-point earthing method for all equipment enclosures, cabinets, drawers, assemblies and sub-assemblies.

v) Provide a clean zero-volt reference point for signals in computer and related equipment.

11.5.2 Bonding
Bonding all exposed metallic parts of all equipment and connecting them to the earthing network is a way for meeting safety requirements and minimise noise voltages due to potential differences.

Direct bonding should be used wherever practical. Where indirect bonding via bonding strap is used to connect two isolated items, the bond must satisfy the following minimum requirements and prevailing international standards, for example, IEC1000-5-2.

i) Low bonding resistance from DC to at least 2 Ghz.

ii) Low bonding inductance from DC to at least 2 Ghz.

iii) Proper bonding procedure, including appropriate surface treatment before and after the bonding process is adopted.

iv) Proper use of bond material to reduce electrolytic corrosion.

11.6 Reliability, Availability and Maintainability

All escalators shall be subject to the reliability assessment as described in Sub-section 4.9 of this Technical Specification. The Contractor shall ensure that the equipments supplied shall achieve the availability standard as laid down in Sub-section 4.10 and shall always be under good repair within the environmental conditions prevailing in the General Specification, where the escalators will be installed.

END OF CHAPTER
CONTRACT

EMPLOYER’S REQUIREMENTS
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CHAPTER 12

MATERIALS AND WORKMANSHIP
12. MATERIALS AND WORKMANSHIP REQUIREMENTS

12.1 General

12.1.1 General Requirements

This Section covers general standards of workmanship, material requirement and construction methods which are required for the execution of the Work. Any reference to any specific material or plant does not necessarily imply that such is included in the Works.

The names of the manufacturers of materials and equipment proposed for incorporation in the Works together with performance, capacities, certified test reports, Approval letters and other significant information pertaining to the same, shall be furnished when requested by the “Engineer”, who shall have the power to reject any parts which in his opinion are unsatisfactory or not in compliance with the Specification and such parts shall be replaced by the Contractor with neither cost nor programme implications to the Employer.

Samples of equipment submitted for the Approval by “Engineer” shall not be incorporated into the Works without getting the permission in writing from the “Engineer”.

The “Engineer” will examine and confirm as Approved or Rejected the quality and workmanship of the first installation for each configuration of the Works. The installation, if approved, will establish the minimum acceptable standards for the Contractor’s Works.

12.1.2 Plant Design

The whole of the Works shall be designed to conform to the best Engineering practice. Manufacturer’s standard designs shall be used for all items of Plant for which standard designs are available provided that they conform to the Specification.

The Plant shall be designed for simplicity and reliability to give economy, long continuous service and minimum maintenance.

The whole of the Works shall be designed for neat appearance and tidy arrangement. The style and finish shall be consistent throughout the Works. The “Engineer” shall decide the final colours for all paintwork and other finishes to be applied to any part of the Works.

All parts shall be designed to withstand the maximum stresses under the most severe conditions of service after loss of any corrosion allowance and for lifetime of not less than 30 years.

The Plant shall be designed to minimize fire risk and of damage in the event fire.
The Plant shall be designed to prevent the entry of vermin and to minimize the entry of dust and dirt. Adequate safe-guards shall be provided to prevent accidental contact with rotating machinery, hot surfaces, electrically live parts and any other hazardous components or content of the Plant.

12.1.3 Compliance with Standards and Local Ordinances

All materials and components to be used, whether incorporated in the Works, Plant and Equipment at the manufacturer’s Works or used for installation on Site, shall comply with the requirements of this Section and applicable Standards. These requirements shall be minimum requirements for general purposes and they shall not relieve the Contractor from ensuring that all his materials and components incorporated in the Works are suitable for their intended purposes and environments.

Where no alternative Standards are stated or agreed in the Contract, all details, materials, equipment and workmanship for which Standards have been issued by the Bureau of Indian Standards shall be in accordance with such Standards, even though no specific Standard may be mentioned in the Contract.

Alternatively, internationally recognized Standards such as IEC, DIN, ASME, ASTM, BS, NEMA, JIS may be Approved by the “Engineer” for manufacture of equipment provided that all parameters specified can be met.

The Works shall conform to all Statutory Ordinances, Orders or Regulations having the force of law.

Where the choice of plant, materials or equipment is affected by Indian Government Regulations or local Ordinances, the plant materials or equipment supplied shall comply with all relevant sections of such regulations even though no particular reference may be mentioned in this Specification. The order of precedence in the event of conflict is stated in this TS.

The Contractor may comply with any equivalent alternative Indian code or standards in lieu of those mentioned in this chapter. However unless satisfactory documentary evidence and test certificates of compliance with the relevant clauses of this Specification, Standards, Ordinance, Regulation and the like, issued by competent, independent and internationally reputable testing authority (ies) are submitted for “local made” materials, including all components of locally assembled equipment and fixtures, Approval for the use of such materials may not be considered.

12.1.4 Materials- General

All materials incorporated in the Works shall be suitable for the duty concerned and shall be new and of best commercial quality, free from imperfections, and selected for long life and minimum maintenance under the conditions specified.
All material used shall be of current production and well-proven application for the design and intended usage.

As far as practicable the use of electrically dissimilar metals in contact shall be avoided, but, where unavoidable, these metals shall be so selected that the Electro-chemical potential difference between them does not exceed 250 millivolts. If this is not possible, the contact surfaces of one or both of the metals shall be electroplated or otherwise finished in such a manner that the potential difference is reduced to within the required limits or the two metals shall be insulated from each other by an Approved method.

Where different components of equipment are interconnected to form a complete system, their characteristics of performance and capacities shall be matched in order to ensure efficient, economical, safe and sound operation of the complete system.

The use of asbestos and asbestos-based materials is not permitted.

12.1.5 Workmanship - General

Workmanship and general finishes shall be of best quality and in accordance with best workshop practice.

All similar items of Plant and their component parts shall be completely interchangeable. Spare parts shall be manufactured from the same materials as used for the originals and shall fit all similar items or plant. Where machining may be needed before fitting renewable parts, the machining fits with their tolerances shall be shown on the drawings accompanying the instruction manuals.

All revolving parts shall be truly balanced both statically and dynamically so that when running at normal speeds and at any load up to the maximum there shall be no significant vibration due to out-of-balance forces.

All parts and equipment, which are subject to, wear or damage by dust or moisture in the environment they are installed shall be totally enclosed in housings of the appropriate degree of protection.

All equipment shall operate without excessive vibration and with a minimum of noise.

The standard of workmanship shall be consistent throughout the Works. Unless otherwise specified, the “Engineer” shall decide the final colours for all paintwork and other finishes to be applied to any parts of the Works.

12.1.6 Tropicalisation

All items of plant shall be tropicalised to suit the conditions prevailing in JAIPUR in general and within the station and location where the escalator is installed in particular. Clause 1.12 in the Chapter 1 of General Specification gives the climatic conditions prevailing in JAIPUR above and below ground and the Works shall be
suitably designed, manufactured and installed to meet these conditions.

In particular, the following points for tropicalisation of electrical components shall apply:

(i) All components of electrical systems shall be housed in suitable cubicles or enclosures, which provide the degree of protection as specified.

(ii) Operating coils shall be vacuum impregnated with waterproof insulating varnish or epoxy-resin encapsulated.

(iii) Wire-wound resistors shall be on ceramic formers and embedded in fireproof and damp-proof material.

(iv) Current and voltage transformer windings shall be epoxy-resin encapsulated against the ingress of moisture.

(v) Equipment provided with anti-condensation heaters shall be capable of operating without damage should the heaters be left on continuously.

12.1.7 Welding- General

Pull details of proposed procedures for factory and site welding of important components shall be provided by the Contractor. Welding of important structural components shall be subject to non-destructive testing as may be stipulated in this Technical Specification.

The design and specification of welded joints and connections, and the fabrication of welded steel parts shall conform to the requirements of BS 5135 structural steelwork and BS 7475 for stainless steel and, unless otherwise agreed by the “Engineer”, shall also be stress relieved to an Approved code.

Members to be joined by welding shall be accurately cut to size and, where required, shall be rolled or pressed to proper curvature in accordance with Shop/Fabrication Drawings. Edges of members shall be suitably machined for the required type of welding and to permit thorough penetration.

Surfaces prepared for welding shall exhibit sound metal without laminations and other injurious defects. Surfaces of plates to be welded shall be free from rust, grease, mill scale and other foreign matter over a distance of at least 25mm back from weld edges.

All welding operatives assigned to the Works for the manufacture, assembly or erection on Site of pressure-tight or highly stressed components shall be qualified in accordance with an Approved code and shall satisfy the “Engineer” in this respect prior to commencement of work.

If at any time, in the opinion of the “Engineer”, the work of any welder appears
questionable, such a welder shall be required to undergo, in the presence of the Employer or his representative, tests to determine the welder’s ability to undertake satisfactorily the type of work upon which he is engaged. Tests upon the welded specimens shall be undertaken by an Approved examiner. For such qualification tests and welding techniques shall be identical with those for the work in question and the Contractor shall:

i. Furnish to the “Engineer” all test plates and welding electrodes

ii. Furnish to the “Engineer” certified copies of reports of results of physic tests

12.1.8 Materials and Ancillaries

a. Structural Steel Sections: -

i. Hot rolled structural steel section shall comply with BS 4: Part 1.

ii. Corrosion protection shall be by hot dip galvanized or heavy protective finished as specified in the Specification.

b. Mild Steel: -

i. Mild steel for general purposes shall conform with the requirement of BS 4360.

ii. Unpainted steel parts shall be zinc sprayed, or zinc coated, zinc plated, passivated cadmium plate galvanized as appropriate to Approved standards and as specified in the Specification.

iii. Unpainted, uncoated or non-corrosion resistant steel parts shall not be used unless otherwise approved by the “Engineer”.

c. Steel Castings and Forgings: -

i. All steel castings shall conform with the requirements of BS 3100. Forgings shall be to BS 29.

ii. Before proceeding with foundry and forging work, the Contractor shall submit drawings to the “Engineer” of all steel castings and forgings and all other important components, showing the proposed locations for taking specimens for tensile, impact, fatigue, bend and any other appropriate tests.

iii. Castings shall be true to drawings and any casting in which any dimension is sufficiently reduced to impair its strength by more than 10% or to increase the stresses above specified limits, shall be liable to rejection by the “Engineer”. Excessive segregation of impurities or alloys at critical points in a casting shall be sufficient cause for its rejection.
iv. Cracks or other defects disclosed during cleaning or machining operations shall be chipped or grooved out by carbon-arc air process to sound clean metal, and then inspected by appropriate non-destructive method(s) to be agreed between the Contractor and the “Engineer”. Should removal of metal, to uncover or remove a crack or defect, result in a reduction in stress bearing cross-section of a component or increase the stresses above specified limits by more than 10%, the component may, at the option of the “Engineer”, either be rejected or repaired.

v. In such special cases as may be decided by the “Engineer”, steel castings and forgings shall be subject to x-ray, gamma-ray or other Approved form of non-destructive testing to appropriate British Standard or such other Standards as may be Approved by the “Engineer”. When required by the “Engineer” to do so, the Contractor shall furnish stress calculations and full details of proposed repair procedures before receiving Approval to proceed with remedial works.

vi. No repair shall be undertaken without prior Approval by the “Engineer”. Such Approval shall also refer to the procedure for repair. Repairs by welding to steel castings and forgings shall be undertaken only by properly qualified welders and in full accordance with an Approved procedure. All such repairs shall be subject to stress relief.

d. Corrosion Resistant Steel:

i. Unless otherwise specified or Approved by the “Engineer”, stainless steel tubes, sheets and plates used in this Contract shall be in accordance with the following Standards:

Austenitic stainless steel tubes shall comply with BS 6323: Part 1 and Stainless and heat-resisting steel plate, sheet and strip shall comply with BS 1449: Part 2, grade 304 unless otherwise specified.

ii. Stainless steel shall have good arc-welding properties and low carbon content. Stainless steels adversely affected by welding shall not be used. There shall be no visible welding mark on the exterior surface. All stainless steels shall be subject to Approval by the “Engineer”.

iii. Where cladding with stainless steel is proposed, the method of application shall be submitted to the “Engineer” for Approval.

iv. Stainless steel protective cover shall be applied on the external surface and retained until installation is completed. Covering materials between seams or panel joints shall be removed before assemble. The protective cover shall be removed by the Contractor as instructed by the “Engineer”,

there shall be no residual covering materials left on the surface or in between seams or panel joints after removal.

e. Cast Iron: -
   i. Cast iron shall not be used for systems containing high-pressure air, oil or water or for any components subject to tension or impact stresses.
   ii. Where cast iron is used, grades shall not be inferior to BS 1452 Grade 150.

f. Aluminium and Aluminium Alloys: -
   i. Any aluminium used for electrical purposes shall be of the highest purity commercially available, and the Contractor shall substantiate this by submitting certificates of analysis stating the percentages and nature of any impurities. Wrought aluminium and aluminium alloys for electrical purposes shall comply with BS 2898.
   ii. Unless otherwise specified, aluminium or aluminium alloy when used for components shall either be painted or be anodised to give a deposit of not less than 50 g/mm and 25 micron thickness. Aluminium and aluminium alloys shall not be in direct contact with dissimilar metals. The treatment of any such paints shall be agreed with the “Engineer”.
   iii. All die-cast aluminium components in large quantities shall bear a marking clearly indicating the month and the year of manufacture.
   iv. Aluminium die-casting shall conform to BS 1490.

g. Bronze: -
   Bronze castings for bearings, packing boxes, and similar applications shall be of the phosphor bronze type to BS 1400.

h. Copper: -
   i. Copper tubing shall be of the seamless type to BS 2871.
   ii. Copper for electrical purposes shall conform to the requirements of BS1432-4 and BS 1977 as appropriate for the duty.

i. Brass: -
   Brass tubing shall be of the heavy gauge seamless type and shall comprise 70% copper, 29% zinc and 1% tin.

j. Wood: -
The use of wood shall be avoided as far as possible. When its use is specified or unavoidable, then it shall be fire retardant to BS 476: Part 20 to 22, thoroughly seasoned teak or other Approved hard-wood, tantalised, free from knots and blemishes and naturally resistant to decay. Joints shall be dove-tailed or tongued and pinned where possible. All metal fittings shall be of non-ferrous or stainless steel.

k. Fabrics, Cork, Paper, and Similar Materials:
Fabrics, cork, paper and all similar materials shall not be used unless such use is unavoidable. If used, and where not subsequently protected by impregnation, all such materials shall be adequately treated with an Approved fungicide and shall meet the minimum performance requirements with respect to fire safety. Sleeving and fabrics treated with linseed oil or linseed-oil varnishes shall not be used.

l. Insulating Materials:
Non-impregnated paper, fabric, wood or press- palm shall not be used for insulating purposes. Where synthetic resin bonded insulating boards are used, they shall be fire resistant to the minimum requirements for fire safety and all cut edges shall be sealed with an Approved varnish.

m. Adhesives:
Adhesives shall be specially selected to ensure use of types, which are impervious to moisture, resistant to mould growth and other forms of attack or deterioration. Synthetic resin cement only shall be used for joining wood.

12.1.9 Finishes

a. General Requirements
Exposed metal surfaces shall, after inspection and witnessed testing in the factory, be thoroughly cleaned of all dust, oil, grease, dirt, scale and rust by grit or shot-blasting in accordance with relevant Part of BS 7079 and then ground smooth where necessary, immediately after which they shall be treated.

Surfaces of castings, steel work, piping and plant which are to be in direct and permanent contact with concrete shall be properly painted and covered, prior to dispatch from the factory, with a substantial coating of cement wash or other Approved proprietary coating plus a lapping of an Approved weatherproof tape.

Except where otherwise specified, all non-embedded pipes and fittings located in inaccessible positions (e.g. in pipe trenches, pits and similar locations) shall be externally coated by dipping in acid-free hot bituminous compound. The coating thickness shall be Approved by the “Engineer”. The pipe or fitting shall then be overlapped with a layer of anti-corrosion tape, which shall be Approved by the “Engineer”.
The internal surfaces of all oil service ferrous pipes and fittings shall be carefully inspected to ensure that all scale and other particles or contaminants have been removed and shall then be protected in an Approved manner to prevent deterioration during transport and subsequent erection.

The external surface of accessible ferrous pipes and fittings shall be treated with two coats of Approved primer paint prior to dispatch from the place of manufacture.

The external surfaces of all plant or items in damp environments shall, unless made of non-ferrous metal, be similarly coated with an Approved bituminous compound. All access ladders and platforms and associate supporting steelwork shall be galvanised.

All other exposed surfaces, except where otherwise specified, shall be thoroughly cleaned of all dust, oil, grease, dirt, scale, rust or other contaminants by power tool operated metal brush, or preferably by shot or grit blasting, and shall then be coated immediately with one coat of an Approved primer paint. Following witnessed factory tests, any rough surfaces shall be filled in and carefully dressed smooth, on completion of which further treatment shall be as detailed hereunder:

i. The interior surfaces of oil-filled chambers and tanks, and the external surfaces of piping or fittings included therein, shall receive one undercoat followed by two final coats of oil-resistant enamel paint of a colour and type Approved by the “Engineer”.

ii. All internal surfaces of cubicles, kiosks, boxes and the like, containing wiring or other apparatus, and the internal compartments of plant components forwarded to Site in assembled or partially assemble condition, shall be paint-finished with three coats of white enamel the last of which shall be an anti-condensation finish.

iii. The external surfaces of panel suites, cubicles, kiosks, marshalling and junction boxes, etc, shall be factory finished in stove enamel paint (minimum: 40 Micron DFT Primer + 40 Micron DFT Undercoat + 40 Micron DFT Top Finish, where DFT = Dry Film Thickness), and with colour in accordance with BS 381C.

iv. All surfaces of plant and machinery shall receive protection to suit the duty involved. In particular all surfaces forming an interior accessible compartment shall receive one primer coat and one undercoat to be followed by two final coats of oil-resistant enamel paint, the application of which shall be undertaken only following completion of site erection.

v. The external surfaces of all other plant components shall have any damage to priming or undercoats made good by the Contractor on completion of installation and shall then be finally painted in Approved colours.
b. **Galvanizing**

Unless otherwise specified, all galvanized coatings shall be applied by hot dip process to BS729 forming a smooth, clean, dull grey zinc coating free from bare spots or other defects, and of uniform thickness complying with BS729. Sheradising, Parkerizing, or other alternative processes shall not be used without the Approval of “Engineer”.

All drilling, punching, tapping and bending of parts shall be completed and all burrs removed before galvanizing is done.

The preparation for galvanizing and the galvanizing itself shall not adversely affect the mechanical properties of the wire or coated material.

Unless otherwise specified, semi-finished products such as zinc sprayed, zinc coated, zinc plated or hot dip galvanised steel sheet suitable for subsequent fabrication shall have the following coating weights:

i. Where no paint finish is required the coating weight shall be not less than 300g/m² per surface, i.e. 600g/m² on both sides.

ii. Where paint finish is required the coating weight shall be not less than 60g/m² per surface i.e. 120g/m² on both sides.

In the case of steel wire, the coating shall be of such thickness as to comply with the tests of BS 443.

c. **Paint Finishes for E&M Elements of the Works**

i. Unless otherwise specified, the Contractor shall apply paint finish to all exposed metal works including supporting rods and brackets, cable trays, trunkings, lighting fittings, pipe works, ductworks, surface conduits and accessories and other equipment, as supplied and installed under this Contract.

ii. **Method of Application**

The paint finish shall be regarded as an additional finish applied over hot dip galvanized steel sheet or extruded aluminum surface, or other coatings already defined elsewhere in the Contract. Details shall be submitted to the “Engineer” for Approval prior to application.

As far as possible, paint finish shall be applied at manufacturer’s Works prior to delivery to Site for installation.

iii. **Electrostatic Painting of E&M Equipment at Manufacturer’s Works**

The process shall be applicable to escalator steps and other equipment which are fabricated and pre-finished/painted at manufacturer’s Works and shall include the following steps:
iv. Painting of E&M Installations

The process shall be applicable to supporting rods and brackets, pipe works, duct works and other E&M equipment which tailor-fabricated on and shall include the following steps:-

(1) Preparation

Galvanized surface shall be washed with white spirit to remove dirt and grease. Following cleansing the surface shall be washed with a Mordant solution such as British Rail 'T wash'. If metal coating is defective, instructions shall be obtained from the “Engineer” before proceeding.

Mild steel or ductile iron surfaces shall be scraped or wire-brushed to remove rust and loose scale and welding slag or splatter. Crevices shall be cleaned out. Oil, grease and dirt shall be removed using white spirit.

All preparation materials shall be fully cleansed from surface before proceeding.

(2) General

Colours as Approved by the “Engineer” shall be agreed prior to painting. For each finish colour, the colour of undercoat recommended by the paint manufacturer shall be used.

Control Samples: Approval of representative sample areas of each paint type shall be obtained from the “Engineer” before carrying out the remainder.

(3) Cleanliness

All brushes, tools and equipment shall be kept in a clean condition.

All surfaces shall be kept clean and free from dust during painting
and drying.

A suitable receptacle for liquids, slops, washings etc. shall be provided. Disposal shall be in accordance with the Environmental Protection Department procedure.

(4) Preparation of materials

Paints shall be prepared as recommended by the manufacturer.

Any paint showing impurities, lumps, skin or uneven consistency shall be strained through fine gauze prior to application.

Different paints shall not be intermixed.

Paints shall be stirred to attain an even consistency before use.

(5) Protection

Freshly applied paints shall be adequately protected from damage.

"Wet Paint" signs shall be exhibited and protective barriers shall be provided on Site where necessary.

Surfaces adjacent to those being painted shall be adequately protected.

(6) Application

Paints shall be applied in accordance with the manufacturer’s recommendations to clean, dry surfaces in dry atmospheric conditions and after any previous coats have hardened.

(7) Priming

Priming coats shall be applied by brush unless other methods are specifically permitted and Approved by the “Engineer”.

Priming coats shall be to manufacturer’s recommended thickness.

Any primed surfaces that have deteriorated on Site or in transit shall be touched-up or re-primed.

Metal surfaces shall be painted on the same day they have been cleaned.

Undercoats shall be applied by brush in a wet, even film all over surfaces, avoiding uneven thickness at edges and angles.

All priming and undercoats shall be rubbed down to a smooth surface with abrasive paper and all dust shall be removed before applying the next coat of paint.
Unless otherwise specified, finish coats shall be applied by brush in a wet, even film all over surfaces, avoiding brush marks, sags, runs and other defects. Second coats shall be applied within 48 hours of first coats.

Surface shall be cut in neatly and clearly. Adjacent surfaces shall not be splashed or marked.

d. Materials for Painting of E&M Elements of the Works

All coating materials for use shall be obtained only from the ISI approved manufacturers, unless otherwise specified. Any of the other listed suppliers’ equivalent products can be substituted provided that all compatible coating materials come from the same supplier.

Coating materials shall be delivered in manufacturers sealed containers, clearly labeled with the following information.

(1) Type of material
(2) Brand Name, if any
(3) Intended Use
(4) Manufacturer’s batch numbers.

e. Paints for E&M Finishes

i. For hot-dip galvanized finish:

(1) Primer shall be zinc chromate primer ICI Dulux F500-388 or equivalent
(2) Undercoat shall be ICI Dulux speed undercoat A543-101 or equivalent
(3) Finish coat shall be ICI Dulux gloss finish A365-line or equivalent
(4) 1 primer, 1 undercoat and 2 finish coats shall be applied

ii. For extruded aluminium surface:

(1) Etch primer shall be IMP Unilite 220 or equivalent
(2) Finish coat shall be polyurethane, IMP Imperite 330 or equivalent
(3) 2 primers and 2 finish coats shall be applied

iii. For other finish/surface:

(1) Undercoat shall be ICI Dulux speed undercoat A543-101 or equivalent
(2) Finish coat shall be ICI Dulux gloss finish A365-line or equivalent
(3) 1 primer, 1 undercoat and 2 finish coats shall be applied

Paint samples and manufacturers shall be approved by the “Engineer” prior to commencement of painting.

Touch-up proposals to make good any areas/surfaces that have been damaged on Site or in transit shall be submitted for the Approval of “Engineer”.

f. Paint for Conduit and Duct Systems

Bituminous paint for steel conduits and steel cable ducts shall comply with BS 3416, type 1.

Zinc chromate primer for cable duct systems shall comply with BS 4652.

Galvanizing paint for cable duct systems shall be a proprietary type Approved by the “Engineer”.

12.1.10 Nameplates and Labels

a. Nameplates

The Contractor shall provide and attach to each major piece of equipment a metal name and rating plate to be approved by the “Engineer”. All nameplates shall be mechanically attached (not adhered) in a manner Approved by the “Engineer”.

Each plate shall quote the name and address of the manufacturer, serial number, full rating data and the date of manufacture.

b. Labels

Descriptive labels shall be provided for all instruments, gauges, devices, fuses, links, valves, strainers, motors, cables control cubicles and panels and the main apparatus contained therein.

Labels for normal situations shall be of Approved material, suitable for Site conditions and resistant to mechanical shock. Unless otherwise specified, they shall have lettering not less than 6 mm high.

The designation on these labels shall be clear and shall, where practicable, incorporate the appropriate device number along with concise descriptive wording both in English and Hindi. The Hindi wordings will be supplied to the Contractor by the “Engineer”.

Labels shall be of engraved type, with durable markings, and, unless otherwise Approved by the “Engineer”, samples of all labels shall be submitted for the “Engineer’s” Approval.

Electrical warning signs shall have graphic symbols and wording in red on a white background. All such signs shall be submitted for the “Engineer’s” Approval.
All labels shall be mechanically attached to the Approval of the “Engineer”.

12.1.11 Lubrication

a. The Contractor shall submit a schedule providing details of quantities and recommended alternative manufacturers and grades for all oil and grease necessary for the lubrication of plant equipment and components provided under the Contract. From this schedule the “Engineer” will select a supplier from whom the Contractor shall be required to purchase and provide, sufficient oil and grease, plus an excess of ten per cent, for the flushing and initial charging of all lubrication systems occurring in the Works. Procedures for system flushing and charging shall be subject to Approval by the “Engineer”.

b. Unless otherwise specified, each grease lubrication point shall be served by an individual line and nipple. Grease nipples and their location shall be Approved by the “Engineer”. For each type of grease an agreed type of nipple shall be used to prevent mixing of non-compatible lubricants.

c. Lubricating points shall be positioned so as to be fully accessible and instructions regarding the type of lubricant to be used shall be affixed immediately adjacent to the lubricant point and shall be plainly visible. Oil level indicators shall be easily visible.

d. All equipment shall be charged with the initial supply of lubricant before running the equipment, and, where such charging is carried out at a manufacturer’s premises or elsewhere, the Contractor shall ensure that this has been done.

12.1.12 Protection of Works for Electrical and Mechanical Installation

a. Structures in which electrical and mechanical installations are being carried out shall be maintained in a clean, dry condition, free from dust, during the installation, testing and commissioning phases.

b. The dust level in all escalator “well – way” and EMRs shall be kept to a minimum by using industrial dust extractors of a type permitted by the “Engineer” during and after installation. Temporary screens shall be installed to separate dust-affected areas from the installations or temporary covers shall be installed around the installation as necessary.

12.1.13 General Samples

a. Unless instructed otherwise by the “Engineer” the Contractor shall submit in accordance with the Approved Programmes, samples of all materials and components specified and obtain the “Engineer’s” Approval prior to confirming orders, and:

i. Submit samples in sufficient time to allow inspection, examination and checking by the “Engineer” and not less than 4 weeks prior to the time of
required Approval.

ii. Submit samples in duplicate unless otherwise instructed by the “Engineer”.

iii. Label or mark clearly submitted samples with the following information:

   (1) General Description: item and use.

   (2) Relevant References: as appropriate, to Drawings, Specification clauses and Bill of Quantities.

   (3) Date of Submission.

   (4) Date of required Approval.

a. Minimum size of sample board shall be 1500mmx1500mm unless agreed otherwise.

b. The sample submitted shall have markings on it showing the name of the manufacturer or product brand name and where applicable the BS or other recognized international standard the item is manufactured to.

c. Upon completion of the Contract and with an instruction from the “Engineer”, the Contractor shall handover the required samples to the designated storage areas for the “Engineer’s” future use.

d. The Contractor shall liaise with the “Engineer” to allow suitable space to accommodate samples, mock-ups and prototypes as may be required by the Technical Specification.

12.1.14 Assessment of Materials and Substances

Before being brought onto Site any materials proposed by the Contractor shall be assessed by the Contractor for their human and environmental compatibility. Any material that is toxic, explosive or flammable or may otherwise create a hazard shall wherever 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.

12.2 Mechanical Works

12.2.1 Screws, Springs and Pivots

The use of iron and steel for screws, springs and pivots in instrument and electrical relays shall be avoided wherever possible. Steel screws when used shall be plated with zinc, chromium or cadmium or, when tolerance limitations preclude plating, shall be of corrosion-resistant steel. All visible fixing screws shall be of stainless steel. All non-ferrous screws to be electro-tinned, or nickel or chromium plated finish.

Wood screws shall be of dull nickel-plated or other Approved finish. Instrument
screws, except where forming part of a magnetic circuit, shall be of brass or bronze.

Springs shall be of non-rusting material (e.g. phosphor bronze or nickel silver) where possible. Pivots or other parts for which non-ferrous material is unsuitable shall be of an Approved corrosion-resistant material.

12.2.2 Bolts, Studs, Nuts and Washers

All bolts, studs and nuts shall be to an Approved Standard and to metric dimensions and shall generally be of bright steel. Those subject to vibration, high temperature or pressure shall be of high tensile material to the Approval of the “Engineer”. The use of black grade bolts shall be permitted only Approved locations of minor importance.

Bolts, studs, nuts and washers shall be made of free machining quality stainless steel when:

i. Subject to frequent adjustment or removal, such as adjusting bolts, removable screws or bolts, and adjustable bearings.

ii. Used for any application subject to corrosion.

Bolts, studs and nuts shall be suitably machined. Rolled threads will be considered acceptable if conforming to an Approved standard. Washers shall be provided under all nuts and also bolt heads where appropriate. Bolts an studs shall protrude by at least one thread pitch beyond the outside face of nuts.

Jacking and connection screws shall all be of high tensile steel with fine threads of an Approved form.

Nuts, bolts, tap-bolts, set pins and any other item subject to vibration shall be secured with Approved locking devices

12.2.3 Bedplates, Alignment and Leveling

All bedplates of fabricated construction shall, prior to final machining, be fully stress-relieved.

To facilitate the alignment and leveling of larger components, all bedplates shall incorporate jacking screws suitably arranged to provide for movement of driving motors in both axial and transverse directions. Motor seating pads shall be so arranged that single piece machined packers can be inserted in place of shims of required thickness under each foot, or pair of feet, on completion of alignment.

After final alignment checks have been completed, and the unit run at full output for not less than six hours, the alignment shall be rechecked and the unit securely dowelled to the bedplates.
12.3 Electrical Works

12.3.1 General

a. These requirements of this Section shall be taken to be generally applicable in accordance with good practice, and they shall not relieve the Contractor from ensuring that all plant, equipment and installations incorporated in the Works are suitable for their intended purposes and environments.

b. Where detailed requirements are expressed in Chapter 5 of this specification they shall take precedence over the general requirements hereunder.

c. Polarity

The polarity of all apparatus shall be arranged as follows when viewed from the front of the units:

1. for two pole apparatus the phase pole at the top (or left hand side) and the neutral pole at the bottom (or right hand side);

2. for three or four pole apparatus the phases in order, red, yellow, blue and neutral reading from top to bottom or left to right in the case of vertical and horizontal layouts respectively.

All cables shall be so connected between main switches, distribution boards, plant, machinery and accessories such that the correct sequence or phase colours are preserved throughout the system.

d. Enclosures for Electrical Apparatus

Cubicles shall be symmetrically arranged as far as possible with projections kept to a minimum and extendable from either end.

The arrangements of the equipment within each cubicle shall be such that all normal maintenance can be carried out through hinged access doors or removable covers, from the front.

Where two or more cubicles are fitted together they shall form a flush-fronted continuous suite of uniform height when viewed from the front.

Each suite of panels or cubicles shall be fitted with a designation label giving plant identification number, voltage rating and duty. Such labels shall be fitted on the front of the cubicle, and on the sides and/or rear where appropriate.

Where a number of different plant items are in close proximity, the enclosure shall be grouped to form a single suite or a composite enclosure shall be provided.

e. Cubicle Construction
Panels shall be made of sheet steel with a minimum thickness of 2mm and suitably braced to form a rigid structure. Exterior corners and edges shall be rounded to give a smooth overall appearance. Interior edges shall be smooth.

An Approved method of construction shall be employed and the use of externally visible assembly bolts and screws will not be accepted.

Enclosures shall provide a degree of protection not less than that defined by characteristic IP 55 in accordance with BS EN 60529.

Individual sections of the enclosures shall be fully segregated to comply with the safety requirements of relevant Indian or British Standard specifications.

The design of cubicles shall be such as to ensure adequate ventilation and air circulation without permitting the entry of vermin. The operation of the ventilation fans in the controller should have temperature control, based on temperature inside the controller. Dust penetration shall be kept to a minimum by the fitting of recessed rubber seals around doors and removable panels.

The cable entries to cubicles shall be closed and made vermin proof by Approved means such as non-magnetic, fireproof barrier plates cut away where required to fit the cables.

All cubicle switchboards shall be in compliance with BS EN 60439-1 FORM 3 in respect of fault segregation.

The height of the cubicles shall not exceed 2130mm. The size of the Cubicles shall be sufficient for enclosing the Control Panel considering the ventilation & light arrangement and easy access to work in the panel. All cubicles shall be suitable for floor mounting unless otherwise approved by the “Engineer”. The design of the Cubicles is subject to the approval of Employer at design stage.

Cubicles shall be provided with flush front access doors fitted with lockable handles and lift-off type hinges so arranged that one shank engages before the other to permit ease of fitting. No instruments or relays shall be mounted on the doors unless otherwise specified. The key of lock shall be similar for all Cubicles.

Switchboard and Motor Control Cubicles

Switchboards and motor control cubicles shall be fitted with lockable hinged front doors and bolted removable panels at the rear where the removable panels give access to primary conductors, busbars or terminals. Where the voltage exceeds 110V d.c. or a.c., danger plates with suitable labels shall be fitted to give warning of the potentials contained therein. Where applicable, labels shall be fixed adjacent to the warning label advising isolation and earthing of conductors before removal of the panel. The wording of the labels shall be subject to the approval of the “Engineer”.

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Cubicles for multi-circuit switchboards shall be subdivided into single circuit sections, each provided with individual access door and rear cover. All dividing screens shall be of sheet metal, rigidly secured and arranged to segregate individual circuits and comply with the specified safety requirements.

Control wiring within the cubicles shall be neatly loomed or contained in purpose designed trunking unless every cable is insulated for the highest voltage present in accordance with the requirements of BS 7671.

The front door of all cubicles shall only be opened when the functional unit is locked off.

Live panel wiring terminations shall have a protective cover and warning labels.

g. Assembly of Panels

Component layout within panels shall provide a logical arrangement of equipment with the maximum feasible segregation between mains voltage/high current and low voltage/low current components and wiring.

A space allowance across the whole width of panels of a minimum of 100 mm shall be provided between the outgoing (plant) side of the terminal rail and the panel side of the gland plate for all control and monitoring cables.

For incoming and outgoing power cabling this space shall be increased as necessary to ensure that the bending radius of the conductors is not compromised and segregation between power cabling and control cabling is preserved.

All components within control panels shall be either directly mounted on the back plate by means of screws in tapped holes or onto a "DIN" type mounting rail itself directly mounted on the back plate by means of screws in tapped holes.

h. Small Wiring and Terminations

Wiring shall be carried out in a neat and systematic manner and securely fixed by insulated cleats or other Approved methods, and arranged so that access to any apparatus or connection point is not impeded.

Where inter-panel wiring passes through panel side sheets the access hole shall be fitted with a suitable rubber grommet.

Identification ferrules shall be fitted on all wires at both ends; numbers and letters used shall correspond with the appropriate wiring diagram and shall read from the terminals outwards. They shall be legible and durably marked and shall not be affected by oil or moisture. All cables connected to any nodal point shall be allocated with a discrete number which must not be used elsewhere in the associated circuits.

The wires shall not be jointed or broken in between terminal points.
Terminations for screw or stud terminals shall be of the crimped-on ring type. Termination of standard conductors to clamp type terminals shall be of the crimped-on solid rod type.

Not more than one core of either internal or external wiring shall terminate on any outgoing terminal. Where duplication of terminal blocks is necessary, suitable solid bonding links shall be incorporated in the design of block selected.

Wiring for all known future equipment shall be provided and all wires shall be terminated.

Wires of different voltages, AC or DC shall be completely separated.

Control and mains cabling shall be enclosed in slotted cable trunking with clip-on covers. No more than 50% of the internal cross-sectional area of the trunking shall be used in any length of trunking. Wiring outside the trunking shall be neatly set for connection to terminals or equipment.

All equipment and terminals associated with voltages in excess of 110 shall be fully shrouded.

i. Cubicle Electrical Safety Arrangements

All terminals, connections, relays and other components which may be "live" when access doors are open shall be adequately screened. It shall not be possible to obtain access to any adjacent cubicle when any door is open.

Components within each cubicle shall be fully labeled.

Where several outgoing circuits occupy a common termination chamber all copper work, cable lugs, terminations and terminal boards shall be fully screened or insulated to enable work on any one circuit to be carried out with other circuits live.

Isolators, clearly labeled, shall be provided in such positions and connections so that maintenance can be carried out with maximum safety. This shall particularly apply to control circuits fed from a remote position. Where it is necessary to maintain the isolator in the "off" position, such apparatus shall be so screened and labeled as to eliminate the possibility of accidents. Additionally, a system of removable, insulated links isolating-type terminal blocks shall be provided to enable particular components to be isolated for maintenance purposes whilst retaining other essential circuits energized.

j. Cubicle Control Components

All individual components of control equipment associated with any item of plant shall be contained in a single control cubicle. Where a similar number of items of plant are specified a composite cubicle shall provided.
Details of electrical connectors between the control cubicles and the items of plant shall be identified to facilitate cabling.

All instruments, relays, switches, lamps, push buttons and the like shall be arranged on the cubicle in a neat, functional and logic manner.

Similar items shall be of the same type, style, pattern or appearance throughout. Control and changeover selection switches for various functions shall be of the same type of appearance but with a handle of different shape for each specific function. They shall be fitted with facilities for locking to prevent unauthorised operations.

Instruments, controls and relays mounted on different panel sections but having similar functions shall be located in a physically similar position.

k. Labeling and Marking

Warning labels shall be fitted in all situations where the removal of covers or access panels may expose live equipment operating at voltages above 50V between circuits or to earth and shall bear the inscription ‘Danger - Live Parts’ in red letter on a white background. Minimum height of letters is 10 mm.

If the cubicle contains items of equipment which may retain electrical charges after they have been switched off, a warning label shall be provided.

All labels shall be of Formica engraving laminate or similar and Approved, of ample size and engraved in English and Hindi characters. A permanent mechanical means of fixing these labels shall be provided, other than by adhesives.

All equipment and apparatus, both inside and outside the switchboard, including instruments, meters, and relays, which is not clearly identified by integral labeling, shall be adequately labeled by means of an engraved label bearing, in black letters on a white background.

12.3.2 Electrical Distribution Equipment

a. Moulded Case and Miniature Circuit-breakers

Miniature circuit – breakers (MCB’s) and Moulded case circuit – breakers (MCCB’s) shall comply with BS EN 60898 and BS EN 60947-2 respectively. They shall be fitted with thermal overload and instantaneous magnetic short-circuit protection.

The instantaneous magnetic short-circuit protection shall be adjustable in MCCB’s in frame sizes above 60 amperes.

Earth leakage protection shall be of the current operated type.

Unless otherwise specified, the A.C. rated short-circuit capacity for MCB shall not be less than 6kA, and that for MCCB shall not be less than 25kA.

The maximum rating of MCB’s shall be 80 amperes.
Triple pole MCB’s shall be integral units and interlocked internally so that an overload on any one phase shall trip and all three phase of the breaker simultaneously. An assembly of three single-phase units mechanically strapped together is not acceptable.

b. Residual Current Circuit Breakers with Integral Overload Protection

Residual current circuit breakers with integral overload protection shall be current-operated, housed in a totally enclosed moulded/metal case or distribution board, manufactured and tested in compliance with BS EN 61009.

The rated earth-leakage tripping current and time shall comply fully with the requirements of the latest edition of IEE Wiring Regulations.

Provision shall be made for testing the automatic residual current tripping by an integral test device.

Manually operated ON/OFF facilities shall be provided.

The rated tripping currents for various applications shall be 30mA, 100 mA, 300 mA or 500mA and be Approved by the “Engineer”.

c. Auxiliary Switches and Contacts

Auxiliary switches supplied for indication, protection, metering, control interlocking and supervisory purposes shall be readily accessible and enclosed in a transparent dust-proof cover. Adequate secondary disconnects shall be included to enable the auxiliary switch to be wired to the fixed portion of the equipment.

Spare auxiliary contacts shall be provided (the number being to the nearest manufacturer’s standard design with a minimum of two normally open and five normally closed) and shall be wired to suitably identified spare terminals.

Contacts for all applications shall be rated at 6 amperes 240V 50Hz and 110 V dc operating current (0.4 power factor inductive load) for one million on-load operations.

d. Volt-Free Contacts

Where volt-free contacts are specified or supplied on any equipment e.g. a circuit-breaker or contact starter, they shall comprise of a pair of contacts operated directly by the equipment but electrically separated such that no potential derived from the equipment appears at the contacts. Volt-free contacts will be used to complete external control, alarms or indication circuits, the supplies for these circuits being obtained from an external source. Unless otherwise stated, these supplies shall be low voltage ac or dc sources and auxiliary isolating poles, e.g. on starter isolators need not be provided.

Volt-free contacts shall be readily convertible from N/O. to N/C, and vice versa by simple field adjustment. Contacts shall be rated adequately to make and break and
carry continuously not less than 6 amps at 240V ac or 6 amps at 110V dc, unless specified otherwise.

e. Operating Coils

All fine wire operating coils and wire wound resistors shall be vacuum impregnated with an approved insulating varnish.

f. Terminal Blocks

Terminal blocks shall be of the type which clamps the wire securely and without damage between two plates by means of a captive screw and permits removal of a terminal without disturbing any adjacent terminals. Pinch screw type terminal blocks where the screw is in direct contact with the conductor shall not be acceptable. The minimum size of terminal shall be suitable for 4mm² conductors. Terminal blocks at different voltages shall be segregated into voltage groups and terminal board layouts shall correspond with the wiring diagrams. Where Approved barrier pattern screws or stud-type terminal boards are used, covers of transparent, insulating material, which do not sustain combustion shall be provided.

Terminals for voltages higher than 110V or which may be alive when the main equipment is isolated from the main supply shall be suitably labeled to reduce the risk of accidental contact. All terminals shall bear permanent identification number or letter.

Terminal blocks shall be located adjacent to the point of cable entry adequate space being allowed for terminating the cable tails on Site.

After terminating all cores (including spares) there shall be not less than 10% spare terminals still available for use.

g. Insulated Terminal Blocks

The rated voltage of terminal blocks shall be 415V between terminals, 240V to earth.

Terminal blocks shall comprise brass tubular connectors with screw connections contained within moulded block suitable for working temperature up to 100 deg.C.

Terminals shall be designed to clamp the conductor between metal surfaces with sufficient contact pressure but without causing damage to the conductor. With the largest recommended conductor in position, and tightly clamped, there shall be at least two full threads of the screw engaging in the connector.

h. Fuses and Links

Fuses and links shall be provided to enable any circuit to be isolated as necessary for maintenance and test purposes without isolating the whole panel. All fuses shall be of the HRC cartridge type. Fuse carriers and solid link carriers and bases shall be made
of plastic moulded insulating material of an approved make. Other type of materials may be used subject to the “Engineer’s” Approval. All accessible live connections shall be efficiently shrouded and it shall be possible to change fuses with the circuit alive without danger of contact with live metal. The fuses shall be rated to give maximum protection to the apparatus in circuit and the rating shall be inscribed on the fuse label.

Earthing and neutral links in main supply circuits shall be of the solid copper bolted pattern.

Fuses and links functionally associated with the same circuit shall be mounted side by side. At least 10% spare fuses and links shall be provided.

An adequate number of spare fuse cartridges for each rating shall be supplied and fitted in clips inside the panel.

Descriptive circuit/function labels shall be mounted adjacent to all fuses and links, the layout of which shall correspond with the wiring diagrams.

i. Push Buttons

Push Buttons shall be coloured as follows:

(1) "Start" - Green;
(2) "Stop" - Red;

All other push buttons shall be black.

"Start" push buttons shall be effective when the selected switch is in the "local" position. They shall not be effective when the selector switch is in the "off" or "remote" position.

Emergency stop push buttons shall be provided and positioned in the immediate vicinity of the associated motor drive in all cases where:-

(1) There is no direct line of sight between the motor and the controlling starter;
(2) The distance between the motor and the controlling starter exceeds 5 metres;
or
(3) The level difference between the motor and the controlling starter exceeds 600mm.

Emergency stop push buttons shall be connected in the control circuits such that they are effective under all conditions, and shall have red mushroom headed pushes of the stay put pattern. A deliberate reset action shall be required before the drive can be put back into service, but resetting of the push button shall not restart the drive.

In addition to the contacts connected in the control circuits of the circuit-breaker of
starter, all emergency stop push buttons shall be provided with an additional contact for remote indication purposes. This additional contact shall close when the emergency stop push button is activated.

j. Instruments, Gauges and Meters

All instruments, gauges and meters shall be approved by the “Engineer” and those which perform similar duties shall be of uniform type and manufacture. They shall be flush pattern, dust and moisture proof suitable for the environment in which they are installed. Where hinged covers are necessary they shall be provided with locks. Indicating instruments shall be of the dial type fitted with zero adjuster externally accessible from the front, have no parallax error and have the normal maximum reading at approximately 600/6 full scale. Dials shall be white with black scales and black lettering not subject to fading. Scales shall be of such material that no peeling or discolouration will take place with age under any conditions.

Motor ammeters shall be capable of withstanding and indicating the starting current and shall have a compressed overload scales.

k. Control Transformers

All control circuit supplies for contactor starting shall be obtained from a 110V 50Hz internal control transformer contained in the cubicle.

Each control transformer shall be bus bar connected and be provided with isolation facilities and primary and secondary HRC fuses.

Transformers shall be of the double wound pattern and be provided with earth screw button primary and secondary windings. One end of the secondary winding shall be earthed.

l. Indication Lamps

Unless otherwise approved by the “Engineer”, indicating lamps on panels shall be suitable for operation on voltage below 50V and rated to withstand not less than 20% continuous over-voltage.

Lamps shall be well ventilated and the design shall readily permit removal of lamp glasses and bulbs from the front of the unit.

m. Control Switches

Switches for control selection, motor control and other purposes shall have spade type handles and with key locking facilities. Contacts shall be non-welding.

Control switches shall comply with the requirements of BS EN 60947-5-1.

n. Current Transformers

Current transformers shall comply with BS 7626 and shall be of the bar primary
pattern where practicable. All current transformers shall have a short-time current rating of not less than that of the switch panel in which it is incorporated. For bar primary current transformers this rating shall be for a period of 3 seconds and for wound primary designs the rating shall preferably be for a period of 3 seconds but may be reduced to not less than 0.5 seconds subject to Approval.

Current transformers shall have identification labels giving type, ratio rating, output and serial numbers.

In balance circuits, the spill current with maximum stability conditions shall not exceed one quarter of the operating current of the relay.

All protective current transformers shall be of Class ‘10P15’ accuracy. Other metering current transformers shall be of Class “3” accuracy.

Measuring current transformers shall be connected to test terminal blocks. The test blocks shall be provided with easily removable links, and designed to facilitate connection of test instruments to load without open-circuiting the current transformers.

o. Isolating Transformers

Isolating transformers shall be of the double wound air-cooled pattern to BS3535: Pt.1 Class II transformer. Separate windings shall be provided for the primary and secondary. The transformers shall be housed in double insulated enclosures.

p. Contactors

Contactors shall generally be of the air-break type fitted with are shields and rolling self-cleaning double-break silver face contacts contained in a dust-tight metal case. The units shall be complete with 240V operating coils, neutral links and HRC control fuses.

Contactors shall be electrically held in when in the closed position and fitted with a latch-in facility for test purposes. Each unit shall be fitted with a direct-coupled mechanically-operated indicator to show the contactor position.

q. Contactor Type Motor Starters

All contactor type motor starters shall incorporate air break contactors, triple pole HRC fuses, over current and earth leakage protection relays, necessary auxiliary relays, contactors, timers, auxiliary fuses, necessary wiring, main power cables and terminals which shall be properly interconnected. Control and indication facilities shall be provided on each starter as specified.

All low-voltage contactors shall comply with the requirements of BS EN 60947-4-1 and shall have a Utilization Category AC3 and Mechanical Endurance Class III.
Main drive motor starters shall be suitable for their required frequency duty in line with this Technical Specification. Other motors starters shall also be suitable for their required frequency duty but in no circumstance shall the frequency duty be less than 40 operations per hour. Their performance shall be in accordance with BS EN 60947-4-1.

All medium voltage starters shall incorporate a triple-pole, fully interlocked, load-breaking, isolating switch capable of breaking the installed motors current. Starters may be of the fixed or withdrawable pattern to the manufacturer’s standard. If they are withdrawable, facilities shall be provided for testing started control circuits and operation when withdrawn without the necessary for complete removal of the starter chassis. Where control circuit supplies and interlock circuits are broken via plugs on withdrawal of the starter at least one jumper lead and plug assembly of each size and type shall be provided to facilitate testing in the withdrawn (isolated) position.

All three phase motor starters shall be completed with three HRC fuses suitable for the starting duty of the circuit for short circuit protection and a triple pole hand reset thermal overload device with single phasing protection unless otherwise specified. Auxiliary contacts which close on the occurrence of overload/single phasing and remain closed until reset shall be provided for fault indications.

Where starters incorporate a number of contactors for reversing and/or assisted starting, these shall be both electrically and mechanically interlocked.

r. Relays

Protective, control, interlock and alarm relays shall be placed in positions readily accessible during operation of the plant. Unless otherwise Approved, these relays shall satisfy the general requirements of BS 14:

Relays shall be contained in dust-proof cases suitable for flush mounting on panels or cubicles, and shall not be fixed to doors without prior Approval.

All metal bases and frames of relays shall be earthed except where they must be insulated for special requirements.

The relays shall be of an Approved type, construction and flush relay equipment shall be of the flush withdrawable pattern and shall have protective means for retention in the service position.

The contacts of all relays shall be adequate for the maximum current that can occur in the circuit they control. They shall also be capable of breaking such currents, unless provision is made for automatically breaking the current on contacts elsewhere in the circuits. The contact shall be of Approved material and shall be capable of repeated operation without deterioration. Contacts for remote alarms and indication shall be volt-free hand reset.
Relays shall not be adversely affected by mechanical shock or vibration, or by external magnetic fields, consistent with the place or method of mounting.

Operation indicators shall be fitted to trip relays and such other relays or relay equipment to enable the type of fault condition to be identified. The indicator shall be capable of being reset without the relay case being opened.

Except when the requirements of auto-control circuits do not permit, all protection relays which initiate tripping (excluding tripping relays) shall have not less than two independent pairs of contacts, of which one shall operate the tripping relay directly without the interposition of auxiliary contactors, and preferably, without the use of reinforcing contactors.

All de relays shall operate satisfactorily when the supply voltage is between 50% and 120% of the rated voltage.

All relays shall be marked for purposes of identification with the following information:

(1) Function of relay
(2) Device number (BS EN 60617)
(3) Voltage and phase colour of the supply (where applicable).

All contacts for control and auxiliary equipment shall be adequately rated for their duty and subject to the Approval of the “Engineer”.

Earthing Arrangement of All Plant & Equipment

A continuous copper earth terminal shall be provided for all cubicles for connections to the metal cladding or armouring of all incoming and outgoing cables and, where specified, to the station earthing system. The cross-sectional area of the earth bar(s) shall not be less than the recommendations of BS 7430.

Earth bar for main earthing system shall be 300mm² tinned copper bar. No earth terminal shall have a cross-sectional area of less than 25mm². All metal parts of the Plant and equipment, other than those forming part of any electrical circuit, shall be effectively connected in an approved manner on to the main earthing system.

The entire conduit and trunking installation shall be electrically continuous throughout, forming a completely bonded system. All apparatus or parts thereof not directly connected to the conduit or trunkingsystem, shall be connected thereto by substantial bonding clamps. The earth pin of all switch sockets and the exposed conductive parts of all lighting fitting and all other fittings and equipment shall be effectively earthed.

The Contractor shall test every complete earth loop circuit comprising conduits, cable sheaths, core conductors and transformer windings. The impedance values of the loop circuits for each section of the installation shall not exceed 0.5 ohm.
12.3.3 Cable Trunking, Conducts & Fittings

a. Trunking and fittings shall comply with BS 4678, part 1. Factory fabricated bends and tee’s shall be used.

b. Trunking shall be manufactured in mild-steel sheet and shall be hot-dip galvanised. Trunking shall have a removable cover throughout its length with centre-screw latch fixing, or quick-fixing device reviewed without objection by the “Engineer”. The thickness of the sheet metal shall be 1.6mm for trunking size up to 100mm x 100mm and 1.8mm for trunking size of 150mm x 75 mm to 150mm x 150mm. Bonding link shall be fixed on external surfaces unless otherwise specified.

c. Unless otherwise reviewed without objection by the “Engineer”, the minimum size shall be 50mm x 50mm.

d. All bend, tee pieces, stop ends, outlets, intersections and adapters will be of the same manufacture as the trunking. All inside edges of trunking shall be smooth and provision shall be made to prevent abrasion at bends.

e. All conduits, except flexible conduit, shall be heavy gauge, hot-dipped galvanised welded steel complying with BS 4568: Part 1 Class 4. All conduit fittings and components shall be in accordance with BS 4568: Part 2.

f. Flexible conduit and fittings shall comply with BS 731 Part 1 and in addition shall be of a metallic watertight pattern, oversheathed with a low smoke halogen free material and with a separate earth wire enclosed within the conduit.

g. The minimum size of conduit used in the installation shall be 20mm diameter.

h. Separate conduits shall be provided for extra low voltage circuits.

i. Inspection-type conduit bends, elbows and tees shall not be permitted.

j. Standard conduit and draw-in boxes and covers shall comply with the appropriate British Standard and in addition shall be galvanised malleable cast-iron or steel. Draw-in conduit and cables entering the boxes shall be installed in accessible positions.

k. All boxes and conduit accessories shall be fully weatherproof when used in outdoor locations. Weatherproof boxes and conduit accessories shall also be used in locations other than outdoors when so specified or as directed by the “Engineer”.

l. All draw boxes and junction boxes shall be of ample size to permit the cables to be drawn in and out. They shall be made of galvanised 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 proper butting of the conduit and a tapped 5mm hole in the base to accept a solid brass earth terminal.

m. 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.

n. The ends of the conduit shall butt solidly in all couplings. Where they terminate in fuse-switches, fuse boards, adaptor boxes, non-spouted switch boxes etc., they shall be connected thereto by means of smooth bore male brass bushes, compression washers and sockets. All exposed threads and all bends shall be painted with an aluminium spirit paint after installation. Exposed metal shall be similarly treated.

o. All conduits shall be kept 80mm clear of water, gas and other services. All necessary equi – potential bonding shall be installed including that for piped services, in accordance with the IEE Wiring Regulations.

p. Particular care shall be taken to ensure that no water is allowed to enter the conduit at any time and all conduits shall be arranged with adequate ventilation and drainage. Inaccessible junction boxes will not be allowed.

q. The ends of conduits laid or set in formwork prior to concreting shall be temporarily sealed off with a coupler and a solid brass plug.

r. All bends are to be made on Site to suit site conditions. An adequate number of suitably sized hot-dip galvanised 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 fitted after every two bends, or after a maximum straight run of 15m. Tees, elbows and sleeves when used, shall be of type reviewed without objection by the “Engineer”.

s. 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.

t. Where conduit crosses expansion joints, the Contractor shall allow for the installation of expansion couplers at the position of the expansion joint and at right angles to it. Allowance shall be made for running an earth wire between each terminal fitted in the nearest conduit boxes at each side of the coupler. All flexible metallic tubing shall be galvanised water-tight pattern fitted with sweated brass adaptors. Typical details are given in the drawings for surface mounted conduit installation.
u. Wiring shall be carried out on the looping-in system and no joints other than at looping-in points will be allowed.

v. No cables installed in conduit shall be laced.

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CHAPTER 13

INTERFACES
13. Interfaces

The Contractor shall interface the design and construction of the Works with that of other contractors, principally the Contractors for the Designated Contracts as defined in the General Conditions of Contract. The Contractor shall keep the “Engineer” fully informed in respect of such interfaces, such information being given to the “Engineer” in a manner and form and at such intervals as stated in the Contract or as required by the “Engineer”.

Contract Packages for Signaling, Communications and Train Control

This contract provides for signalling and automatic train control systems including equipment in the station control rooms and the Operation Control Centre (OCC) such as train mounted control equipment, relay room equipment, independent telephone networks including automatic switching centres and exchanges, main trunk cables, direct telephone lines, communication equipment, emergency telephones, closed circuit television, radio communication.

Automatic Fare Collection

This contract provides for the revenue control system at stations, including automatic ticket vending machines, barriers, manual control and checking equipment and electronic linkages to station control rooms and the Central Control room.

Rolling Stock

This contract provides for air-conditioned rolling stock in rakes of up to 8 coaches.

Civil, E&M and VAC

The Contract provides for Civil and E&M works including the stations & tunneling. The E&M and VAC works include stations lighting, 415V AC distribution, tunnel ventilation, station air-conditioning, fire protection system etc.

The Contractor shall co-ordinate with these Contractors for design as well as installation related issues as part of his interface responsibilities. The relevant Contractors shall be referred to as Designated Contractors in this specification.

Building Management System (BMS)

This contract provides for the Building Services Management System for the Stations.
NP- SCADA Contract

This contract provides for non-power SCADA systems from stations to OCC.

Elevators

This contract provides for lifts at stations. The Contractor shall co-ordinate with the lift contractor for requirements related to remote monitoring and control system etc to be provided in Station Control Room.

13.2 Interface Responsibilities

The responsibility for specification and provision of the requirements for the works which interface with Designated Contractor’s equipment are tabulated below.

The Appendix "A" describes the interface requirements between Designated Contractors, which include Civil Contract & E&M Contract and this Contract.

This Appendix shall be read in conjunction with the relevant clauses of the Employer’s Requirements. The Contractor shall be responsible for ensuring that all requirements of the specifications pertaining to interfaces are properly satisfied.

This Appendix outlines the interfacing requirements during the execution of the Works. However the requirements herein specified are by no means exhaustive and it remains the Contractor’s responsibility to develop, update and execute jointly an Interface Management Plan (IMP) after the commencement of the Works and throughout the execution of the Works to ensure that:

a) All interface issues between the contractor and the Designated Contractors are satisfactorily identified and resolved; and

b) All the construction tolerances at the interface shall meet the requirements of the respective specifications relating to the interface points.

Where details of the design of this contract are required to enable the Designated Contractor to implement interface works, the Contractor shall provide the Designated Contractors with the necessary information including, but not limited to, those described in the summary table appended to this requirement. The level of information provided shall be in sufficient detail to enable the Designated Contractors to design and / or construct the required interface works.

The Contractor shall take a lead in developing the Interface Management Plan. The IMP will be prepared in conjunction with the Designated Contractors to cover all aspects of the implementation of the interface works required. The IMP will define the interface works necessary to complete all the works in this contract and is not limited to those listed in the summary table attached.

Should it appear to the “Engineer” that the progress of the Works, Works Programme or the Three Month Rolling Programme does not conform with the IMP, the Contractor shall be required to revise all such programmes and plans such that they do reflect the progress of the Works, are mutually consistent and conform to other provisions of the Contract.
The Contractor shall review the details of interface works and notify the “Engineer” of any amendments to the summary table required in the process of his works. Unless such requests are reviewed without objection by the “Engineer”, the Contractor shall design and construct the works in accordance with the provisions outlined in the Appendix “A”.

13.3 Scope of Work of Interface Management Plan (IMP)

The information and scope of works to be provided by the Contractor include but are not limited to those outlined in the Appendix A. The Appendix A only defines those tasks at the interface point and is not a complete itemisation of the Scope of Work.

The Designated Contractors shall liaise with the Contractor in the design, installation, testing and acceptance of works.

The Contractor shall provide all access and attendance necessary in accordance with the contract requirements to enable the Designated Contractors to complete those activities defined under the summary table attached to this interface specification in a timely manner.

Where the Contractor’s works are identified as failing to meet the requirements of the contract and which will impact the Designated Contractor’s works, the Contractor shall submit the proposed remedial measures to the “Engineer” for review and shall copy the same to the Designated Contractors.

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CHAPTER 14

SITE ARRANGEMENTS
14. SITE ARRANGEMENTS

14.1 General

14.1.1 In addition to the general conditions and provisions of the Site as described in the General Specification, this Section of the Specification sets out the site arrangements, conditions and requirements for the delivery and installation of the escalators supplied under this Contract.

14.1.2 Methods and procedures may vary depending upon site conditions which shall be discussed and agreed with the “Engineer” during the planning and installation stage but the Contractor shall make provision for alternatives in the methods and procedures provided that the basic criteria for delivery and installation as described below remain unchanged. Method Statement shall be submitted to Employer for approval 30 days before starting the work.

14.1.3 The conditions and requirements set out in this Section of the Specification shall not relieve the Contractor of his responsibility to deliver the equipment in time to meet the Approved programme as defined in Chapter 21 of this Technical Specification and to install the Plant in accordance with the Specification.

14.2 Access and Power on Dates

14.2.1 The Contractor shall note that no exclusive possession of the Site will be granted. The Contractor will be required to work with the Designated Contractors, the Interfacing Contractors and other contractors.

14.2.2 The Contractor shall take note of the access and power on dates shown in the “Engineer’s” Preliminary Programme and Project Calendar. Except approved by the “Engineer”, the Contractor shall not have exclusive access to the designated areas.

14.3 Works Areas

14.3.1 The Contractor shall coordinate with the Designator Contractor for the works areas allocated within the site in which he may erect offices, workshops and stores. The area allocated to the Contractor and the period of availability shall be interfaced with Civil Contractor as per decision of Employer which shall be binding to the Contractor.

14.3.2 The Contractor shall allow for transportation of all materials and equipment to the Works Areas and from the Works Areas to the Site.

14.3.3 The Contractor shall note that works trains are not intended for transportation of material and equipment except to those locations where road access would not normally be available. The Contractor shall coordinate with the relevant Designated Civil Contractors for delivery of major equipment by road access.
14.3.4 General attendance and other services will be made available at the Works Areas in accordance with the General Specification.

14.3.5 The Contractor shall be responsible for the cleanliness and tidiness of the Site after each period of work.

14.3.6 The period within which the area will be available to the Contractor is shown in Appendix 'C'. The Works Area shall be returned to the Employer no later than the date specified for the completion of the Works. The Contractor shall remove all facilities erected by the Contractor at the Works Areas before returning the Works Area to the Employer.

14.4 Delivery

14.4.1 General

Each escalator shall consist of truss, track, drive unit, steps, step chains, comb plates, handrails, driving machine, control cubicle, safety devices, balustrades, special tool kit for operation and maintenance and all other parts required to provide a complete escalator.

Each escalator shall be partially assembled, tested without handrail and balustrade decking at the Contractor’s Works, and then dismantled and delivered in sections to site, unless otherwise agreed by the “Engineer”. Provision shall be made to properly secure the in-truss equipment during transportation, and during access into the Works Area. Allowance shall be made for the truss being tilted at an angle of 45° to the horizontal when being delivered into the Works Area.

14.4.2 Methods of Delivery

The method of delivery of escalator sections to site shall be by road, and access to the Works Areas through a station entrance, and/or temporary access openings if provided, and via a route within the Site. The Contractor shall be responsible for arranging access into the Site with the Designated Contractors for the stations works. The Contractor shall co-ordinate the routes and time of entry into the stations with the Designated Contractors. The delivery route within the stations shall be agreed between the Contractor and the Designated Contractors. The access plan of each station shall be submitted for the “Engineer’s” Approval 30 days before starting the work.

The locations and size of the access openings and the size of working area around each opening will depend on site and local traffic conditions and shall be agreed by the “Engineer”. The method of delivery for each station shall be governed by the overall installation Programme of Jaipur MRTS and be subject to the “Engineer’s” Approval, whose decision shall be final.

14.4.3 Delivery, Access to and Through the Site
The Contractor shall make provisions to deliver his equipment by vehicles into the working area around the access opening. In the event that the working area is not large enough or the local traffic conditions cannot permit any container vehicle to gain access into a particular working area during normal working hours, the Contractor shall make arrangements to deliver the equipment by trucks and unload the equipment within a limited working area allocated by the “Engineer”.

When it is unlikely that a mobile power crane can be used within the vicinity of the access opening due to restricted site conditions, the Contractor shall arrange to maneuver his Plant by smaller traction equipment from the unloading working area into the access opening and Works Areas.

Transportation, unloading and delivery equipment such as hoisting frames, gantries, lifting tackles, chain blocks, trolleys etc., required for delivery, shifting and equipment access to the Works Areas shall be provided by the Contractor, unless otherwise specified herein or as Approved by the “Engineer”.

The Contractor shall provide a Schedule of major deliveries of Plant for each station to the “Engineer” at least 2 months prior to the first delivery.

Each escalator section shall preferably be hoisted into position in the well way immediately after delivery to Site. Long period of storage inside the station will not be allowed, unless written permission has been received from the “Engineer”.

The Contractor shall provide adequate means to protect completed architectural finishes during delivery and shall make good any damage caused by delivery of the equipment.

**14.5 Installation**

**14.5.1** It is desirable that the installation time of Escalators on Site shall be kept to a minimum and the proposed design shall take due account of this requirement.

**14.5.2** The Contractor’s attention is drawn to the restrictions on working area available on Site and shall make his own arrangements to store materials and equipment off-site or at the Depots until such time as they can either be incorporated into the Works or stored within the working area assigned to him.

**14.5.3** The Contractor shall co-ordinate with the Designated Civil Contractor for the hoisting points and confirm acceptability before commencing installation. When it is not possible to provide such hoisting points due to its particular location. In such case, the Contractor shall provide suitable hoisting frame, gantries or the like for hoisting. Safe working load of such equipment shall be stated and relevant testing certificates shall be submitted for the “Engineer’s” Approval.

**14.5.4** All other lifting equipment such as lifting tackles, chain blocks etc., required for
installation purposes shall be provided and installed by the Contractor.

14.6 Care of Works

14.6.1 The Contractor shall protect the equipment within his own reasonable control, particularly in normal construction site conditions such as dust, dirt, plastering and small particles which may possibly damage the equipment, stainless steel decking and panels, if they are not properly protected. Such damage, if occurring, shall not relieve the Contractor of his responsibility to repair and/or replace these parts, depending on individual conditions, to the satisfaction of the “Engineer”.

14.6.2 The contractor shall provide adequate protection to the Escalators during the Stop Work Period and before handing over of the complete installation to the Employer. The protection shall not be removed unless instructed by the “Engineer”.

14.7 Material Recovery

14.7.1 The Contractor shall remove all redundant materials and cables from Site. The Contractor shall handle all redundant equipment with care and deliver to a location designated by the “Engineer” where it shall be stored in a neat and orderly fashion.

14.7.2 Recovery work shall occur after the completion of every stage of the above mentioned Works and as directed by the “Engineer”.

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CHAPTER 15

PACKAGING, SHIPPING AND DELIVERY
15 PACKAGING, SHIPPING AND DELIVERY

15.1 General

15.1.1 All the stipulations laid down in the GS shall apply.

15.2 Packaging and Shipping

15.2.1 All equipment Goods and materials shall be properly inspected to ensure that there are no defects before shipment. An inspection tag bearing the words “INSPECTION PASSED” giving reference number to the inspection date and details to permit verification of inspection details shall be attached to those items inspected satisfactorily.

15.2.2 The four adjacent sides of each package shall be marked with permanent paint with the following information:

CONSIGNEE
COMMODITY
CONTRACT No
SHIPPING MARK

15.2.3 Appropriate caution notices such as “FRAGILE”, “HANDLE WITH CARE”, “KEEP DRY”, KEEP UPRIGHT” along with visual display symbols internationally accepted shall be conspicuously displayed on the outside surfaces of boxes, crates and packages.

15.3 Delivery

15.3.1 The Contractor shall be responsible for transportation and delivery of materials to site or to the storage space and shall continue to be responsible for its safe storage, handling, erection and commissioning.

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CHAPTER 16

NOT USED
16 NOT USED
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CHAPTER 17

MAINTENANCE REQUIREMENTS
17. MAINTENANCE REQUIREMENTS

17.1 Maintenance

In addition to his obligations under the Conditions of Contract, the Contractor shall provide maintenance services throughout the Defects Liability Period (DLP) and also for the specified period for all the escalators supplied under the Contract. Maintenance work shall include attendance to all service calls, work described in approved Maintenance Schedule, and the followings:

17.1.1 All defects shall be remedied either when observed on the weekly service call or on an attendance to a service call. Service shall include all work necessary to maintain the entire escalator system in good working order at all times.

17.1.2 The Contractor shall supply adequate quantity of consumable and contingent spare parts in order to minimize the shut down time due to repairs and maintenance. All parts rendered defective, including replacement of indicator lamps and programmable circuit board, shall be replaced by the Contractor. The list of these consumable & contingent spares (DLP spares), tools and mandatory spares are enlisted in appendix “E”. Any additional spares, tools and test equipment are required the same may be indicated by the Firm in their Technical Offer. The employer may revise the list of spares at the time of submission of the Preventive Maintenance Schedule (PM) & Corrective Maintenance (CM) procedure, as mentioned in 17.1.10. These spares as per the approved list will be handed over by the Contractor to the employer at the time of taking over of equipment / section in proportionate quantity and will be issued by the employer to Contractor during DLP based on actual consumption. The balance spares shall be the property of the employer and if any additional spares are required the contractor shall arrange the same without any extra payment. Mandatory spares provided to the Employer under the Contract will not normally be released to the Contractor for such purpose.

17.1.3 The Contractor shall dispatch competent personnel to rectify stoppages at any time during the day or night when being called on by the Employer. Repairs shall be carried out on a 24 hours per day, 7 days per week basis until the faulty unit is put back in service.

17.1.4 The Contractor shall carry out periodic testing and examination of equipment safety devices as may be required by the provisions of any enactment in force relating thereto or of any enactment, regulations or by-laws of any local or other duly constituted authority which may be applicable to such tests and to provide such copies of the test certificates, duly signed by a Registered Escalator “Engineer” and Registered Escalator Contractor, as may be required. A master schedule of such planned tests shall be submitted to the Employer at least two months before
commencement of the DLP.

17.1.5 The Contractor shall provide quarterly and half-yearly reports on the condition of the equipment in an agreed format. Such reports shall include event logs and performance data collected from the associated indicative panel stored on diskettes or other agreed medium, over the reporting period. Such data shall enable off-line individual and fleet statistical analysis to be performed on the lap-top Personal Computer supplied by the Contractor.

17.1.6 A report in duplicate shall be sent to the Employer immediately following every call out, indicating the time of call out visit, cause, remedial action taken and the time that the service was restored. The monthly summary of failure report along with the analysis given details of nature of fault, remedial action taken etc in the approved format shall be provided.

17.1.7 Reports on routine visits are not required except where necessary to draw attention to defects of a minor nature which could not be rectified during the routine visit. Records of each routine visit and call-out visit, together with details of the work done or action taken, shall be entered on a log book which shall be provided by the Contractor and retained in the escalator machine room or other location as decided by the “Engineer”.

17.1.8 Before the expiry of the Defects Liability Period, the Contractor shall perform a loading test for each escalator to re-confirm that the function of the system is being met and shall undertake corrective adjustment if necessary. This test may be incorporated into the half-yearly equipment survey maintenance works.

17.1.9 The Contractor shall provide a maintenance plan and a major component replacement programme for review and acceptance by the “Engineer” 90 days before the programmed commencement of the Defects Liability Period.

17.1.10 The Maintenance service shall include all Preventive/Scheduled & Corrective Maintenance. In this context, the Contractor shall submit a PM Schedule and CM procedure for Approval, 3 months before the commencement of the DLP.

17.1.11 In order to ensure that the system will meet the RAM targets and Customer Service requirements using the minimum resources, the Contractor shall conduct a detailed Maintenance Requirement Analysis to derive a complete list of preventive maintenance schedules and procedures under the Contract. The Maintenance Requirement Analysis shall identify for each system function the potential functional failures, the failure consequences and the appropriate maintenance approach. RAM analysis shall be submitted quarterly during 2 years DLP. Based on the Maintenance Requirement Analysis, the Contractor shall indicate in the
Maintenance Plan, the final preventive maintenance programme, the proposed skill and manning level, spares level and special tools require. The proposal shall be fully traceable to the maintenance Requirement Analysis output.

The Maintenance Requirement Analysis shall be submitted as part of the maintenance plan, under the main contract tender submission. However, tenderers will be allowed to defer submission of this Analysis, latest 12 months before the commencement of the Defect Liability Period, by presenting formal written request for such deferral.

17.1.12 Accommodation for Emergency Service Report Centre

An Office of suitable area will be provided by the Employer as the emergency service report centre. The premises will be located at least one place in the Jaipur Metro Network on station as determined by the Employer”.

17.2 Employer’s Maintenance Strategy

17.2.1 Maintenance Strategy

The Contractor shall ensure that the system designed, installed and commissioned is supportable throughout the service life of the System to address, as a minimum, the following:

Design errors in the System;
Operational changes;
Environment changes; and
Changes in infrastructure.

According to the maintenance strategy, all equipment and infrastructure supplied for the 'Project' must be designed for minimum or no maintenance. Maintenance activities required must be capable of being performed with little or no impact on the train service. In addition, the maintenance work systems shall ensure safety of personnel and equipment.

17.2.2 The Contractor, upon noticing any defects, deficiency in quality and quantity of spares and materials shall without delay, arrange for alternative source of supply and submit his proposal to the “Engineer” for review.

17.3 Maintenance during DLP

During the 2 years’ DLP period, the contractor shall carry out all type of preventive and breakdown maintenance. The preventive maintenance would be done during non-traffic hours whereas breakdown maintenance would be done whenever breakdown occurs. “The contractor should post his supervisor and maintenance staff at least one places in the JMRC network on the stations as determined by the Employer”.

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The acceptable response & attention time also needs to be mentioned for minor & major breakdowns.

17.3.1 Maintenance Management System (MMS) and Maintenance Arrangement
During non-operation time, sections of line will be closed for maintenance work. The minimum time for possession periods is 4 hours. Ideally, this time shall be the free time available for maintenance.

17.3.2 Competency of Personnel
During the DLP the Contractor shall depute sufficient trained and competent personnel for maintenance purpose.

Such persons shall have their generic competence established and must demonstrate their specific competence and knowledge in the particular systems, environment and procedures.

The Contractor shall provide evidence of specific competence and knowledge, which shall include:

- assessment and certified training in particular applications and operations;
- recording of competence and work in the license holders logbook; and
- receiving or in receipt of sufficient and current exposure to the area of work that the holder is licensed for.

Routine spot checks on licensing may be carried out from time to time by the “Engineer’s” qualified personnel on the proficiency of the Contractor staff.

In the event of a failure, the Contractor shall undertake the management and investigation necessary to identify and rectify the cause.

17.3.3 Testing and Re-commissioning of System and Equipment
In the event of a failure requiring modifications to the System, the Contractor shall undertake any testing and re-commissioning required. Any such modification shall be submitted for review by the “Engineer”.

17.3.4 Temporary Alterations to Restore Service
The Contractor shall undertake any temporary modifications necessary to maintain service. Any such modification shall be submitted for review by the “Engineer”.

17.3.5 Discrepancies between Installation and Design Records
Should the Contractor discover inconsistencies between the maintenance drawings and documentation and the installed equipment, the Contractor shall correct all such errors within two weeks.

17.3.6 Communications
The Contractor shall ensure that adequate communication facilities are provided to its staff during the DLP.

17.3.7 Location of Staff

The Contractor shall be responsible for locating staff such that the Contractor meets its obligations.

17.3.8 Storage of Equipment and Materials During the Maintenance Period

The Contractor shall ensure that no equipment is stored along the trackside.

The Employer will provide defined storage locations for the support of the different levels of Maintenance.

The Contractor shall satisfy itself and the “Engineer” that the storage locations for equipment and materials will meet the performance requirements of this TS.

17.3.9 Maintenance Regimes

The Contractor shall produce a maintenance regime for the equipment that shall comprise two constituent parts, corrective and routine/preventative maintenance.

Corrective maintenance shall be available 24 hours per day, able to respond to all foreseeable circumstances.

The maintenance regime shall cover all parts and equipment of the system designed, installed and commissioned by the Contractor.

The Contractor shall take into account the requirements of the operations and maintenance when determining and proposing its maintenance regime.

17.3.10 Scope and Hours of Coverage

The regime and structure of corrective maintenance shall be robust in design.

The Contractor shall provide a full 24 hour On-Call coverage and shall be such that initial response and rectification of failure are in accordance with the following:

- assistance for first line corrective maintenance within 30 minutes, upon request of first line maintainer;
- 24 hour from notification for second line maintenance where spare parts replacement is involved; and
- within 2 weeks including transportation time for third line maintenance where replacement or repair of component from factory is involved. Any extension to this time shall be agreed with the “Engineer” and a replacement provided.
All elements of First Line preventative maintenance shall be carried out and completed during non-traffic hours without interrupting train services.

If the equipment is kept non-functional for more than a week then the DLP may be enhanced proportionately in the multiple of month.

17.3.11 Failure Investigations

The Contractor shall conduct failure investigations.

Disputes between the Contractor and other Contractors will be resolved by the “Engineer”.

The Contractor shall make available to the Employer all test and failure data as required.

17.4 Software Support

17.4.1 General

The Contractor shall submit to the “Engineer” for review, the software support plan at least 90 days before commencement of software installation.

Employer will have the right, for multiple use of the Software. Employer at his discretion may download the software on multiple PCs as per the requirement. For this purpose, no specific password, Key Number etc should be required from the Contractor / Software firm.

All changes, bug fixes, updates, modifications, amendments, new versions shall not result in any non-conformance with this Specification.

The Contractor shall submit all new versions to the “Engineer” for review at least 2 weeks prior to their installation.

The new versions of software shall not degrade the operation of the System.

17.4.2 Security Obligations

Within 14 days of the installation of any software into the Permanent Works by the Contractor, the Contractor shall submit to the “Engineer” for retention by the Employer two back up copies of the software, which shall include any specified development tools required for maintenance of the software, including, but not limited to, editors, compilers and linkers.

Any software item delivered by the Contractor to the “Engineer” pursuant to the above Paragraph shall not be translated or modified by the Employer without the prior consent of the Contractor unless:

- the owner of the software becomes insolvent or has a receiving order made against it or makes an arrangement or assignment or composition with or in favour of its creditors (including the appointment of a committee of inspection) or goes into
liquidation or commences to be wound up or has a receiver, liquidator, trustee or
similar officer appointed over all or any part of its undertaking or assets or if distress,
execution or attachment is levied on, or if an encumberancer takes possession of,
any of its assets or any proceeding or step is taken which has an effect comparable to
the foregoing in any relevant jurisdiction; or
- the owner of the software ceases to trade; or
- the owner of the software assigns copyright in the software and the Contractor fails
within 60 days of such assignment to procure in favour of the Employer, a licence
from the new owner in the same terms as that required by the Contract; or
- The Contractor is in breach of any of his obligations under the Contract.

17.4.3 Error Correction
The Contractor shall inform the “Engineer” immediately when a fault is discovered
within delivered software or documentation.

On receipt of a request from the “Engineer” for identification or further diagnosis of a
failure or fault, the Contractor shall provide appropriate resources.

The Contractor shall provide written details as to the nature of the proposed
correction to the “Engineer”.

17.4.4 Training
The Contractor shall provide training for Employer’s staff to enable the Employer to
make proper use of any new versions.

17.4.5 Fixes or Patches
The Contractor shall notify the Employer promptly of any fixes or patches that are
available to correct or patch faults.

The Contractor shall detail any effect such fixes or patches are expected to have,
upon the System.

17.4.6 New Versions
The Contractor shall ensure that all new versions are fully tested and validated on the
simulation and development system prior to installation.

The Contractor shall ensure that all new versions are fully tested and commissioned
once installed on the Site.

The Contractor shall deliver to the Employer any new version, together with the
updated Operation and Maintenance Manuals.
The Employer shall not be obliged to use any new version and that shall not relieve the Contractor of any of its obligations.

Any effect upon the performance or operation of System that may be caused by a new version shall be brought to the Employer's attention.

17.4.7 Routine and Corrective Maintenance Procedures

Routine and corrective maintenance procedures shall be supplied for all equipment. The format shall be as follows:

- Uniform format and layout irrespective of equipment supplier;
- Colour coding for each activity;
- Cross referenced to the Operation and Maintenance Manuals; and
- Document control information.

17.4.8 Operation Activities

All operational activities shall comply with the Employer's safety rules, and requirements of the Operation and Maintenance Manuals.

The Contractor shall recommend in detail the frequencies for preventive and corrective maintenance, and what items of work are to be carried, including but not limited to the following.

- Step-by-Step procedure to carry out the task;
- Diagrams and flow charts for illustration, if applicable;
- Precautions for the maintenance personnel to follow; and
- Estimated duration and manpower required.

**JMRC shall facilitate Entry/Exit to the contractor staff for attending failures and maintenance during DLP and AMC**

END OF CHAPTER
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EMPLOYER’S REQUIREMENTS
TECHNICAL SPECIFICATION

CHAPTER 18

SPARES, SPECIAL TOOLS AND TEST EQUIPMENT
18. SPARES, SPECIAL TOOLS AND TEST EQUIPMENT

18.1 General

18.1.1 The Contractor shall note the requirements stipulated in the General Specification and Spare Policy as provided at Appendix-E of this TS.

18.1.2 The Contractor shall supply all spares, special tools and test equipment to facilitate the maintenance, repair and overhaul of the escalators effectively and efficiently while ensuring their performance to a high standard of safety and reliability consistent with the requirements as detailed in this Specification. The details and Policy for various spares, tools and test equipment required has been provided in Appendix – E. Any additional spares, tools and test equipment are required the same may be indicated by the Firm in their Technical Offer.

18.1.3 All spare parts shall be identical to the equivalent installed items and strictly interchangeable, be suitable for use in place of the original parts fitted and comply with this Technical Specification and the tests specified therein.

18.1.4 They shall be suitably marked and numbered for easy identification and shall be packed for long storage in wooden boxes in suitable groups for easy maintenance. While necessary parts shall be coated in protective material to prevent deterioration.

18.1.5 In the event that rectification and/or modifications are introduced to any part of the equipment which are deemed necessary by the “Engineer” in order to comply with the Specification requirement, the Contractor shall modify and replace all spare parts and/or special tools whether delivered or otherwise.

18.1.6 The Contractor shall guarantee that the test equipment supplied shall be well calibrated in accordance with manufacturer’s instruction. Appropriate calibration certificates shall be required by the “Engineer” for checking prior to carry out testing and commissioning.

18.2 Spares

18.2.1 Commissioning and DLP Spares
The Contractor shall recommend and provide a list of commissioning and DLP spares with sufficient quantities to ensure the successful completion of the testing and commissioning activities and covering of DLP. Details are provided in Spare Policy at Appendix-E of this TS.
18.2.2 Mandatory, Unit exchange, Recommended and 10 years Spares beyond DLP Details are provided in Spare Policy at Appendix-E of this TS.

18.3 Test Equipment

18.3.1 NOT USED.

18.3.2 Portable Test Equipment

Portable lap top computer shall be provided to allow rapid verification of satisfactory operation of system, assist in trouble shooting and isolating sub-system failures. Use of Portable lap top computer shall not require any mechanical or electrical disconnection to or within the sub-system under tests.

Four numbers of portable lap top computer for the entire contract specified at clauses 18.3.2 shall be provided by the Contractor.

18.4 Special Tools

18.4.1 The Contractor shall provide all necessary tools for normal as well as emergency rescue operation and for maintenance purpose including tools such as brake releasing devices and hand winding devices, all other keys for the key operated switches such as the key to open the Auxiliary Switch Cabinet. 3 set of keys for each escalator shall be provided by the Contractor at the time of hand over to Employer for trial Operations.

18.4.2 The Provision of the special tools under this part of the Technical Specification shall be deemed to have been included in the Contract and shall be handed over to the “Engineer” when the escalator installations are completed.

18.4.3 Certain items of these special tools shall be fixed on to a shadow board or housed in a container mounted at an approved location inside the escalator machine rooms. Details of the arrangement will be given to the Contractor by the “Engineer” during the installation stage.

18.4.4 The Contractor shall supply one complete set of any special tools for each type of escalator that are necessary for routine maintenance to be carried out. These tools shall be supplied in a suitable hard wood or steel tool box

18.5 Availability of Consumable Spares during Defect Liability Period

18.5.1 Consumable Spares shall be provided as per Spare Policy given at Appendix-E of this TS.

18.6 Not used

18.7 Second Sourcing for Non-Proprietary Items
18.7.1 The Contractor shall identify principal source suppliers that can supply the Mandatory Spares. The Contractor will furnish the list of proprietary items. For non-proprietary items the contractor shall submit the list of alternate/second source of suppliers.

18.7.2 The Contractor shall ensure that second-source supplier information is maintained up to date up to a period of 10 years after taking over of whole works. The Contractor will provide support to the Employer to a reasonable extent regarding the second-source supplier information throughout the service life of the system.

18.7.3 The Contractor shall make the second-source supplier information available to the “Engineer” at the time of submission of the final design and taking over of the works.

18.8 Long Lead Times
18.8.1 The Contractor shall identify the lead times for all spare parts. Parts with long lead times shall be identified in the spares list.

18.9 Routine Change
18.9.1 In the event that any item of the supply requires to be routinely changed or calibrated, regardless of whether it appears in the spares list or not, it shall be identified to the “Engineer” together with the routine change interval.

18.10 Shelf Life
18.10.1 In the event that any of the spares identified have a particular life or storage requirement, this shall be made known to the “Engineer” with the submission of the spares list, including the necessary action for disposal or storage.

18.11 Price of AMC Charges
The Contractor shall furnish price for 3 years AMC rates beyond the DLP. The details shall be provided in statement 9A of BOQ (Pricing Document-Vol-7).

18.12 Vendor Approval Policy
Refer Appendix-F of this TS for vendor approval Policy.

END OF CHAPTER
CONTRACT

EMPLOYER’S REQUIREMENTS
TECHNICAL SPECIFICATION

CHAPTER 19

TRAINING AND TRANSFER OF TECHNOLOGY
19 TRAINING AND TRANSFER OF TECHNOLOGY

19.1 General Requirements

19.1 This section of the specification covers the requirements for a Training Program to train the Employer's maintenance, operations and training personnel. The training Program shall enable the staff to operate, service, enhance, maintain, and interact with, the hardware, software, and firmware, such that the escalator systems and associated equipment will perform in accordance with the specifications of this contract.

The Contractor shall provide comprehensive training to the Employer’s staff, including Employer’s training Instructors. The Employer’s staff basically consist of Executives, senior supervisors, junior supervisors and maintainers. Some of the senior supervisors would be nominated as Employer’s Training instructors. The Contractor shall provide competent training instructors, training manuals, all necessary aids and materials in support of all training courses. The training manuals shall be submitted in original plus five hard copies and in electronic format.

The training instructors shall be qualified, competent, with sufficient years of practical experience in the relevant fields and possesses good communication skills.

The training instructors shall be competent staff of the Contractor, or the subcontractors or the equipment manufacturers.

19.1.2 The training shall be carried out at such locations where the greatest benefit for trainees may be gained. This may be in India, abroad, at place of manufacture, assembly or testing, or at such other locations as may be necessary. All places of training shall be subject to review by “Engineer”.

19.1.3 The training courses and/or sessions shall include system performance requirements and all major equipment and works designed, by the Contractor.

19.1.4 The Contractor shall provide full-time on-Site management and co-ordination of the entire training programme to ensure the continuity of classes, and proper distribution of training materials, and be responsible for interfacing with the instructors.

19.1.5 The training courses shall be delivered to all relevant Employer’s staff, including instructors, operation and maintenance engineering staff.

19.1.6 The training shall cover a holistic view of operation & maintenance of complete Escalator system. It should also cover, man-power requirement, job description, maintenance infrastructure requirements including tools, test-instruments, spares etc.
19.1.7 Audio-visual aids, class room training, site visits, on the job training and Trainer’s kit for training on trouble shooting to be used.

19.2 **Scope of Training**

The training shall be provided by the Contractor to the Employer’s personnel in design, manufacturing, testing, system architecture and installation practices related to Escalators. This will cover training in India and abroad including training at manufacturing facilities.

19.3 **Training Programme**

Contractor shall submit a training programme for imparting training to Employer Staff with batches of approximately 20 persons for Escalator systems in following areas.

<table>
<thead>
<tr>
<th>S.N</th>
<th>Description</th>
<th>Total Period (Trainer Working days)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Design of Escalators</td>
<td>05</td>
<td>During the Design Stage</td>
</tr>
<tr>
<td>2</td>
<td>Manufacturing facilities, Testing methods and procedures, Working MRTS installations. Short Module course on System description, architecture etc, for Escalators. Training in O &amp; M in operational MRTS where similar system functions.</td>
<td>05</td>
<td>During manufacturing at factory premises and other locations.</td>
</tr>
<tr>
<td>3</td>
<td>Installation and site testing practices for Escalators</td>
<td>10</td>
<td>During installation and commissioning phase</td>
</tr>
<tr>
<td>4</td>
<td>Escalator control &amp; monitoring system, troubleshooting, fault diagnosis, emergency handling, etc.</td>
<td>15</td>
<td>At existing installation in other MRTS or similar sites.</td>
</tr>
<tr>
<td>5</td>
<td>Overall view of Escalator system, Operation and maintenance practices for Escalators, Maintenance infrastructure, PM &amp;CM, CBM (vibration etc.)</td>
<td>30</td>
<td>At suitable locations</td>
</tr>
</tbody>
</table>

19.4 **Training Plan**

The Training Program shall be prepared and submitted by the Contractor as per requirements of GS.

19.5 **Training Courses**

The Contractor shall provide Training Courses on all facilities, systems, equipment, hardware, and firmware, software. Each Course shall be specific, and shall consist of
classroom, hands-on, or field training as necessary to accomplish the Course Objectives specified in the Training Program Plan. The Contractor shall provide training courses for each of the sub-systems, including, but not be limited to:

(i) Escalator structure and support  
(ii) Escalator drive and braking system  
(iii) Escalator Control & monitoring system

Different types of training courses of each subsystem shall be provided for staff from different disciplines. Operations training courses shall be provided for the operations staff. Maintenance courses shall be provided for 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 additional staff in future in all aspects of operation and maintenance of the System.

Training is also required to be given to all station operating staff in emergency operations & small recoveries and to identify the defects so that maintenance teams can be called.

19.6 Operations Training Courses

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:

- Overview of the Escalator Systems;  
- Brief description of the operation principle each of the Subsystems;  
- Operational features and functions;  
- Familiarisation and use of all man-machine interfaces involved;  
- Reading and interpretation of system status and alarm messages or indications;  
- Normal operating procedures;  
- Operating procedures under emergency situations;  
- Procedures for recovery from minor or simple faults; and  
- Use of Operation and Maintenance Manuals and documentation.

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 fault recovery.
19.7 **Maintenance Courses**

The maintenance courses shall be developed to provide all necessary knowledge and skills:

1) To perform full maintenance, including preventive/corrective maintenance and condition based maintenance on the Escalator Systems and use of CM techniques like vibrations.

2) To perform system Engineering management including system parameter configuration, enhancement, adjustments and provision of new equipment and components.

3) Man-Power requirement.

4) Maintenance infra-structure requirement.

The Contractor shall determine the content of the courses and the courses shall include the following as minimum:

- Overview of the Escalator Systems;
- System features and functions;
- Operation principles;
- Description of system components;
- Test and commissioning procedures;
- Use of test equipment and special tools;
- Reading and interpretation of alarm indications, messages and print-outs;
- Preventive maintenance procedures;
- Fault diagnosis, troubleshooting and corrective maintenance procedures;
- Equipment settings and parameters configuration;
- Use of equipment manuals, Operation and Maintenance manuals, circuit diagrams and wiring schematics;
- Methods and procedures to provide new circuits, system expansion and enhancement;
- Data, software backup and loading; and
- Use of software such as peripheral control and configuration, utility, database structure, generation and modification.

Practical exercises shall be provided for each trainee to practise the following as minimum:

- Use of test equipment and special tools;
- Preventive maintenance;
- Fault diagnosis and troubleshooting with induced faults set by the Contractor to simulate real-life situation; and
- Faulty modules or cards replacement and restore the system to normal operation.
- CM techniques.
- CM based maintenance (CBM), Maintenance Requirement Analysis (MRA), Reliability centred maintenance, FMECA, RAMs etc.

19.8 Training Materials

Audio-visual Training Aids, Interactive Training Video CD, Training Materials, and Training Devices (like Trainer’s kit) shall become the property of the Employer on approval of the Training Demonstration, or on approval of the Final Deliverables, as applicable. For every lecture, training manual is to be given well in advance before commencement of training.

The Contractor shall provide all Training Aids, Interactive Training Video CD, along with the Training Materials, Training Devices, Special Tools, fixtures, models, or other equipment required to train Course participants.

Training Manuals are a convenient source document for use in the field. However, for every lecture, handouts with Interactive Training Video CD will also be required to be given.

Training Manuals shall be separate from Operation and Maintenance Manuals.

The Contractor shall prepare Training Manuals bi-lingual (i.e. in Malayalam or any other Indian Language as approved by employer and English both) as per requirement of the project, and submit them to the Employer for review and approval at least 60 days prior to the start of the Training Demonstration.

Throughout the Contract and DLP, it shall be the responsibility of the Contractor to supply the Employer with all changes and revisions to the Training Manuals.

Training Manuals shall become the property of the Employer.

The Contractor shall provide the master and five hard copies of the Training Manual for each course/subject.

The Employer reserves the right to copy all Training Manuals for use in Training Courses.

The Contractor shall, for each course, distribute two sets of trainer’s guides for the trainers, one set of training handout for each trainee, two sets of trainer’s guides and three additional sets of training handout to the Employer before the commencement of the training course. Electronic copy of Trainer’s guide & Training manual will required to be provided.

All the training materials shall be accurate and match with the actual design of the System.

19.9 Training Records

The Contractor shall keep records on the attendance of trainees.

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 for review four weeks before the commencement of the training course.

The Contractor shall issue appropriate training certificate to the trainees who pass the assessment and have over 80-90% attendance. At the end of successful training, contractor shall issue competency certificates to O & M staff of various levels.

19.10 **Training of Employer’s Training Instructors (ETI)**

19.10.1 The objective of this training is to enable the Employer’s Training Instructors to be competent to deliver future courses for other employees of the Employer.

19.10.2 The Contractor shall provide training to the Employer’s Training Instructors on the various Systems. Aspects covered shall include, but not be limited to, the following:

- Basic Operating & Features and functional principles of the Escalator Systems
- System design aspects including but not limited to design standards, design criteria and parameters, short-circuit and other calculations, insulation and protection coordination;
- Details of major equipment and components used in the System;
- System operation and maintenance management procedures;
- Control and monitoring systems for Escalators;
- Trouble shooting, faults, failure analysis & remedial action, PM, CM & CBM, first level, second level & third level maintenance.

19.11 **Transfer of Technology (TOT)**

Tenderer shall submit the detailed plan of transfer of technology along with MOU with suitable Indian companies or company having proven track record and are working in related areas for all major systems/subsystems.

TOT shall be essential and shall include system assembly, installation, maintenance and software modification/customization and training of Indian Company’s personnel to cover;

- All configuration/application programmes for Escalator system for:
  - Engineering of extensions and upgradations of stations.
  - Re-engineering to suit changed traffic conditions.
  - Incorporation of additional features.
  - Incorporation of optional facilities.
  - Addition /Modifications to equipment and components
  - Maintenance of Escalators.
  - Change in parameters of any of the Escalator equipment in stations.
The Transfer of Technology may require involvement of Indian Company's personnel in design, manufacturing, testing and installation of Escalator Sub-Systems during the Contract period. The Contractor shall undertake to supply or make arrangement with the original manufacturer to supply additional equipment required for replacement or upgradation of the Escalator systems in future. The Contractor shall undertake to provide to the above Indian Company, during the life of the equipment ordered technical assistance in the form of additional drawings, maintenance practices and technical advice.

END OF CHAPTER
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EMPLOYER’S REQUIREMENTS
TECHNICAL SPECIFICATION

CHAPTER 20

OPERATION AND MAINTENANCE
DOCUMENTATION
20  OPERATION AND MAINTENANCE DOCUMENTATION

20.1  General

20.1.1  The Contractor shall provide Interactive Training and Operation and Maintenance manuals, bi-lingual (i.e. in Malayalam or any other Indian Language as approved by employer and English both) and Interactive Video CD, for use by supervisory, operating and technical staff of Employer.

Requirements of Interactive Manual

The contractor shall submit in English language Interactive Electronic Technical Manuals (IETMs) to manage technical documentation. IETMs shall compress volumes of text into CD-ROMs which may include sound and video, and shall allow readers to locate needed information rapidly than in paper manuals.

This IETM shall follow the structure and format of a printed book, with indexes and table of contents that are hyperlinked into the content of the document. All figures, tables and section references shall be linked.

The data to be stored in a relational database, obtaining benefits of data integrity and removal of data redundancy. Relationships in the content that are presented as hyperlinks, are mapped directly to relations in the database scheme. The IETM shall be able to change the content dynamically based on users navigation and input through the content; the content may now be user specific.

20.1.2  Requirements of submission have been furnished in Chapter 11 of GS.

20.1.3  Each and every manual shall be divided into indexed sections explaining the subject matter in logical steps. Most manuals shall consist of A4-size printed sheets bound in stiff-cover wear-resistant binders clearly and uniformly marked with the subject matter and reference number. Where alternative sizes are proposed, (e.g. A5/A6 pocket books of schematic wiring diagrams) these shall be submitted for review of “Engineer”. The binding shall allow for all subsequent changes and additions to be readily effected.

20.1.4  Information shall be provided in pictorial form wherever possible and shall include step-by-step instructions and views of the particular equipment including exploded views. Programmable equipment shall be supplied with sufficient flow charts and fully documented programmes to enable faults to be quickly identified and system modification to be undertaken at any time.
20.1.5 The Contractor shall provide clarifications and amendments to the Operation and Maintenance manuals as necessary during the Defects Liability Period. Updates shall be provided for the originals and all copies.

20.1.6 The first draft of operation & maintenance manuals are to be provided at least 60 days before the installation commences. These should be corrected as per employer’s comments and finally be submitted during installation and commissioning.

20.1.7 Hard copy as well as electronic copy should incorporate colour photos, colour sketches and drawings in pictorial form wherever possible.

20.2 Operation Manuals

20.2.1 The Contractor shall provide operation manuals explaining the purpose and operation of the complete system together with its component subsidiary systems and individual item of equipment. The characteristics, ratings and any necessary operating limits of the Equipment and Sub-systems shall be provided. The Operation Manuals shall focus on operation aspects under normal and emergency conditions.

20.3 Maintenance Manuals

20.3.1 The Contractor shall provide particulars of operating parameters, tools for dismantling and testing, methods of assembly and disassembly, tolerances, repair techniques and all other information necessary to set up a repair and servicing programme.

20.3.2 The manual shall also include inspection/overhaul procedure and periodicity of various inspection/overhaul schedules in detail including the tools, special tools/plants, and facilities required. The manual shall be subject to review by the “Engineer”.

20.3.3 The maintenance manual shall also include an illustrated parts catalogue of all plant supplied and shall contain sufficient information to identify and requisition the appropriate part by maintenance staff. The catalogue shall comprise 2 sub-sections.

20.3.4 The first shall be an alphanumeric parts list, which shall include the following information:

(i) Part number
(ii) Description
(iii) Name of manufacturer
(iv) Quantity and Unit
(v) Part number of next higher assembly (usually a line replaceable unit).
(vi) Cross-reference to figure number.
(vii) Category: e.g. consumable, line replaceable unit, repairable.
(viii) Life-expected life, Mean time between failure or mean distance between failure where available, Mean time between repair, Mean time between maintenance, Reliability.

(ix) General or specific purpose

20.3.5 The second is a series of illustrations to indicate the location of each replaceable item which shall be clear and progressive with exploded views to enable parts to be identified easily by cross-reference with the alpha-numeric list.

20.3.6 Maintenance manual should cover the following:

- Maintenance planning, Maintenance management, Maintenance Requirement Analysis like Reliability centred maintenance, FMCEA etc.
- PM, CM, CBM & condition monitoring techniques i.e. during installation, vibration levels are required to be noted down which becomes reference for vibration limits.
- Maintenance infrastructure
- Man power requirement
- Job description, Comprehensive annual maintenance.

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CHAPTER 21

PROGRAMME REQUIREMENTS
21 PROGRAMME REQUIREMENTS

21.1 General

The expected dates of commissioning of various section of JAIPUR Metro Rail Project are defined in Clause 2.2 of Chapter 2.

In addition to the requirements specified in the General Specification, the Contractor shall programme the Works in accordance with a pre-determined sequence to meet various Key Dates and Access Dates so as to meet the Target Dates of commercial opening:

21.2 Key Dates

The work includes a number of stages. These stages are inter-related and essential to the completion of the Escalator works to be achieved within the Key Dates.

The Key Dates indicated in the schedule of Key Dates are mentioned in terms of the time period reckoned from the commencement of the works, and the deliverables for each Key Date shall be achieved by the midnight of the last day of the week mentioned.

If the identified work is not achieved by the stated Key Dates, liquidated damages may become applicable as set out in the Contract.

Each Key Date and its description is given in the Appendix "B".

21.3 Access Dates

The contractor shall require Access to information as well as to various locations at stations / depots / 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 terms of the time period reckoned from the commencement of works, and shall mean guaranteed access by the mid-night of the last day of the week mentioned.

These sequence, timings and extent access within any location will be further refined and reflected in the Master Programme developed by the “Engineer”, based on the Installation Programme from the Contractor and Project Contractors.

The exact timing to access a specific location (or any part of the location) shall then be confirmed by the “Engineer” in the weekly Works Meeting during the construction stage.

Major installation works in the stations and ancillary buildings which require co-ordination with the Civil Project and Electrical Project Contractors, shall be followed as per the Co-ordinated Installation Programme to be prepared by the Civil Project Contractors.
The Access dates for this contract in connection with various stages are also given in the Appendix "B".

END OF CHAPTER
CONTRACT

EMPLOYER’S REQUIREMENTS
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CHAPTER 22

NOT USED
22  NOT USED
APPENDIX A

INTERFACE MATRIX OF ESCALATOR CONTRACT

1) All System Contractors to display interface issues on boards at site in suitable format, so that concerned contractor / department and inspecting officials are aware of the interface requirements.

2) Architect / DDC to ensure that interface requirements are met with while issuing GFC drawings. All system contractors are to ensure it & sign off. Interface with concerned contractor is the responsibility of the system contractor. Engineer will provide the contact detail of concerned contractors to system contractor to facilitate timely interface.

If they fail to timely ensure, it will be contractors responsibility to get it done. Not getting it done will attract imposition of penalty.

Part-I

<table>
<thead>
<tr>
<th>Civil contractor responsibilities</th>
<th>Electrical Contractor responsibility</th>
<th>Escalator Contractor responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design :</strong></td>
<td><strong>Design:</strong></td>
<td><strong>Design :</strong></td>
</tr>
<tr>
<td>• Identify escalator locations and sizes of escalators.</td>
<td>• Electrical power, Control Interfaces and system shall be developed.</td>
<td>• Co-ordinate details of mounting provisions, power supply, electric load and control requirements.</td>
</tr>
<tr>
<td>• Define mounting and structural provisions for escalator assemblies, Co-ordinate access and delivery space provisions.</td>
<td></td>
<td>• Define requirements and provide design details to Civil and E&amp;M contractor for escalator’s various requirements.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Furnish sizes for escalator controller enclosures, pit, support details and well way dimensions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Co-ordinate fire safety requirement with fire fighting systems.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Interface with Civil Contractor and Architect for location of suitable hoisting hooks and stray water drainage arrangements.</td>
</tr>
<tr>
<td><strong>Construction :</strong></td>
<td><strong>Construction :</strong></td>
<td><strong>Construction :</strong></td>
</tr>
<tr>
<td>• Provide escalator structure including upper and bottom pits with the notches. The pits shall have gravitational drainage system.</td>
<td>• Provide three phase power with dual earth duly terminated on a suitable MCCB in the escalator control room / enclosure.</td>
<td>• Provide Isolating Switch (suitable capacity MCCB and ELCB) in the Escalator controller where the main power supply cable will be terminated.</td>
</tr>
<tr>
<td>• Cut outs for laying of cables.</td>
<td>• Provide water connection up to escalator sprinkler system if applicable.</td>
<td>• Provide and install escalator units complete with claddings, finishes and operating mechanisms.</td>
</tr>
<tr>
<td>• Providing and fixing of hoisting hooks.</td>
<td>• Provide Connection to Fire detector installed in the Escalators Pits from</td>
<td>• Provide lighting, ventilation and power socket in the escalator Controller / Enclosure.</td>
</tr>
<tr>
<td>• Drainage Pit from the</td>
<td></td>
<td>• Plan escalator section / sizes considering local site conditions to</td>
</tr>
</tbody>
</table>
### Part-I

<table>
<thead>
<tr>
<th>Civil contractor responsibilities</th>
<th>Electrical Contractor responsibility</th>
<th>Escalator Contractor responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escalator should be away from the escalator pit for ease of cleaning.</td>
<td>Displaying smoke detection signals on Fire Alarm Control Panel of station in the form of potential free contacts from escalator control panel of each escalator.</td>
<td>Facilitate easy transportation to location of installation.</td>
</tr>
<tr>
<td>The depth of the sump / drain pit should be more than the depth of Escalator pit for effective drainage.</td>
<td>If separate Escalator Control room is constructed, then Provide lighting, ventilation and power socket in the escalator control panel room.</td>
<td>The gap between escalators and the sides of escalator and the adjoining walls/ parapet walls / Stairs shall be provided with decking extensions up to 300 mm. The Contractor shall allow a gap of approximately 15 mm between the deck and the adjacent walls/ parapet walls. The gap shall be filled up by the Escalator Contractor with flexible sealant.</td>
</tr>
<tr>
<td>Wall should not be provided beside the escalator pit to avoid obstruction in opening of covers of escalator pit for maintenance purpose.</td>
<td>Provide cast in conduits/race ways from escalator control room to escalator’s nearest pit.</td>
<td>Provide and install Fire detectors in the Escalators Pits and Escalator Control Panel / Escalator Controller Cabinet.</td>
</tr>
</tbody>
</table>

### Part-II

<table>
<thead>
<tr>
<th>Architect / DDC Responsibility</th>
<th>Civil Contractor Responsibility</th>
<th>Electrical Contractor Responsibility</th>
<th>Escalator Contractor Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before erection</td>
<td>Before erection</td>
<td>Before erection</td>
<td>After erection</td>
</tr>
<tr>
<td>• To issue structural drawings for present and future escalator at stations as per vertical rise of escalators and details of the same.</td>
<td>• Adequate storage area at station / depot / storage yard including proper access to storage area from near by road for carrying escalators by cranes / trailers.</td>
<td>• Single phase power supply for LED based RMS panel in Customer Care Centre / Station Control Room.</td>
<td>• RMS cable laying.</td>
</tr>
<tr>
<td>• Identification of proper (naturally ventilated and protected from rain shower) escalator control panel location for each escalator in consultation with escalator contractor.</td>
<td>• To protect and cover future escalator shafts suitably.</td>
<td>• Adequate lighting fixtures above the escalator for proper illumination.</td>
<td>• Installation of LED based RMS Panel in SCR and other designated room.</td>
</tr>
<tr>
<td>• Identification of ECP Room (if</td>
<td>• Marking for finished floor level at top support, intermediate supports and bottom support of escalator.</td>
<td>• UPS supply at Escalator Control Panel as per requirement of escalator contractor.</td>
<td>• Installation of escalator safety instructions in chrome plated stainless steel pipe frame both in Hindi and English language at both landings.</td>
</tr>
<tr>
<td>Architect / DDC Responsibility</td>
<td>Before erection</td>
<td>Before erection</td>
<td>After erection</td>
</tr>
<tr>
<td>Civil Contractor Responsibility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Testing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Load testing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Escalator safety testing</td>
</tr>
</tbody>
</table>
ECP panel is not placed in open) in consultation with escalator contractor.

- Identification of location for installation of LED based RMS in CCC / SCR and sabotage.
- Load testing of hooks.
- Pit cleaning, PCC work and construction of slope in pit towards drainage hole.
- Hole in Slab / Wall for cable entry from escalator control panel (ECP) to escalator pit, from Escalator Switching Room (ESR) to ECP.
- Finishing of roof ceiling, painting etc above escalator.

**After erection**
- StoneFlaming for making it rough surface.
- Filling of Gap(b/n stone or wall and floor plate).
- Filling of gap around escalator pit on all side.
- Storage area for maintenance purpose.
- SS Handrail near top floor plate and bottom floor on both side of escalator as per requirement of escalator contractor.

**Testing**
- Drainage Hole connectivity to Sump Checking.

If they fail to timely ensure, it will be contractors responsibility to get it done. Not getting it done will attract imposition of penalty.

**End of Appendix**
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APPENDIX B

KEY DATES AND ACCESS DATES

1.0 Key Dates

The following key dates have been stipulated in this Contract:

1.1 Key Date 1 (KD1): Preliminary Design submission

Achievement - The following activities shall have been completed prior to the Key Date:
Submission to the “Engineer” of the Preliminary Design which consists of general equipment layouts including machine room sizes, major cabling routings, proposed architectural materials for public areas, preliminary drawings, escalator equipment details and proposed arrangement, preliminary delivery routes, preliminary design and construction specifications, preliminary installation and testing procedures etc. Submission to “Engineer” of Interface Management Plan.

1.2 Key Date 2 (KD2): Submission of Final Design (Definitive)

Achievement - The following activities shall have been completed prior to the Key Date:
Submission to the “Engineer” of the Definitive Design in respect of the whole of the works, the same being in the opinion of the “Engineer”, a complete and comprehensive submission or submissions which complies with the Employer’s Requirements.

1.3 Key Date 3 (KD3): Delivery to Site of Escalators

Achievement - The following work shall have been executed prior to the Key Date:
Manufacture, acceptance of factory testing, shipping and delivery to site of all major equipment and components of proposed Escalators. The delivered equipment shall be unloaded and stored at storage area, which will be subject to agreement by the “Engineer”.

1.4 Key Date 4 (KD4): Installation at Site, Testing and Commissioning of Escalator Systems.

Achievement - The following work shall have been executed prior to the Key Date:
Completion of all installation processes at site for escalators systems. The completion of all testing at site, completion and testing of all remote monitoring and control system, obtaining all licenses and clearances from local authorities and commissioning of escalator systems.

1.5 Key Date 5 (KD5): Completion of whole of the Works and taking over by the Employer.

Achievement - The following work shall have been executed prior to the Key Date:
Completion of whole of the works to facilitate taking over of escalator system by the Employer. Completion of all training related activities for the Employer’s Staff. Submission of all necessary documents including operation and maintenance manuals etc. Supply and handing over of all mandatory spares as required under the Contract.
SCHEDULE OF KEY DATES

Please refer Section-6 of the Bid Document

Note:

a) All the key dates are from the date of commencement.

b) For the part week, full week will be considered for this purpose.

c) The site shall be made available progressively and if some part is not made available then the extension of time shall be allowed only to the work/KD of that particular part.

END OF APPENDIX

APPENDIX C

END OF APPENDIX
# APPENDIX D

## LIST OF ABBREVIATIONS

The abbreviations used in this Specification are as follows:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>Alternating Current</td>
</tr>
<tr>
<td>ASTM</td>
<td>American Society for Testing and Materials</td>
</tr>
<tr>
<td>BCC</td>
<td>Back-up Control Centre</td>
</tr>
<tr>
<td>BIS</td>
<td>Bureau of Indian Standards</td>
</tr>
<tr>
<td>BS</td>
<td>British Standards</td>
</tr>
<tr>
<td>CPWD</td>
<td>Central Public Works Department</td>
</tr>
<tr>
<td>DC</td>
<td>Direct Current</td>
</tr>
<tr>
<td>DDC</td>
<td>Detail Design Consultants</td>
</tr>
<tr>
<td>DFT</td>
<td>Dry Film Thickness</td>
</tr>
<tr>
<td>DLP</td>
<td>Defects Liability Period</td>
</tr>
<tr>
<td>E &amp; M</td>
<td>Electrical and Mechanical</td>
</tr>
<tr>
<td>EMC</td>
<td>Electro Magnetic Compatibility</td>
</tr>
<tr>
<td>EMI</td>
<td>Electro Magnetic Interference</td>
</tr>
<tr>
<td>EMU</td>
<td>Electrical Multiple Unit</td>
</tr>
<tr>
<td>EMR</td>
<td>Escalator machine room</td>
</tr>
<tr>
<td>EN</td>
<td>European Standard</td>
</tr>
<tr>
<td>g</td>
<td>Gravitational acceleration</td>
</tr>
<tr>
<td>GCC</td>
<td>General Conditions of Contract</td>
</tr>
<tr>
<td>GS</td>
<td>General Specification</td>
</tr>
<tr>
<td>IEC</td>
<td>International Electro Technical Commission</td>
</tr>
<tr>
<td>IEEE</td>
<td>Institute of Electrical and Electronic Engineers</td>
</tr>
<tr>
<td>IMP</td>
<td>Interface Management Plan</td>
</tr>
<tr>
<td>IS</td>
<td>Indian Standards</td>
</tr>
<tr>
<td>ITB</td>
<td>Interface Terminal Board</td>
</tr>
<tr>
<td>LCD</td>
<td>Liquid Crystal Display</td>
</tr>
<tr>
<td>LED</td>
<td>Light Emitting Diode</td>
</tr>
<tr>
<td>LT</td>
<td>Low tension</td>
</tr>
<tr>
<td>LMR</td>
<td>Lift machine room</td>
</tr>
<tr>
<td>m</td>
<td>metre</td>
</tr>
<tr>
<td>mm</td>
<td>millimetre</td>
</tr>
<tr>
<td>MCB</td>
<td>Miniature Circuit Breaker</td>
</tr>
<tr>
<td>MCCB</td>
<td>Moulded Case Circuit Breaker</td>
</tr>
<tr>
<td>MMS</td>
<td>Maintenance Management System</td>
</tr>
<tr>
<td>MRT</td>
<td>Mass Rapid Transit</td>
</tr>
<tr>
<td>N</td>
<td>Newton</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>NFPA</td>
<td>National Fire Protection Association, USA</td>
</tr>
<tr>
<td>N/m²</td>
<td>Newton per square metre</td>
</tr>
<tr>
<td>N/C</td>
<td>Contactor or relays with normally close contacts</td>
</tr>
<tr>
<td>N/O</td>
<td>Contactor or relays with normally open contacts</td>
</tr>
<tr>
<td>OCC</td>
<td>Operations Control Centre</td>
</tr>
<tr>
<td>TS</td>
<td>Technical Specification</td>
</tr>
<tr>
<td>RAM</td>
<td>Reliability, Availability and Maintainability</td>
</tr>
<tr>
<td>SCC / PC</td>
<td>Special Conditions of Contract / Particular Conditions</td>
</tr>
<tr>
<td>SCADA</td>
<td>Supervisory Control and Data Acquisition</td>
</tr>
<tr>
<td>SCR</td>
<td>Station Control Room</td>
</tr>
<tr>
<td>TOT</td>
<td>Transfer of Technology</td>
</tr>
<tr>
<td>UPS</td>
<td>Un-interruptible Power Supply</td>
</tr>
<tr>
<td>VVVF</td>
<td>Variable Voltage Variable Frequency</td>
</tr>
<tr>
<td>JMRC</td>
<td>JAIPUR Metro Rail Corporation Limited</td>
</tr>
</tbody>
</table>
APPENDIX E
Spare & Tools Policy for Electrical Contracts

1.1 General
The Contractor shall supply the following spares:

1.1.1 Consumable Spares
(i) The ‘consumable spares’ shall include items such as lubricants, oils, greases, sealants, filter Medias, gaskets, lamps and wearable parts etc. whose declared life is less than one year. This will not include the consumables like Diesel Salt etc. required for operation of the equipment.

(ii) The Tenderer shall provide a recommended un-priced list of ‘consumable’ spares in Annexure-1 of this Appendix E on Employer’s Requirements as noted above for maintenance and repairs of equipment in technical package. Any consumable item if required but not included in the above recommended list by the tenderer will be deemed to have been included and shall be supplied as per the provisions of this contract without any extra financial implication to the Employer. Contractor will be required to supply the requisite quantity of spares, as required irrespective of the quantities indicated by the contractor in the recommended list. Employer’s decision in determining any particular item(s) as consumable in line with above guideline will be final and binding. In case any changes are required in the supply of consumables on account of changes at design stage, the contractor shall have to supply the required consumables also.

(iii) List of consumable spares furnished in the technical package shall be updated during the execution of contract and following information as minimum shall be provided.
   a) Names, addresses, telephone numbers and other particulars of manufacturers and their local representatives;
   b) Models and part numbers, 
   c) Full description of spares including a note whether it is sealed unit or an assembly or sub-assembly which can be broken down into component parts;
   d) Quantity installed in the system;
   e) Expected consumption rates;
   f) Overall dimensions and weight including minimum packing (if any) for shelf space purposes;
   g) Inter-changeability or otherwise with similar parts;
   h) Normal manufacturing and shipment lead times; and
   i) Shelf life.

(iv) The consumable spares shall be stored at the location agreed to by the Engineer.

(v) It shall be the responsibility of the contractor to maintain sufficient stock of consumable spares till the end of DLP. These spares will be utilized by the Contractor during the maintenance etc. and its consumption to be countersigned with Operation & Maintenance of Employer and the old replaced parts shall be destroyed in the presence of Employer representative. Unused spares, if any, by the end of DLP shall be handed over to Employer and it will become property of employer.

(vi) Recommended list shall be furnished by the contractor as part of design submission / vendor approval for respective systems and subsystems. (The price of these spares will be part of tender evaluation while assessing the L-1 bidders).

1.1.2 Unit Exchange Spares
The Contractor shall supply the Unit Exchange Spares as listed in the Annexure-2 of this Appendix E on Employer’s Requirements. The Unit Exchange Spares shall be supplied in the Store nominated by the Engineer. These shall be delivered as per the key dates defined (key dates will be informed to the contractor within sixty (60) days of issuing of LOA/NTP). Any delay in this regard will make the Contractor liable for liquidated damages as per tender conditions. This will be part of tender evaluation while assessing the L-1 bidder.

1.1.3 Commissioning And DLP Spares

(i) The Contractor shall submit to the Engineer for review a list of minimum spare parts that he intends to make available during the installation, erection, commissioning and defect liability periods. An indicative list is provided at Annexure-3 of this Appendix E on Employer’s Requirements.

(ii) The Contractor shall keep on Site, at his own cost, throughout the installation, erection, commissioning and defect liability periods, stocks of spare parts, as per the list to enable rapid replacement of any item found to be defective or in any way in non-conformance with the Specification.

(iii) The Contractor shall generally not be entitled to use any of the Employer’s spare parts during the installation, erection and commissioning periods or during the Defects Liability Period.

(iv) Contractor shall not be permitted to remove any working/healthy equipment / components / sub-systems / systems for any reason whatsoever without specific approval in writing from Employer’s Engineer or Engineer’s authorised representative.

(v) Spares as per the agreed list shall be supplied at least three months before ROD. Stocks of such spares as available in Contractor stores will be jointly checked with Engineer every three months. Certificate by Engineer confirming availability of the spares in contractor stores / in Depots as per agreed list will be a pre-requisite for release of interim payments of the Contractor. However, this condition will not be applicable for six months before the expected expiry of the DLP period.

(vi) The Contractor shall include the price of these items in cost of DLP in their Financial bid. the price of DLP shall be part of tender evaluation while assessing the L-1 bidder.

1.1.4 Mandatory spares and tools

(i) The Contractor shall supply the Mandatory Spares and tools as listed in the Annexure-4 of this Appendix-E of Employer’s Requirements. The Spares and tools shall be supplied at the location nominated by the Engineer. The price of these spares and tools shall be quoted at actual and will also be part of the evaluation for assessing L-1 bidder.

(ii) No change in quoted price of any spare will be allowed even when there is change in design of any equipment/sub-system during the execution of the contract.

(iii) Contractor will furnish complete details during contract execution (detailed design stage) as noted below for the listed spares;

a) Names, addresses, telephone numbers and other particulars of manufacturers and their local representatives;

b) Models and part numbers

c) Full description of spares including a note whether it is sealed unit or an assembly or sub-assembly, which can be broken down into component parts;

d) Quantity installed in the system;

e) Overall dimensions and weight including minimum packing (if any) for shelf space purposes;

f) Designed and shelf life;
g) Interchangeability or otherwise with similar parts;
h) Normal manufacturing and shipment lead times;
i) Purchase Technical Specification with relevant drawings.

The information as above shall also be given for all other components/equipments etc. which may have to be changed / replaced during maintenance as decided by the Engineer based on the proposed maintenance practices.

1.1.5 Recommended Spares for 3 years beyond DLP

(i) The Tenderer shall furnish priced list of the ‘recommended spares’ not covered under ‘Unit Exchange Spares’, ‘consumables’ and ‘mandatory’ spares but the Contractor expects them to be required during three years after expiry of defect liability period, along with the bid as per format enclosed in Annexure-5 of this Appendix-E of Employer’s Requirements. The prices should be proportionate and reasonable. Employer may decide to procure any number of these spares at quoted / negotiated rates before the end of DLP. The Spares shall be supplied at a location nominated by the Engineer.

(ii) Contractor shall supply all the spares recommended by equipment/sub-system manufacturers within the quoted cost for recommended spares. Contractor shall update list of spares recommended by equipment/sub-system manufacturers at design submission stage.

(iii) This will not be part of tender evaluation while assessing the L-1 bidder.

1.1.6 10 years spares beyond DLP (Purchase of spares from Vendors)

(i) The Contractor shall ensure availability of spare parts for a period of ten years from the last date of taking over of whole of Works. The Tenderer shall furnish an un-priced list of spares for maintenance and repair for a period of ten years from the date of taking over as per format enclosed in Annexure-6 of this Appendix-E of Employer’s Requirements. The spares shall be in kit form/ items. The Tenderer shall also quote unit prices for the kit / items, spare item with escalation clause in the Financial Package. The Employer at his discretion, during a period of ten years from the date of taking over of the whole works, purchase as many kits / items of spare parts as required by him, at the rates indicated in this schedule.

(ii) If during the period of ten years, the manufacturer / vendor intends to discontinue the manufacture of spare or replacement parts, the manufacturer / Contractor shall immediately give notice to the Employer of such intention. The Employer shall be given the opportunity of ordering at contracted prices such quantities of such spare or replacement parts as the Employer shall reasonably require in relation to the anticipated life of the equipment.

(iii) In the event of Vendor / manufacturer / 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 Manufacturer / Contractor so requires, shall be returned by the Employer to the Contractor in good order and condition (fair wear and tear excepted). Also in the event of vendor / manufacturer / contractor failing to supply the spare parts in accordance with this clause are liable to be blacklisted.

(iv) 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.
The Contractor will, so far as he is reasonably able to bind his sub-contractors / vendors 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 / vendor who will not so conform in which event the Employer may direct the Contractor to seek an alternative sub-contractor/vendor.

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)

In case the Contractor is unable to supply spares in accordance with Clause above, he shall furnish, free of cost to the Employer, the drawings, specifications, and other technical details, to enable the Employer to manufacture parts, or have them manufactured. Such drawings and technical data shall be provided free of any charge or royalty, on the understanding that the Employer will use such data and drawings, only for the manufacture of parts for his own use.

The foregoing shall hold equally good for the Contractor, any or all of his sub-contractors, and vendors.

In the event that technological progress results in improved versions of spares and replacement parts, the latest version shall have the same plug compatibility, and spatial needs of its predecessor, to avoid modifications being required, to accept the up-graded version of the part.

1.2 Manufacture, Delivery and Warranty

(i) The major spare parts ordered under the Contract shall be manufactured, tested and inspected in accordance with the relevant quality system, suitably packed and labeled. All spares shall be subject to inspection by the Engineer. In the event that any item is known to be going out of production, then the Contractor shall give advance notice to the Engineer.

(ii) The warranty period of ‘unit exchange’ and ‘mandatory spares’, delivered shall be:
   (a) Either 24 months from the date of acceptance or
   (b) Upto expiry of the defect liability period, whichever is later.

1.3 Purchase of Spares from Vendors

(i) The Contractor shall furnish an undertaking that he has no objection whatsoever to and shall not in any way deter or obstruct the Employer, its licensee or its representative from dealing directly with the Contractor's Vendors for the purchase of the spares during the Contract period. The spares purchased shall be subject to inspection by the Engineer.

(ii) Contractor shall obtain an undertaking from vendors, OEMs etc. at detailed design submission stage that they will deal directly with Employer for supply of spares, equipments and/or sub-systems.

1.4 The relevant list of the spares mentioned above shall be submitted in the technical bids after blanking the prices, where applicable. The financial bid shall have the price details.

1.5 Contractor shall submit technical specifications of the items used in this project for the purpose of purchasing. Engineer's views, if any, shall be suitably incorporated.
Annexure-1 to Appendix-E of TS

List of Recommended Consumable Spares

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Foreign Currency</td>
<td>INR</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total

**Note:**

(i) List is to be provided by the bidder in line with the clause 1.1.1 of Appendix -E (spares policy) of TS.

(ii) Bidder need to submit the un-priced list in the Statement of Price -3A of True copy of the BOQ (with price left blank) with the technical package.

(iii) Priced list shall be provided in Statement of Price –3 (A) of Bill of Quantity (Section vi) with the financial package only.

(iv) Total quoted Amount of this statement will be considered for tender evaluation while assessing the L-1 bidder.
## Annexure-2 to Appendix-E of TS

### Unit Exchange Spares

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Item</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Complete Motor Gear Assembly</td>
<td>1 no of each category</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Complete Chain Drive Assembly</td>
<td>1 no of each category</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Complete Escalator Control Panel</td>
<td>1 No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
</tr>
</thead>
</table>

(i) List is to be provided by the bidder in line with the clause 1.1.2 of Appendix -E (spares policy) of TS.

(ii) Bidder need to submit the un-priced list in the Statement of Price -3B of True copy of the BOQ (with price left blank) with the technical package.

(iii) Priced list shall be provided in Statement of Price -3B of Bill of Quantity (Section vi) with the financial package only.

(iv) Total quoted Amount of this statement will be considered for tender evaluation while assessing the L-1 bidder.
Annexure-3 to Appendix-E of PS

List of DLP Spares

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Item</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>ForeignCurrency</td>
<td>INR</td>
</tr>
<tr>
<td>1</td>
<td>Emergency brake complete assembly</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Photocell sensor with transmitter</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Handrail Antistatic brush or roller</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Step Antistatic brush</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Pit Lamp</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Emergency stop switch</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Service brake coil assembly</td>
<td>1</td>
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<td></td>
</tr>
<tr>
<td>8</td>
<td>Bottom shaft bearing</td>
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<tr>
<td>9</td>
<td>Handrail shaft bearing</td>
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<td></td>
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<tr>
<td>10</td>
<td>Main shaft bearing</td>
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<tr>
<td>11</td>
<td>Control panel exhaust fan</td>
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<tr>
<td>12</td>
<td>Control panel filter</td>
<td>8</td>
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</tr>
<tr>
<td>13</td>
<td>Comb carrier assembly</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Breaking control unit of each rating</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>V3F Drive of each type rating</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Smoke detector</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Escalator control panel lock assembly (window, main lock, inside door lock)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Contactor of each type and each rating</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
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<td>Skirt of different stranded size</td>
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<td>Floor plate lining of complete set bottom and top</td>
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<td>86</td>
<td>Handrail profile complete set Left and right of 1 escalator</td>
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<td>87</td>
<td>Handrail of standard size of escalator</td>
<td>1 set including left and right</td>
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<td>88</td>
<td>Bumper for main shaft if used complete for 1 escalator</td>
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<td>89</td>
<td>Pit exhaust fan if required</td>
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</table>

Note:-
1. List is to be provided by the contractor in line with the clause 1.1.3 of Appendix - E (spares policy) of TS.

2. The list is indicative and not exhaustive. **The bidder may indicate substitute / alternative against the above listed items**, any additional spares in compliance to Chapter 13 of GS and Clause 17.1.2 and chapter 18 TS, if required the same may be indicated by the Firm in their Technical Offer.

3. If any additional spares are required during the DLP period the same will be arranged by the Contractor, without any Extra Payments.

4. This will not absolve the firm of the responsibility to fulfill the DLP obligations as per relevant clauses of TS.

5. Bidder may review the List & Quantity of spares in view of clause – 4.10 of TS.

6. Bidder need to submit the un-priced list in the Statement of Price -6 C of True copy of the BOQ (with price left blank) with the technical package.

7. Priced list shall be provided in Statement of Price -6C of Bill of Quantity (Section vi) with the financial package only. The price of the DLP spares shall be included in the in statement of Price 1 of Bill of quantity (Section vi). This list is for reference purpose only, and will not be considered for evaluation purpose.
## Annexure-4 to Appendix-E of TS

### List of Mandatory Spares

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<td>Photocell sensor with transmitter</td>
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<td>Handrail Antistatic brush or roller</td>
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<td>Step Antistatic brush</td>
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<td>Pit Lamp</td>
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<td>Emergency stop switch (bottom &amp; Middle)</td>
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<td>7</td>
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<td>8</td>
<td>Bottom shaft bearing</td>
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<td>Control panel exhaust fan</td>
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<td>Breaking control unit of each rating</td>
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<td>V3F Drive of each type rating</td>
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<td>Hour meter Safety switch (Reset)</td>
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<td>Local / Remote switch Comb light</td>
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<td>Mother board or equivalent PLC with All attached PCB cards Varistor brake</td>
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<td>65</td>
<td>Broken chain assembly</td>
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<td>Pit emergency stop</td>
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<td>67</td>
<td>Wago connector of each size</td>
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<td>Circlip of each size</td>
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<td>Power cable of each size</td>
<td>10mtr</td>
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<td>Control cable of each size</td>
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<td>service Brake liner</td>
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<td>Tangential guide</td>
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<td>Lateral guide for step entry</td>
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<td>2Set.</td>
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<td>Step guide pad</td>
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<td>Handrail pressure assembly complete set</td>
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<td>78</td>
<td>Handrail entry plastic profile</td>
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<td>79</td>
<td>Gear oil as recommended</td>
<td>2 barrel</td>
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<tr>
<td>80</td>
<td>Lubrication oil as recommended</td>
<td>1 barrel</td>
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<tr>
<td>81</td>
<td>Sticker &quot;Pictogram&quot; as per EN115</td>
<td>20 nos.</td>
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<tr>
<td>82</td>
<td>Sticker &quot;Emergency stop&quot;</td>
<td>20 nos.</td>
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</table>
## List of the Tools

<table>
<thead>
<tr>
<th>S No.</th>
<th>Description</th>
<th>Qty.</th>
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<tbody>
<tr>
<td>1</td>
<td>Escalator starting &amp; control Panel Keys</td>
<td>2set/Esc</td>
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<tr>
<td>2</td>
<td>Barricade</td>
<td>2 Nos /Esc</td>
</tr>
<tr>
<td>3</td>
<td>Both Side open spanner (6,8,10,12,14,16,18,20,21,24,25,27,30,32)mm</td>
<td>2Nos. Each</td>
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<tr>
<td>4</td>
<td>Screw Driver 75X5,100X3,450X10,827</td>
<td>2Nos. Each</td>
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<td>5</td>
<td>Side cutting plier</td>
<td>2 Nos. Each</td>
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<td>6</td>
<td>Centre Punch 6&quot;, 12&quot;</td>
<td>2Nos. Each</td>
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<td>7</td>
<td>File Flat</td>
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<td>8</td>
<td>Force Box 2462</td>
<td>2Nos. Each</td>
</tr>
<tr>
<td>9</td>
<td>Extension 250mm &amp; 125mm</td>
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<tr>
<td>10</td>
<td>Monkey plier</td>
<td>2Nos. Each</td>
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<tr>
<td>11</td>
<td>Adjustable wrench</td>
<td>2 Nos. Each</td>
</tr>
<tr>
<td>12</td>
<td>Line Tester</td>
<td>10 Nos.</td>
</tr>
<tr>
<td>13</td>
<td>Nose plier</td>
<td>2Nos. Each</td>
</tr>
<tr>
<td>14</td>
<td>Mallet</td>
<td>2 Nos. Each</td>
</tr>
<tr>
<td>15</td>
<td>Ball Hammer</td>
<td>2 Nos. Each</td>
</tr>
<tr>
<td>16</td>
<td>Combination plier 8&quot;</td>
<td>2 Nos. Each</td>
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<tr>
<td>17</td>
<td>Allen key set</td>
<td>2 Nos</td>
</tr>
<tr>
<td>18</td>
<td>One Side ring &amp; one side open spanner (8,10,13,15,17,19,21,24,27,30,32)</td>
<td>2Nos. Each</td>
</tr>
<tr>
<td>19</td>
<td>One side ring &amp; one side open set</td>
<td>2 Nos. Each</td>
</tr>
<tr>
<td>20</td>
<td>Philips screw driver 12&quot;</td>
<td>2 Nos. Each</td>
</tr>
<tr>
<td>21</td>
<td>Philips screw driver 8&quot;</td>
<td>2 Nos. Each</td>
</tr>
<tr>
<td>22</td>
<td>Nose Mask</td>
<td>30 Nos</td>
</tr>
<tr>
<td>23</td>
<td>Screw Driver 6&quot;</td>
<td>2 Nos. Each</td>
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<tr>
<td>24</td>
<td>Cleaning brush</td>
<td>5 Nos.</td>
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<td>25</td>
<td>Wire stripper</td>
<td>2Nos. Each</td>
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<tr>
<td>26</td>
<td>Screw Driver set</td>
<td>2Nos. Each</td>
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<tr>
<td>27</td>
<td>Torch LED Type</td>
<td>4 Nos.</td>
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<td>28</td>
<td>Socket allen key 5mm &amp; 8mm</td>
<td>2Nos. Each</td>
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<tr>
<td>29</td>
<td>Socket spanner (8,10,13,15,17,19)mm</td>
<td>2 Nos. Each</td>
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<tr>
<td>30</td>
<td>Circlip plier (Inner &amp; Outer)</td>
<td>2Nos. Each</td>
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<tr>
<td>31</td>
<td>Vacuum cleaner</td>
<td>2</td>
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<tr>
<td>32</td>
<td>Blower</td>
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<td>33</td>
<td>Vernier Caliper</td>
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Technical Specification, Part - B

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<table>
<thead>
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<tbody>
<tr>
<td>34</td>
<td>Techo Meter</td>
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<tr>
<td>35</td>
<td>Vibration Meter (Eva Meter)</td>
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<tr>
<td>36</td>
<td>Magger</td>
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<td>37</td>
<td>Insulation Tester</td>
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<td>38</td>
<td>Cam backle</td>
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<td>39</td>
<td>Cambackle Belt (6mt)</td>
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<td>40</td>
<td>Multimeter clamp meter</td>
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<tr>
<td>41</td>
<td>Handrail removing tool</td>
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<tr>
<td>42</td>
<td>Motor adjustable tool</td>
</tr>
<tr>
<td>43</td>
<td>Eccentric tool</td>
</tr>
<tr>
<td>44</td>
<td>Pulley puller</td>
</tr>
<tr>
<td>45</td>
<td>Hand lamp with 5 meter electric lead</td>
</tr>
<tr>
<td>46</td>
<td>Maintenance Inspection Box 7 meter lead</td>
</tr>
<tr>
<td>47</td>
<td>Hub for opening S.S. cladding</td>
</tr>
<tr>
<td>48</td>
<td>Test weight 20kgs</td>
</tr>
<tr>
<td>49</td>
<td>Noise level meter</td>
</tr>
<tr>
<td>50</td>
<td>Manual oil barrel pump</td>
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<tr>
<td>51</td>
<td>Gear oil removing pump</td>
</tr>
<tr>
<td>52</td>
<td>Gear oil removing tray</td>
</tr>
<tr>
<td>53</td>
<td>Welding machine</td>
</tr>
<tr>
<td>54</td>
<td>Hammering drill machine</td>
</tr>
<tr>
<td>55</td>
<td>Software and hardware tools for downloading fault log/ fault history of escalator</td>
</tr>
<tr>
<td>56</td>
<td>A-frame for maintenance purposes for lifting main drive shaft, and for lifting motor gear assembly etc.</td>
</tr>
</tbody>
</table>

**Common Tools -- Following should be provided station wise**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>Floor cover opening key</td>
</tr>
<tr>
<td>2</td>
<td>Hand winding tool</td>
</tr>
<tr>
<td>3</td>
<td>Tool Kit Box</td>
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<tr>
<td>4</td>
<td>Steel scale</td>
</tr>
<tr>
<td>5</td>
<td>Filler Gauge (0.01 to 1mm)</td>
</tr>
</tbody>
</table>

**Note:-**

1. List is to be provided by the bidder in line with the clause 1.1.4 of Appendix - E (spares policy) of TS.

2. The list is indicative and not exhaustive. The bidder may indicate substitute / alternative against the above listed items, any additional spares and tools in compliance to Chapter 13 of...
GS and Chapter 18 of TS, if required the same may be indicated by the Firm in their Technical Offer.

3 The Employer reserves the right to revise the items & the Quantity in the list based on the experience / performance during the Defect Liability Period, at No extra cost.

4 bidder need to submit the un-priced list in the Statement of Price - 3 C of True copy of the BOQ (with price left blank) with the technical package.

5 Priced list shall be provided in Statement of Price -3C of Bill of Quantity (Section vi) with the financial package only.

6 Total quoted Amount of this statement will be considered for tender evaluation while assessing the L-1 bidder.
# Annexure-5 to Appendix-E of TS

**Recommended Spares for three years After DLP**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Item</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Total Amount</th>
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<td>1</td>
<td>Emergency brake complete assembly</td>
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<tr>
<td>2</td>
<td>Photocell sensor with transmitter</td>
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<td></td>
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<tr>
<td>3</td>
<td>Handrail Antistatic brush/Roller</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>Step Antistatic brush/Roller</td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td>Pit Lamp</td>
<td></td>
<td></td>
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<tr>
<td>6</td>
<td>Emergency stop switch (bottom &amp; Middle)</td>
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<tr>
<td>7</td>
<td>Service brake coil assembly</td>
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<tr>
<td>8</td>
<td>Return (Bottom) shaft</td>
<td></td>
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</tr>
<tr>
<td>9</td>
<td>Return (Bottom) shaft bearing</td>
<td></td>
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</tr>
<tr>
<td>10</td>
<td>Handrail shaft</td>
<td></td>
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<tr>
<td>11</td>
<td>Handrail shaft bearing</td>
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<td>12</td>
<td>Main shaft</td>
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<tr>
<td>13</td>
<td>Main shaft bearing</td>
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<td>14</td>
<td>Control panel exhaust fan</td>
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<td>15</td>
<td>Control panel filter</td>
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<td>16</td>
<td>Combi carrier assembly</td>
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<tr>
<td>17</td>
<td>Breaking control unit of each rating</td>
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<tr>
<td>18</td>
<td>V3F Drive</td>
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<tr>
<td>19</td>
<td>Smoke detector</td>
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<td>20</td>
<td>Escalator control panel lock assembly (window, main lock, inside door lock)</td>
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<tr>
<td>21</td>
<td>keys</td>
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<td>Contactor of each type (Power and control)</td>
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<td>23</td>
<td>Relay of each type</td>
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<td>24</td>
<td>Float switch (water level sensor)</td>
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<td>25</td>
<td>All safety switch of each type</td>
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<td>26</td>
<td>All sensor of each type</td>
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<td>Relays of each type</td>
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<td>Speed selector switch</td>
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<td>Hour meter</td>
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<td>30</td>
<td>Local / Remote switch</td>
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<td>31</td>
<td>Mother board or equivalent PLC with All attached PCB cards</td>
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<td>32</td>
<td>Combs of all types</td>
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<td>33</td>
<td>Transformer</td>
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<td>PLC Communication Port</td>
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<td>35</td>
<td>Digital display</td>
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<td>Skirt brush</td>
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<td>Skirt brush bracket</td>
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<td>Comb plate actuating assembly (Left &amp; right)</td>
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<td>Releiving curve bottom and top</td>
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<td>Oil Lubrication pump</td>
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<td>Oil pressure switch</td>
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<td>Oil lubrication brush</td>
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<td>Oil lubrication pipe each size</td>
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<td>Oil lubrication pipe assembly (distributor)</td>
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<td>Control panel light with assembly</td>
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<td>Comb light</td>
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<td>MCCB of each type rating</td>
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<td>MCB of each type rating</td>
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<td>Floor plate support</td>
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<td>Direction indicator</td>
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<td>Key switch each type</td>
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<td>Steps</td>
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<td>Handrail reversing wheel</td>
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<td>Friction wheel</td>
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<td>Handrail support roller</td>
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<td>Handrail guiding roller</td>
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<td>Motor of each rating</td>
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<td>Drive chain</td>
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<td>Lubrication oil as recommended</td>
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<td>Gear oil as recommended</td>
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<td>Floor plate complete set</td>
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<td>Floor plate hinge</td>
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<td>Broken chain assembly</td>
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<td>74</td>
<td>Pit emergency stop</td>
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<tr>
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<td>Wago connector of each size</td>
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<td>Circlip of each size</td>
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<td>77</td>
<td>Power cable of each size</td>
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<tr>
<td>78</td>
<td>Control cable of each size</td>
<td></td>
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<tr>
<td>79</td>
<td>service Brake linear</td>
<td></td>
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<tr>
<td>80</td>
<td>Safety brake linear</td>
<td></td>
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<tr>
<td>81</td>
<td>innerdecking screw assembly</td>
<td></td>
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<tr>
<td>82</td>
<td>Tangential guide</td>
<td></td>
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<tr>
<td>83</td>
<td>Lateral guide for step entry</td>
<td></td>
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<tr>
<td>84</td>
<td>Grease as recommended</td>
<td></td>
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<tr>
<td>85</td>
<td>Step chain</td>
<td></td>
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<tr>
<td>86</td>
<td>Step guide pad</td>
<td></td>
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<tr>
<td>87</td>
<td>Handrail pressure assembly complete set</td>
<td></td>
<td></td>
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<tr>
<td>88</td>
<td>Handrail entry plastic profile</td>
<td></td>
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</tr>
<tr>
<td>89</td>
<td>Comb screws</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. List is to be provided by the contractor in line with the clause 1.1.5 of Appendix - E (spares policy) of TS.

2. The list is indicative and not exhaustive. **The bidder may indicate substitute / alternative against the above listed items**, any additional spares in compliance to Chapter 13 of GS and Chapter 18 of TS, if required the same may be indicated by the Firm in their Technical Offer.

3. Bidder need to submit the un-priced list in the Statement of Price - 6 A of True copy of the BOQ (with price left blank) with the technical package.

4. Priced list shall be provided in Statement of Price - 6 A of Bill of Quantity (Section vi) with the financial package only.

5. This statement will not be considered for tender evaluation while assessing the L-1 bidder.
### Annexure-6 to Appendix-E of TS

List of Spares for 10 years beyond the DLP

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Item</th>
<th>Quantity</th>
<th>Base Price at the Base Year ..........</th>
<th>Rate of Escalation per year over the base year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Emergency brake complete assembly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Photocell sensor with transmitter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Handrail Antistatic brush</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Step Antistatic brush</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Pit Lamp</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Service brake coil assembly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Emergency stop switch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Return (Bottom) shaft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Return (Bottom) shaft bearing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Handrail shaft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Handrail shaft bearing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Main shaft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Main shaft bearing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Control panel exhaust fan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Control panel filter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Comb carrier assembly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Breaking control unit of each rating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>V3F Drive of each type rating</td>
<td></td>
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<tr>
<td>19</td>
<td>Smoke detector</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>20</td>
<td>Escalator control panel lock assembly (window, main lock, inside door lock)</td>
<td></td>
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<tr>
<td>21</td>
<td>Keys</td>
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<tr>
<td>22</td>
<td>Contactor of each type and each rating</td>
<td></td>
<td></td>
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<tr>
<td>23</td>
<td>Relay of each type and each rating</td>
<td></td>
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<tr>
<td>24</td>
<td>Float switch (water level sensor)</td>
<td></td>
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<tr>
<td>25</td>
<td>All safety switch of each type</td>
<td></td>
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<tr>
<td>26</td>
<td>All sensor of each type</td>
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<tr>
<td>27</td>
<td>Speed selector switch</td>
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<tr>
<td>28</td>
<td>Hour meter</td>
<td></td>
<td></td>
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<tr>
<td>29</td>
<td>Local/ Remote switch</td>
<td></td>
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<tr>
<td>30</td>
<td>Mother board or equivalent PLC with All attached PCB cards</td>
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<tr>
<td>31</td>
<td>Combs of all types</td>
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<tr>
<td>32</td>
<td>Transformer</td>
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<td></td>
<td>Description</td>
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<tr>
<td>33</td>
<td>PLC Communication Port</td>
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<tr>
<td>34</td>
<td>Digital display</td>
<td></td>
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<tr>
<td>35</td>
<td>Skirt brush</td>
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<td>36</td>
<td>Skirt brush bracket</td>
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<tr>
<td>37</td>
<td>Comb plate actuating assembly (Left &amp; right)</td>
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<tr>
<td>38</td>
<td>Step roller</td>
<td></td>
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<tr>
<td>39</td>
<td>Chain roller</td>
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<tr>
<td>40</td>
<td>Relieving curve bottom and top</td>
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<tr>
<td>41</td>
<td>Step axle</td>
<td></td>
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<tr>
<td>42</td>
<td>Step bride</td>
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<tr>
<td>43</td>
<td>Step bush</td>
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<tr>
<td>44</td>
<td>Step lock pin</td>
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<tr>
<td>45</td>
<td>Oil Lubrication pump</td>
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<tr>
<td>46</td>
<td>Oil pressure switch</td>
<td></td>
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<td>47</td>
<td>Oil lubrication brush</td>
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<tr>
<td>48</td>
<td>Oil lubrication pipe</td>
<td></td>
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<tr>
<td>49</td>
<td>Oil lubrication pipe assembly (distributor)</td>
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<tr>
<td>50</td>
<td>Control panel light with assembly</td>
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<td>51</td>
<td>Comb light</td>
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<tr>
<td>52</td>
<td>Handrail inlet (entry boot)</td>
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<tr>
<td>53</td>
<td>MCCB of each type rating</td>
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<tr>
<td>54</td>
<td>MCB of each type rating</td>
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<tr>
<td>55</td>
<td>Floor plate support</td>
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<tr>
<td>56</td>
<td>Direction indicator</td>
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<td>57</td>
<td>Key switch</td>
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<td>Steps</td>
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<td>Handrail reversing wheel</td>
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<tr>
<td>60</td>
<td>Friction wheel</td>
<td></td>
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<tr>
<td>61</td>
<td>Handrail support roller</td>
<td></td>
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<tr>
<td>62</td>
<td>Handrail guiding roller</td>
<td></td>
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<tr>
<td>63</td>
<td>Gear box</td>
<td></td>
<td></td>
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<tr>
<td>64</td>
<td>Motor of each rating</td>
<td></td>
<td></td>
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<tr>
<td>65</td>
<td>Brake resistance of each type rating</td>
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<td>66</td>
<td>Handrail chain with link</td>
<td></td>
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<tr>
<td>67</td>
<td>Drive chain with link</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>68</td>
<td>Lubrication oil as recommended</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>69</td>
<td>Gear oil as recommended</td>
<td></td>
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<tr>
<td>70</td>
<td>Floor plate complete set</td>
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<tr>
<td>71</td>
<td>Floor plate hinge</td>
<td></td>
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<tr>
<td>72</td>
<td>Broken chain assembly</td>
<td></td>
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<tr>
<td>73</td>
<td>Pit emergency stop</td>
<td></td>
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<tr>
<td>74</td>
<td>Wago connector of each size</td>
<td></td>
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<tr>
<td>75</td>
<td>Circlip of each size</td>
<td></td>
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<tr>
<td>76</td>
<td>Power cable of each size</td>
<td></td>
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<tr>
<td>77</td>
<td>Control cable of each size</td>
<td></td>
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<tr>
<td>78</td>
<td>service Brake linear</td>
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<tr>
<td>79</td>
<td>Safety brake linear</td>
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<tr>
<td>80</td>
<td>Inner decking screw assembly</td>
<td></td>
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<td>81</td>
<td>Tangential guide</td>
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<td>82</td>
<td>Lateral guide for step entry</td>
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<tr>
<td>83</td>
<td>Grease as recommended</td>
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<td>84</td>
<td>Step chain</td>
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<tr>
<td>85</td>
<td>Step guide pad</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>86</td>
<td>Handrail pressure assembly complete set or Pressure Belt</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>87</td>
<td>Handrail entry profile</td>
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<tr>
<td>88</td>
<td>Handrail entry plastic profile</td>
<td></td>
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<tr>
<td>89</td>
<td>Skirt of different size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>Floor plate lining of complete set</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>91</td>
<td>Handrail profile complete set Left and right of 1 escalator</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>92</td>
<td>Handrail</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>93</td>
<td>Combs screws</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>94</td>
<td>Nut and bolt of all type</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. List is to be provided by the contractor in line with the clause 1.1.6 of Appendix - E (spares policy) of TS.

2. The list is indicative and not exhaustive. **The bidder may indicate substitute / alternative against the above listed items**, any additional spares in compliance to Chapter 13 of GS and TS Clause 18.2.2, if required the same may be indicated by the Firm in their Technical Offer.

3. Bidder need to submit the un-priced list in the Statement of Price - 6 B of True copy of the BOQ (with price left blank) with the technical package.

4. Priced list shall be provided in Statement of Price -6 B of Bill of Quantity (Section vi) with the financial package only.

5. This statement will not be considered for tender evaluation while assessing the L-1 bidder.
Appendix-F

Vendor Approval

It shall be obligatory for the Contractor to obtain Notice of ‘No Objection’ from the Engineer for the selection of the vendors for all items of work, even if the name of the vendor is specified in the Contractor’s Technical Submission and the works to be done including purchase of materials and equipment is in accordance with the Standards specified in the Contract.

Vendor to be selected who are capable to provide good after sales services available in Jaipur during DLP and thereafter.

For sub-components / systems of Escalators, equipments from following vendors has been used in Escalators designed and supplied to JMRC.

<table>
<thead>
<tr>
<th>Key Equipments</th>
<th>Vendor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step</td>
<td>Guangdong Hongtai, TernitzDruckguss</td>
</tr>
<tr>
<td>Handrail</td>
<td>EHC, Semperit</td>
</tr>
<tr>
<td>Rollers</td>
<td>EHC, Faigle</td>
</tr>
<tr>
<td>Chains</td>
<td>Universal, Renold Jeffrey, Suzhou AODA, Hangzhou Donghua</td>
</tr>
<tr>
<td>Motor</td>
<td>Tianjin Jiali, Siemens, OMS</td>
</tr>
<tr>
<td>Gear Box</td>
<td>Siemens / Flender, OMS</td>
</tr>
<tr>
<td>Inverter</td>
<td>Yaskawa, VACON</td>
</tr>
<tr>
<td>MCCB, MCB, Contactor</td>
<td>Schneider</td>
</tr>
<tr>
<td>Relays, Limit Switch, Button</td>
<td>OMRON, Schmersal,</td>
</tr>
<tr>
<td>Bearings</td>
<td>SKF, NSK</td>
</tr>
</tbody>
</table>

Tenderers may kindly review the above list while submitting the offer and consider these or comparable vendors. Approval of vendors shall be dealt as per procedure defined below.

Vendor Approval and Selection Procedure

(1) The contractor can send a proposal for the vendor after ensuring that what he proposes at least meets the specifications both, the quality and safety standard of the stipulated makes, the proposed product should be a proven one. He shall also stand full guarantee to his proposal and if at any stage it is found that the material is not suitable or meeting the tender requirement, the contractor shall replace the material and provide the material from the alternate vendor after approval from Employer without any additional cost to Employer. The alternate makes can be used only after an approval accorded by the Employer, whose decision will be final in the matter.

(2) The approval of any equipment or product to be used shall be done in two stages:-

(a) Stage-I
   - Assessment of capability of proposed Vendor to supply a particular equipment or product, with quality and performance requirements, as required by Specifications as well as other contract conditions. The proposed product should be a proven product in service for at least 3 years.
   - Assessment of the financial and functional strength of the Vendor to supply the requisite quantity of equipment and product as per delivery schedule acceptable to contractor and engineer to deliver the project in time.

(b) Stage-II
   Stage-II called as Technical Submission Approval Stage, selection of Equipment or product from the equipment / products manufactured / supplied by the approved vendor will be done. This stage includes thorough technical assessments about the conformance of the offered equipment / product to the Specifications and other requirements.
(c) To obtain Vendor Approval the Contractor must apply with the four sets of the following documents to the Engineer

(i) Company Profile and Experience of the Vendor

(ii) Clause wise compliance of the relevant Clauses of Specifications.

(iii) Details of supplies / orders executed in last ten years for the type of equipment / product offered. Supplies / orders executed for Underground Metro Systems shall be specifically mentioned

(iv) Details of the facilities available at the Works / Manufacturing Unit where the proposed equipment / product shall be manufactured.

(v) ISO 9000 Certification for the Works / Manufacturing Unit where the proposed equipment / product shall be manufactured (The Works / Manufacturing Unit where the proposed equipment / product shall be manufactured must have ISO 9000 Certification)

(vi) Proof regarding compliance to Manufacturer’s Qualifications. The offered products must be proven in service.

(vii) Audited Financial Statements of the Vendor for the last three years.

(viii) Type test certificates/ Performance certificate from accredited laboratories for the proposed type of equipment / products to establish the technical capability of the vendor (In case, specific requirements are mentioned in the relevant sections of Specifications with regard to type testing, same shall also be complied additionally).

(ix) The vendor shall not have been blacklisted by any Govt. Agency in India.

(x) Any other item as required by Employer / Employer’s Representative.

(d) Contractor must certify the check list provided that vendor Proposal is complete and all the above documents are available in the Vendor Proposal. In addition, the Contractor must check / certify compliance to the Specifications before forwarding the same.

(e) Incomplete Vendor Proposal will not be treated as a submission and will be returned.

(f) Engineer will give Approval to the Vendor Proposal (received complete with all the documents mentioned above) expeditiously.

(g) Technical submission shall be accompanied with the calculations / other technical documents to justify the selection of any particular model of equipment / product, detailed technical features / parameters of the selected product, type test certificates from the accredited laboratories for the offered products, any other document required by the Engineer.

(h) Engineer will give Approval to the Technical Proposal (received complete with all the documents mentioned above) expeditiously.
It may be noted that Approval of Vendors as per Point (3) above shall only be done by Employer / Engineer after the award of the work. Vendor submissions shall not be evaluated during the tender evaluation. Conditional Tender offers received from Tenderers with particular Vendors for supply of equipment/ products will not be evaluated during evaluation and will be dealt with after award of the work.

(4) It may further be noted that Employer / Engineer shall be under no obligation to accept equipment / products manufactured by the successful Tenderer, unless it meets the entire criterion mentioned above.

For Design and Build Contracts

In addition to above, in Design and Build Contracts the following shall also be ensured for the Vendor Approval and Selection:-

1. **Proven Design**

   The Contractor shall develop the design based on this specification and on sound proven and reliable engineering practices. The broad design details shall be submitted with technical support data in the technical bid. Detailed calculations shall be submitted to the Engineer during the design process stage for review and approval.

1.1 **Systems and Sub-Systems**

   Manufacturer shall have at least 5 years experience of design and manufacturing of similar system. Proposed systems from the proposed manufacturing unit shall have been in use and have established their satisfactory performance and reliability for 3 years in minimum.

   All sub-systems, equipments and major components etc. (hereinafter referred as ‘sub-systems’) shall be state-of-art and of proven design.

   Proposed Systems/ sub-systems shall have been in use and have established their satisfactory performance and reliability on at least Two mass rapid transit systems (including Railway or Airports) in revenue service over a period of three years or more either outside the country of origin at an average in two different countries. Systems/ Sub-systems/ components used in other MRTS in India do not get automatically qualified for use unless specifically approved by the Engineer for this project. If required by the Engineer, Contractor shall provide certificate of satisfactory performance for a period of five years or more from the Metro operators. Where similar System/ Sub-systems of a different rating are already proven in service as per the above criteria then the supply shall be based on such sub-systems.

   All ‘sub systems’ shall be procured from the approved vendors and sourced from only such manufacturing units that have supplied the sub-systems that fulfill the proven design requirements as above.
In case the contractor proposes to use systems or sub-system(s) that do not fulfill the above said criteria then the contractor shall furnish sufficient information to prove the basic soundness and reliability of the offered systems and sub-system(s) for review of the Engineer.

The Engineer’s decision on contractor’s proposal shall be final and binding.

For sourcing the equipment from indigenous manufacturing facilities, following conditions shall be complied:-

(i) In case the vendor uses his own facilities for indigenization after part supply of equipment from the approved manufacturing unit, no change in design, component type/make, quality standards, manufacture procedure, etc. shall be made without specific approval of the Engineer.

(ii) In case OEM wants to use manufacturing facilities in India (other than his own) for items for which the OEM has been approved, it shall enter into an agreement with such selected Indian equipment manufacturer and obtain prior approval from Employer. No change in composition, rating, type, model no., manufacturing process, quality standards, design, etc. and make of the components used in assemblies/sub-assemblies of such equipment as manufactured by the approved parent vendor shall be made without specific approval of the Engineer.

(iii) In case OEM wishes to change/make/type specifications, etc. of any sub-components for supplies to be sourced from Indian facility, specific prior approval of the Engineer shall be obtained for changes made, model, specification, etc. Responsibility for obtaining such prior approval shall rest solely with the contractor.

Format for submitting the vendor approval request shall be given to the contractor during initial stages and approved format shall be followed throughout the contract.

END OF APPENDIX
Appendix -G

MAINTENANCE REQUIREMENTS

To be Read in conjunction with the chapter -17 Maintenance Requirement of TS

1.0 Maintenance

1.1 The Contractor shall provide maintenance services throughout the 2 Years Defects Liability Period (DLP) under the Main Contract and also under the Supplementary Comprehensive Annual Maintenance Contract for the Escalators supplied under the Contract.

1.2 The Maintenance work shall include attendance to all service calls, work described in approved Maintenance Schedule, and the followings:

1.2.1 Service shall include all work necessary to maintain entire escalator system in good working order at all times through Preventive / Scheduled Maintenance (PM) & Corrective Maintenance (CM). Preventive Maintenance can be carried out only during Non – Revenue Hours. (likely to be 00.00 hrs (Midnight) to 04.00 hrs.)

1.2.2 The Contractor shall dispatch competent personnel to rectify stoppages at any time during the day or night when being called on by the Employer within a time of Four hours (maximum).

1.2.3 The Contractor shall maintain adequate quantity of consumable and contingent spare parts as per agreed list at mutually agreed location in order to minimize the shut down time due to repairs and maintenance.

1.2.4 The DLP and Comprehensive AMC includes all spare parts of Escalators including consumables.

1.2.5 Contractor shall carry out periodic testing and examination of Escalators safety devices as required by the provisions of any enactment in force relating thereto or of any enactment, regulations or by-laws of any local or other duly constituted authority which may be applicable to such tests and to provide such copies of the test certificates, duly signed by a competent “Engineer.”

1.2.6 Contractor shall be fully responsible for obtain & ensure timely renewal of relevant safety certificate(s) or license(s) or any other documents required from statutory authorities for operation & maintenance of Escalators, during 2 Years Defects Liability Period (DLP) and also during the Comprehensive Annual Maintenance Contract. Nothing extra shall be payable.

1.2.7 Annual Independent Third Party Safety Check including loading test for each Escalator and corrective adjustment (if necessary) shall be done by the Contractor. The report format shall be approved by Employer.

1.2.8 Reports

1.2.8.1 The Contractor shall provide monthly, quarterly, half-yearly and yearly reports on the condition of the equipment in a format approved by the Employer.

1.2.8.2 A report in duplicate shall be sent to the Employer immediately following every call out, indicating the time of call out visit, cause, remedial action taken and the time that the service was restored. The monthly summary of failure report along with the
analysis giving details of nature of fault, remedial action taken etc in the approved format shall be provided.

1.2.8.3 Reports on routine visits are not required except where necessary to draw attention to defects of a minor nature, which could not be rectified during the routine visit. Records of each routine visit and call-out visit, together with details of the work done or action taken, shall be entered on a log book which shall be provided by the Contractor and retained in the location as decided by the “Engineer”.

1.2.9 Maintenance Service Plan

1.2.9.1 The Contractor shall provide the employer with a maintenance service plan and a Predictive Replacement Plan for the components which are likely to result in failure of Escalators. Reference Plan shall be finalized during design approval stage.

1.2.9.2 Maintenance service plan shall include all Preventive / Scheduled & Corrective Maintenance, and must be submitted for Approval, 3 months before the commencement of the DLP.

1.2.9.3 The Employer shall reserve the right to review the “Predictive Replacement Plan” based on actual performance of equipment during 2 Years Defects Liability Period (DLP) and also during the Comprehensive Annual Maintenance Contract. Nothing extra shall be payable.

1.2.10 Failure Investigations

The Contractor shall conduct failure investigations. The Contractor shall make available to the Employer / Owner all test and failure data as required. Disputes (if any) will be resolved by “Engineer”.

1.2.11 Contractor shall provide Operation and Maintenance Manuals (in Malayalam & English).

1.2.12 Contractor shall provide training to JMRC personnel (a batch of 20 person) in operation & maintenance related to Escalators for 15 trainer working days (from 10:00 hrs to 17:30 hrs).

2.0 Maintenance Performance Requirements.

2.1 The Contractor shall dispatch competent personnel to rectify stoppages at any time during the day or night when being called on by the Employer within a time of Four hours (maximum). Repairs shall be carried out on a 24 hours per day, 7 days per week basis until the faulty unit / elevator is put back in service.

2.2 If escalator is kept out of service for more than 24 hrs due to non-availability of Spares or due to lack of proper attention. Employer shall impose a penalty of Rs. 10,000/- (INR Ten Thousand Only) per day for each such case. The penalty shall be applicable during DLP and AMC.

2.3 The reliability of equipment should be of level that it does not result in injury / fatality of Escalator User in the Escalator due to equipment failure. Any claim / Damage / Compensation claimed by or on behalf of the affected passenger / escalator user on account of equipment failure shall be recovered from the contractor. In addition, JMRC shall impose a penalty @ Rs.10,000/- (INR Ten Thousand Only) per case. The penalty shall be applicable during DLP and AMC.

2.4 The contractor shall ensure that the Maintenance Performance requirements as mentioned below are achieved:

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<td>1</td>
<td>Availability</td>
<td>≥ 99.9 %</td>
</tr>
<tr>
<td>2</td>
<td>Maintainability (based on Mean Time To Repair)</td>
<td>≤ 4 hrs.</td>
</tr>
<tr>
<td>3</td>
<td>Call out Ratio (per Escalator per Year)</td>
<td>≤ 2</td>
</tr>
<tr>
<td>4</td>
<td>Average Call out Ratio per Year under the contract</td>
<td>≤ 1.5</td>
</tr>
</tbody>
</table>

Availability will be calculated as under:-

\[
\text{Availability} = \frac{(\text{Availability} \times (365 \times 20 \text{ hours}) \times \text{Nos. of Escalators in a Section}) - (\text{Total unavailability hours in one year})}{(365 \times 20 \text{ hours}) \times \text{Nos. of Escalators in a Section}}
\]

**Mean Time To Repair (MTTR)**

The MTTR time measurement shall include On site diagnostics and rectification of the failure up to point that the system is restored to full functionality. In the event that the failure cannot be rectified, the measurement shall include the time necessary to remove the failed piece of equipment from the system and replaced it with a functioning module.

The maintainability shall measure by fault rectification time, which should not exceed 4 hours since its reporting to contractor’s call centre or his representative by JMRC.

2.5 The Contractor shall submit a Quarterly Maintenance Performance Report along with the Payment Invoice, giving the details actual performance achieved on monthly basis in an approved format with specific reasons if any target is not met.

2.6 If the visit of engineer for non schedule maintenance exceeds 2 per escalator per year or average call out ratio exceeds 1.5, a penalty of Rs. 10,000/- (INR Ten Thousand Only) shall be imposed for each such visit. The penalty shall be applicable during DLP and AMC period also (if separate contract will be awarded for AMC after completion of 2 years DLP).

**Indicative List of Spares and tools are provided at Annexure-1 to Annexure-6 of Appendix E of TS.**
PRICE VARIATION CLAUSE FOR COMPREHENSIVE MAINTENANCE CONTRACT FOR ELEVATORS / ESCALATORS

The price of comprehensive maintenance contracts for elevators/escalators is to be revised at the end of one year period on the basis of the following variation formula:

\[ P = P_0 \times \left( \frac{15+50(W/W_0) +25(MP/MP_0) +10(FP/FP_0)}{100} \right) \]

Wherein,

- \( P \) = Revised price payable in accordance with the above formula.
- \( P_0 \) = Previous year’s confirmed price for the maintenance contract.
- \( W_0 \) = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. Of India (Base 1982 = 100). This index number is as applicable for the month six months prior to date of commencement of previous year contract.
- \( MP \) = The final wholesale price index number for metal products as published by the office of the economic advisor, Ministry of Industry, Government of India (refer notes).
- \( FP_0 \) = The final wholesale price index number for fuel, power, light and lubricants as published by the office of the economic advisor, Ministry of industry, Government of India (refer notes).

This index number is applicable on the 1st Saturday of the month, six months prior to the date of commencement of previous year’s contract.

For example: For the contract period 1st January 2002 to 1st December 2002, the applicable \( (P_0) \) should be the contract price for the period 1st January 2001 to 31st December 2001 \( (W_0) \) should be for the month of July 2000, \( (MP_0) \) and \( (FP_0) \) both should be as on 1st Saturday of the month of July 2000 would appear in the circular issued for the month of October 2000.

The above published by IEEMA vide circular reference number IEEMA(PVC)/LLES prevailing as on day of the month............i.e. one month prior to the date of commencement of previous year’s contract.

- \( W \) = All India average consumer price index number for industrial workers. (base 1982 = 100) is as published by labour bureau, Ministry of labour, Govt. of India.

This index number is as applicable for the month, six months prior to the date of commencement of the revised contract.
MP = The final wholesale price index number for metal products as published by the office of the economic advisor, Ministry of Industry, Government of India (refer note).

This index number is as applicable on the 1st Saturday of the month, six months prior to the date of commencement of the revised contract.

FP = The final wholesale price index number for fuel, power, light and lubricants are published by the office of the economic advisor, Ministry of Industry, Government of India (refer notes).

This index number is as applicable on the 1st Saturday of the month, six months prior to the date of commencement of the revised contract.

For example: For the contract period from 1st January 2002 to 31st December 2002, the applicable index numbers (W) should be for the month of July 2001 and applicable wholesale price index number (MP) and (FP) both should be for the week ending 1st Saturday of July 2001, which would appear in the circular issued for the month of October 2001.

Notes:

a. Wholesale price index number for metal products and for fuel, power, light and lubricant are as published by the office of economic adviser, Ministry of Industry, Govt. Of India with base 1993-94=100. These wholesale price index numbers are being published weekly, on provisional basis. However the same gets finalised after 8 weeks and are normally available after two/three months. (Therefore we are considering in our circular only this final index published by the economic adviser for the 1st Saturday of the month.).

b. The sole purpose of the above stipulation is to arrive at the amount of the entire contract under the various situations. The above stipulations do not indicate any intentions to sale material under this contract as movables.

c. The indices MP, FP and W are regularly published by IEEMA in monthly basic price circulars based on information bulletins from the authorities mentioned.

For Indian Electrical & Electronics Manufacturers’ Association

Authorised Signatory
Appendix -H

Remote Monitoring System / Central Monitoring System

1) The Contractor shall provide a PC based Remote Monitoring and Control System (RMS) to be run on the computer of BMS system in the Station Control Room being provided by Designated BMS Contractor. The RMS shall provide continuous monitoring and controlling of the escalators.

2) The following monitoring function shall be provided for RMS.

   a) Power On / Off status indicator
   b) Trip (fault) indicator for all Faults. (Should also include Instructions to
   c) Local operator / Controller to act in case of fault).
   d) Up (escalators) direction indicator
   e) Down (escalators) direction indicator
   f) Start override indicator
   g) Speed of the escalator (0.0 m/s, 0.2 m/s, 0.50 m/s, or 0.65 m/s)
   h) RMS Mode / Local mode.
   i) Down time log.
   j) Maintenance support (Maintenance Log, Maintenance Schedule & Non – maintenance Alarm).
   l) Equipment History. (i/c History of Factory Acceptance Test Results, Commissioning Results and Site Test Results).

3) The trip signal shall be activated whenever the escalator is stopped by any fault or emergency stop button during operation and the activation of the control functions in (a) and (b) in Clause 2.0 above. The signal shall be latched on until it is manually re-set by key switches located at the two landings or remotely via the RMS. The escalator shall only be re-started after the “trip” is cleared and the trip” signal has been re-set. Re-starting of escalators shall also be allowed for those fault signals activated by safety devices without the necessities of maintenance personnel to carry out inspection and the safety device is automatically re-set. Detail proposal shall be submitted by the Contractor for review without objection by the “Engineer” prior to manufacture.

4) The following control function shall be provided for RMS:

   a) Remote stop control
   b) Override control switches to prevent unauthorised starting of the escalator for both normal run and inspection run locally. This shall only function when the escalator has been stopped. A by-pass (Local/Remote) switch with illuminated indication which shall by-pass this function shall be provided in the controller.
   c) Remote re-setting of trip (fault) signal.
   d) Remote starting comprising of option to select Up / Down direction of movement for escalators.

5) The RMS system shall also be used jointly to operate the functions of the Remote Monitoring and Control Systems of lifts. The Contractor shall integrate display requirements of different functions of both lifts and escalators into a single software. The choice of size, system of display and background shall be furnished for the consent of the Employer or his representatives. The Contractor shall interface with Signaling and BMS contractor for integration of RMS system with Building Management System. Translation protocol between Escalator and Elevator software will be prepared by Escalator contractor.

Further, the Escalator contractor will have the option to match protocol of escalator and elevator Software for RMS with the computer provided by BMS Contractor (E&M Contractor for Rail corridor) OR supply his own computer and provide RMS of escalator and elevator.
both. It is also the responsibility of escalator Contractor to match protocol of Escalator & Elevator Software, with the software of equipment in OCC.

6) The Contractor shall be responsible for the provision of all conduits, trunking, cabling and interface terminal board (ITB) in connection with the installation of the RMS except that the conduits and trunking from the Escalator Controller Room to the Station Control Room will be provided by the respective Electrical Contractor. The Contractor shall coordinate and interface with Electrical Contractor and/or his sub-contractor in association with conduits / trunking routing and sizing requirement. The RMS cabling from Elevator to Interface Terminal Block (in Station Control Room) shall be provided by Elevator Contractor.

7) It is preferable that the Contractor proposes the use of Ethernet or a serial data link for RMS e.g. RS485. The physical characteristics and data transmission protocol proposed shall conform to an internationally recognised publicly available standard. The Contractor shall also provide serial data link of each escalator, terminated in the interface terminal board (ITB) located in the Station Control Room for connection to OCC by “Signaling Contractor”. The information to be carried by serial data link is detailed in Clause 5.10.2 above. The Contractor shall interface with “Signaling Contractor” in this regard.

8) Screened cables shall be used for the connection between the communication as described above.
Procurement of Plant
Design, Supply and Installation
JAIPUR METRO RAIL CORPORATION LIMITED
BIDDING DOCUMENT
for
Procurement
of
NCB No.-JP/EW/1B/E3

PART-II REQUIREMENTS

Section 6 - Employer’s Requirements (ERQ)

JAIPUR METRO RAIL CORPORATION LTD.
Khanij Bhawan, Tilak Marg,
C- Scheme, Jaipur (Rajasthan) PIN-302005
Country: India
SAFETY, HEALTH AND ENVIRONMENT (SHE) MANUAL

CONDITIONS OF CONTRACT ON SAFETY, HEALTH AND ENVIRONMENT

(NOVEMBER 2013)
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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.


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


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


xiii) Minimum Wages Act, 1948 and Rules 1950


xvi) Environment Protection Act, 1986 and Rules 1986


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


xxiii) Manufacture, Storage & Import of Hazardous Chemicals Rules, 1989

xxiv) The Hazardous Waste (Management & Handling) Rules, 1989


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:


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 subcontractors 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 (e.g., alter the design to avoid the risk);
   ii) if this cannot be achieved, the risk should be combated at source (e.g., 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 (e.g., use of safety harnesses).

5.4 Duty to provide health and safety risks in the drawing itself

5.4.1 In case of situations were 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 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/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/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.
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:

<table>
<thead>
<tr>
<th>Chairman</th>
<th>Project Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secretary</td>
<td>SHE Manager (In-charge)</td>
</tr>
<tr>
<td>Members</td>
<td>i) Labour Welfare Officer</td>
</tr>
<tr>
<td></td>
<td>ii) In charge of plant and machinery</td>
</tr>
<tr>
<td></td>
<td>iii) In charge of site electrics</td>
</tr>
<tr>
<td></td>
<td>iv) In charge of stores.</td>
</tr>
<tr>
<td></td>
<td>v) Senior Managers/ Engineers heading different sub functions.</td>
</tr>
<tr>
<td></td>
<td>vi) Sub – contractor’s representative</td>
</tr>
<tr>
<td></td>
<td>vii) Labour Contractor’s representative</td>
</tr>
<tr>
<td></td>
<td>viii) Workers’ representative</td>
</tr>
<tr>
<td></td>
<td>ix) Co-contractor representative.</td>
</tr>
<tr>
<td></td>
<td>x) SHE staffs</td>
</tr>
</tbody>
</table>

| 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:

<table>
<thead>
<tr>
<th>Chairman</th>
<th>Project Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secretary</td>
<td>SHE Manager (In-charge)</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>v) Sub- Contractor’s representative</td>
</tr>
<tr>
<td></td>
<td>vi) Labour contractor’s representative</td>
</tr>
<tr>
<td></td>
<td>vii) Workers’ representatives</td>
</tr>
<tr>
<td></td>
<td>viii) All SHE Staffs</td>
</tr>
</tbody>
</table>
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 monitory 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:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Score</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt; 60%</td>
<td>Immediate</td>
<td>Require Contractor to rectify within 24 hours and confirm in writing to Employer</td>
</tr>
<tr>
<td>2</td>
<td>&lt; 75%</td>
<td>Improvement Necessary</td>
<td>Contractor rectification within 7 days and</td>
</tr>
</tbody>
</table>
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:
Audit team members are required to gather information by observations through interviews and by checks of hardware and documentation.

Audit team shall prepare checklist to cover all parts based on SHE legislations rules and regulations and JMRC requirements.

Audit team members shall verify the facts and findings leading to the identified gaps and weakness.

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 willful 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 with out 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 housekeeping 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 Housekeeping 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 housekeeping 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.
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
(a) a working platform
(b) a net, airbag or other collective safe guard for arresting falls.
(c) personal fall protection system
(d) 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;

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 platform 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, loffing 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 eye bolts 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, hydraz 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 rigger 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 at 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.
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 $180^\circ$ 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) In case 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.

<table>
<thead>
<tr>
<th>Person</th>
<th>Maximum weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult man</td>
<td>55</td>
</tr>
<tr>
<td>Adult woman</td>
<td>30</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Type of Lighting</th>
<th>Area of Requirement</th>
<th>Luminaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area Lighting</td>
<td>Workmen and vehicles to move about in safely.</td>
<td>i) Shovel type: non-symmetrical tungsten halogen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Symmetrical or non-symmetrical tungsten halogen</td>
</tr>
</tbody>
</table>

| Beam flood lighting | Concentrated light over an area from a relatively great distance. | 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 | i) Dispersive (Mercury florescent)  
ii) Cargo cluster  
iii) Florescent trough |
| Walkway lighting | Lighting for stairways, ladder ways, corridors, scaffold access routs, etc. | 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 | i) PAR (Parabolic Aluminised Reflector) lamp cluster  
ii) Festoons (with or without shades)  
iii) Adjustable florescent work lamp  
v) 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.
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, screwdrivers, 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 n 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 life 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 an 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 toe 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 barricades.

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.
### Safety, Health and Environment (SHE) Manual

All employees of the Contractor including workmen

| i) Hard hat with company Logo | i) Hard hat with reflective tape |
| ii) Safety boots | ii) Safety boots |
| iii) Hi-visibility **waistcoat** covering upper body and meeting the following requirements as per BS EN 471:1994: | iii) Hi-visibility **jacket** covering upper body and meeting the following requirements as per BS EN 471:1994: |
| a) Background in fluorescent orange-red in colour | 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 | 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 diagonal strips of 5cm wide on back in an ‘X’ pattern covering at least 570cm² | c) Two vertical green strips of 5cm wide on front side, covering the torso at least 500 cm² |
| d) Horizontal strips not less than 5cm wide running around the bottom of the vertical strip in front and ‘X’ pattern at back. | d) Two diagonal strips of 5cm wide on back in an ‘X’ pattern covering at least 570cm² |
| e) The bottom strip shall be at a distance of 5cm from the bottom of the vest. | e) Horizontal strips not less than 5cm wide running around the bottom of the vertical strip in front and ‘X’ pattern at back. |
| f) Strips must be retro reflective and fluorescent | f) The bottom strip shall be at a distance of 5cm from the bottom of the vest. |
| g) Waistcoat shall have a side adjustable fit and a side and front tear-away feature on vests made of nylon. | g) Strips must be retro reflective and fluorescent. |

### 39.4.1 Colour coding for helmets

<table>
<thead>
<tr>
<th>Safety Helmet Colour Code (Every Helmet should have the LOGO* affixed/painted)</th>
<th>Person to use</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>JMRC staffs</td>
</tr>
<tr>
<td>Grey</td>
<td>All Designers, Architect, Consultants, etc.</td>
</tr>
<tr>
<td>Violet</td>
<td>Main Contractors (Engineers / Supervisors)</td>
</tr>
<tr>
<td>Blue</td>
<td>All Sub-contractors (Engineers / Supervisors)</td>
</tr>
<tr>
<td>Red</td>
<td>Electricians (Both Contractor and Sub-contractor)</td>
</tr>
<tr>
<td>Green</td>
<td>Safety Professionals (Both Contractor and Sub-contractor)</td>
</tr>
<tr>
<td>Orange</td>
<td>Security Guards / Traffic marshals</td>
</tr>
<tr>
<td>Yellow</td>
<td>All workmen</td>
</tr>
<tr>
<td>White (with “VISITOR” sticker)</td>
<td>Visitors</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------</td>
</tr>
</tbody>
</table>

**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 subcontractor 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 changes 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 quaintly 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 smoothened 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.
vii) 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 incorporated 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 arrangements 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.

<table>
<thead>
<tr>
<th>SL. NO.</th>
<th>TOPIC</th>
<th>UNSAFE ACT/UNSAFE CONDITION</th>
<th>DEDUCTIBLE AMOUNT</th>
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<tbody>
<tr>
<td>1.</td>
<td>SHE Policy &amp; Plan</td>
<td>i) SHE policy</td>
<td>Rs.5,000 per single violation, compounded to a maximum of Rs.25,000 at any single instance.</td>
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<td></td>
<td></td>
<td>a) non-compliance of clause 4.1</td>
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<td></td>
<td>b) Inadequate coverage, not signed</td>
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<td>c) Not displayed at prominent locations</td>
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<td>ii) SHE plan:</td>
<td>Rs.1,00,000 per single violation, compounded to a maximum of Rs.2,00,000 at any single instance.</td>
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<td></td>
<td></td>
<td>a) Not as per Employers’ content and coverage</td>
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<td></td>
<td></td>
<td>b) Delay in submission</td>
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<td></td>
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<td>c) Not updated as per employer’s instruction as per clause 4.4</td>
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<td></td>
<td></td>
<td>d) Copies not provided to all required supervisors / engineers</td>
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<td></td>
<td></td>
<td>i) Not complying to the minimum manpower requirements as mentioned in General Instruction JMRC/SHE/001</td>
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<td>ii) Not filling up the vacancies created due to SHE personnel leaving the contractor within 14 days.</td>
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<td></td>
<td>iii) SHE organisation not provided with required Audio-visual and other equipments as per General Instruction JMRC/SHE/012</td>
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<td>iv) Employing through outsourcing</td>
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<tr>
<td>2.</td>
<td>SHE Organisation</td>
<td>i) Rs.1,00,000 per month for first month and Rs.2,00,000 for subsequent months</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Rs.50,000 per month for first month and Rs.1,00,000 for subsequent months</td>
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<td>For items iii), iv), v) and vi)</td>
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<td></td>
<td></td>
<td>Rs.50,000 for first violation and Rs.1,00,000 for subsequent violations</td>
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<td></td>
<td>agencies and SHE personal are not in the payroll of the main contractor</td>
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<td></td>
<td>v) Disobedience / Improper conduct of any SHE personnel.</td>
<td></td>
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<td></td>
<td>vi) Chief SHE Manager not reporting directly to CPM of contractor.</td>
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<td>3.</td>
<td>SHE committee</td>
<td></td>
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<tr>
<td></td>
<td>i) Failed to formulate or conduct SHE Committee meeting for any month</td>
<td>i) Rs.1,00,000 for the first violation and Rs.5,00,000 for the subsequent violations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ii) Contractor and Sub-contractor representatives not attending SHE Committee meetings</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iii) Failed to conduct Site inspection before conducting SHE Committee meeting</td>
<td>For item iii), iv), v) and vi) Rs.25,000 for first violation and Rs.50,000 for subsequent violations</td>
<td></td>
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<td></td>
<td>iv) Failed to send SHE Committee Meeting minutes or Agenda to Employer in time</td>
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<td></td>
<td>v) Non-adherence of clause 7.7.1</td>
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<td>vi) Non-adherence of clause 7.9</td>
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<td>4.</td>
<td>ID card</td>
<td>Rs.1,00,000 for first violation and Rs.2,00,000 for subsequent violations</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>SHE Training</td>
<td>For item 1 a) to g) Rs.50,000 for first violation on and Rs.1,00,000 for subsequent violations</td>
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<tr>
<td></td>
<td>i) Not complying to the requirements as mentioned in conditions of contract on SHE and project SHE manual with regard to:</td>
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<tr>
<td></td>
<td>a) Induction training not given</td>
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<td></td>
<td>b) Supervisor/engineer/manager training not conducted as per clause 9.6</td>
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<td></td>
<td>c) Refresher training as per clause 9.7 and 9.11 not conducted</td>
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<td></td>
<td>d) Tool-box talk not conducted as per clause 9.8</td>
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<td></td>
<td>e) Skill development training not conducted as clause 9.9</td>
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<td></td>
<td>f) Daily Safety Oath not conducted as per clause 9.10</td>
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<td></td>
<td>g) Top management behaviour based SHE training conducted</td>
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<td>6.</td>
<td>SHE Inspection</td>
<td>Rs.50,000 for first violation and Rs.1,00,000 for subsequent violations</td>
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<tr>
<td></td>
<td>i) Not complying to the requirements as mentioned in conditions of contract on SHE and project SHE manual as per clause 10.0</td>
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<td></td>
<td>ii) Non compliance of clause 10.3.6</td>
<td></td>
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<tr>
<td>7.</td>
<td>SHE audit</td>
<td>For item i) to iii) Rs.50,000 for first violation and Rs.1,00,000 for subsequent violations.</td>
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<td></td>
<td>Internal Audit: MARS</td>
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<tr>
<td></td>
<td>i) Not conducted as per SHE Plan</td>
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<td></td>
<td>ii) Report not sent to Employer</td>
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<td></td>
<td>iii) Action not taken for any month</td>
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<tr>
<td>Section</td>
<td>Details</td>
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</table>
| **8. SHE Communication** | i) Important days to be observed for SHE awareness as furnished by employer not observed  
ii) Posters as furnished by Employer not printed and displayed |
| | i) Rs.10,000 for first violation and Rs.50,000 for subsequent violations  
ii) 2,00,000 per contract |
| **9. SHE Submittals** | i) Non compliance of clause 13.1  
ii) Non compliance of clause 13.2  
iii) Non compliance of clause 13.3 |
| | For item i) Rs.50,000 for first violation and Rs.1,00,000 for subsequent violations  
For item ii) and iii) Rs.1,00,000 for first violation and Rs.2,00,000 for subsequent violations |
| **10. Injury and Incidence reporting** | i) Fatal accidents  
ii) Injury accident  
iii) Abnormal delay in reporting accidents or wilful suppression of information about any accidents / dangerous occurrence as per clause 14.1.4  
iv) Delay in informing about any accidents / dangerous incidents.  
v) Non-compliance of the clause 14.4 |
| | i. Rs.5,00,000 for first fatality and Rs.10,00,000 for every subsequent fatality.  
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)  
iii. Rs.1,00,000 for first violation and Rs.2,00,000 for subsequent violations  
For items iv) and v) Rs.50,000 for first violation and Rs.1,00,000 for subsequent violations |
| **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** | i) Housekeeping maintenance register not properly maintained up to date  
ii) Surrounding areas of drinking water tanks / taps not hygienically cleaned / maintained  
iii) Office, stores, toilet / urinals not properly cleaned and maintained.  
iv) Required dustbins at appropriate places not provided / not cleaned.  
v) Stairways, gangways, passageways blocked. |
<table>
<thead>
<tr>
<th></th>
<th>Rs.10,000 per single violation Compounded to a maximum of Rs.1,00,000 at any single instance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>vi) Lumber with protruding nails left as such</td>
</tr>
<tr>
<td></td>
<td>vii) Openings unprotected</td>
</tr>
<tr>
<td></td>
<td>viii) Excavated earth not removed within a reasonable time.</td>
</tr>
<tr>
<td></td>
<td>ix) Truck carrying excavated earth not covered / tyres not cleaned.</td>
</tr>
<tr>
<td></td>
<td>x) Vehicles / equipments parked / placed on roads obstructing free flow of traffic</td>
</tr>
<tr>
<td></td>
<td>xi) Unused surplus cables / steel scraps lying scattered</td>
</tr>
<tr>
<td></td>
<td>xii) Wooden scraps, empty wooden cable drums lying scattered</td>
</tr>
<tr>
<td></td>
<td>xiii) Water stagnation leading to mosquito breeding</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>13.</th>
<th>Working at Height / Ladders and Scaffolds</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>Not using or anchoring Safety Belt</td>
</tr>
<tr>
<td>ii)</td>
<td>Not using Safety Net</td>
</tr>
<tr>
<td>iii)</td>
<td>Absence of life line or anchorage point to anchor safety belt</td>
</tr>
<tr>
<td>iv)</td>
<td>Non-compliance of clause 18.17</td>
</tr>
<tr>
<td>v)</td>
<td>Using Bamboo ladders</td>
</tr>
<tr>
<td>vi)</td>
<td>Painting of ladders</td>
</tr>
<tr>
<td>vii)</td>
<td>Improper usage (less than 1m extension above landing point, not maintaining 1:4 ratio)</td>
</tr>
<tr>
<td>viii)</td>
<td>Aluminium ladders without base rubber bush</td>
</tr>
<tr>
<td>ix)</td>
<td>Usage of broken / week ladders</td>
</tr>
<tr>
<td>x)</td>
<td>Usage of re-bar welded ladders</td>
</tr>
<tr>
<td>xi)</td>
<td>Improper guardrail, toe board, barriers and other means of collective protection</td>
</tr>
<tr>
<td>xii)</td>
<td>Improper working platform</td>
</tr>
<tr>
<td>xiii)</td>
<td>Working at unprotected fragile surface</td>
</tr>
<tr>
<td>xiv)</td>
<td>Working at unprotected edges</td>
</tr>
</tbody>
</table>

|   | Rs.10,000 per single violation Compounded to a maximum of Rs.1,00,000 at any single instance |

<table>
<thead>
<tr>
<th>14.</th>
<th>Lifting appliances and gear</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>Non availability of fitness certificate as per clause 21.3</td>
</tr>
<tr>
<td>ii)</td>
<td>Documents not displayed on the machine or not available with the operator as per clause 21.4</td>
</tr>
<tr>
<td>iii)</td>
<td>Maximum Safe Working Load not written on the machine as per clause 21.5</td>
</tr>
<tr>
<td>iv)</td>
<td>Non-compliance of 21.6</td>
</tr>
<tr>
<td>v)</td>
<td>Non-compliance of 21.7</td>
</tr>
<tr>
<td>vi)</td>
<td>Automatic safe load indicator not provided or not in working condition as per clause 21.8</td>
</tr>
<tr>
<td>vii)</td>
<td>Age of the operator less than 21 years or without any licence and non-compliance of other item as per clause 21.9</td>
</tr>
</tbody>
</table>

|   | Rs.50,000 per single violation Compounded to a maximum of Rs.5,00,000 at any single instance |

SHE/ Page 83 of 122 November 2013
|   | 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  |
<table>
<thead>
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<tbody>
<tr>
<td>15.</td>
<td>Launching operation</td>
</tr>
</tbody>
</table>
| 16. | Site Electrical safety | 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 | 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 | 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 |
| 19. | Welding | 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 | 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 | 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 | 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 | 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 |
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<table>
<thead>
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<tbody>
<tr>
<td>a) Barricades</td>
<td></td>
<td>Rs.25,000 per single violation Compounded to a maximum of Rs.1,00,000 at any single instance</td>
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<tr>
<td></td>
<td>i) Not Cleaned</td>
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<td></td>
<td>ii) Not in alignment</td>
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<td></td>
<td>iii) Not numbered</td>
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<td></td>
<td>iv) Not painted</td>
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<td></td>
<td>v) Red lights / reflectors not working</td>
<td></td>
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<tr>
<td></td>
<td>vi) Damages not repaired</td>
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<tr>
<td></td>
<td>vii) Not secured properly</td>
<td></td>
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<td></td>
<td>viii) Barricade inspector not employed</td>
<td></td>
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<tr>
<td></td>
<td>ix) Protruding parts / portions repaired</td>
<td></td>
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<td></td>
<td>x) Barricades maintaining register not properly maintained up to date</td>
<td></td>
</tr>
<tr>
<td>b) Contractor Vehicles</td>
<td></td>
<td>Rs.25,000 per single violation Compounded to a maximum of Rs.1,00,000 at any single instance</td>
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<tr>
<td></td>
<td>i) Over loading of vehicles</td>
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<td></td>
<td>ii) Unfit drivers or operators</td>
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<td></td>
<td>iii) Unlicensed vehicles</td>
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<td>iv) Absence of traffic marshals</td>
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<td>v) Absence of reversing alarm</td>
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<td></td>
<td>vi) Absence of fog light (at winter)</td>
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<td></td>
<td>vii) Power / hand brakes not in working condition.</td>
<td></td>
</tr>
<tr>
<td>c) Splashing of Bentonite on roads / non-cleaning of tyres of dumpers and transit mixers</td>
<td></td>
<td>For item i) and ii): 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</td>
</tr>
<tr>
<td></td>
<td>i) Mishandling of bentonite like splashing of bentonite outside specified width of barricading</td>
<td></td>
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<tr>
<td></td>
<td>ii) Non-cleaning of tyres of dumpers and transit mixers before leaving the site and thereby creating a traffic safety hazard to road users.</td>
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<tr>
<td>24.</td>
<td>Batching plant / Casting yard</td>
<td>Non-adherence of any of the provisions mentioned in clause 38.0.</td>
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<tr>
<td>25.</td>
<td>PPE</td>
<td>i) Not having</td>
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<td></td>
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<td>ii) Not wearing (or) using and kept it elsewhere</td>
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<td></td>
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<td>iii) Using damaged one</td>
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<td></td>
<td></td>
<td>iv) Using wrong type</td>
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<td></td>
<td></td>
<td>v) Using wrong colour helmet or helmet without logo</td>
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<td>vi) Using for other operation (e.g. Using safety helmet for storing materials or carrying water from one place to other)</td>
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<td>vii) Not conforming to BIS standard</td>
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<td>From item vii): a) Rs.10,000 for first violation and Rs.50,000 for subsequent violations</td>
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<td>For item viii): a) Rs.50,000 for first violation and Rs.1,00,000 for subsequent violations</td>
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<tr>
<td>viii)</td>
<td>Non-compliance of clause 39.6, 39.7 and 39.8</td>
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<tr>
<td>26.</td>
<td>Occupational Health</td>
<td></td>
</tr>
<tr>
<td>i)</td>
<td>Fail to conduct Medical examination to workers</td>
<td>Rs.10,000 per single violation Compound to a maximum of Rs.1,00,000 at any single instance</td>
</tr>
<tr>
<td>ii)</td>
<td>Absence of ambulance van &amp; room</td>
<td></td>
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<tr>
<td>iii)</td>
<td>Workers not having ID card</td>
<td></td>
</tr>
<tr>
<td>iv)</td>
<td>Inadequate number of toilets</td>
<td></td>
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<tr>
<td>v)</td>
<td>Toilets not cleaned properly</td>
<td></td>
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<tr>
<td>vi)</td>
<td>Absence of water facilities for toilets and washing places</td>
<td></td>
</tr>
<tr>
<td>vii)</td>
<td>Toilet placed more than 500m from the work site</td>
<td></td>
</tr>
<tr>
<td>viii)</td>
<td>Absence of drinking water</td>
<td></td>
</tr>
<tr>
<td>ix)</td>
<td>Absence of first-aid person in work site.</td>
<td></td>
</tr>
<tr>
<td>x)</td>
<td>Absence or inadequacy of first-aid box.</td>
<td></td>
</tr>
<tr>
<td>xi)</td>
<td>Misuse of first-aid box.</td>
<td></td>
</tr>
<tr>
<td>xii)</td>
<td>First-aid box not satisfy the minimum Indian standard.</td>
<td></td>
</tr>
<tr>
<td>xiii)</td>
<td>Smoking inside the construction site</td>
<td></td>
</tr>
<tr>
<td>xiv)</td>
<td>Drink and drive or work</td>
<td></td>
</tr>
<tr>
<td>xv)</td>
<td>Excessive noise and vibration</td>
<td></td>
</tr>
<tr>
<td>xvi)</td>
<td>Canteen not provided</td>
<td></td>
</tr>
<tr>
<td>xvii)</td>
<td>Food stuff not served on no loss no profit basis</td>
<td></td>
</tr>
<tr>
<td>xviii)</td>
<td>Creche not provided</td>
<td></td>
</tr>
<tr>
<td>xix)</td>
<td>Accommodation not provided as per BOCWA</td>
<td></td>
</tr>
<tr>
<td>xx)</td>
<td>Fumigation / insecticides not sprayed to prevent Mosquito breeding</td>
<td></td>
</tr>
<tr>
<td>xxii)</td>
<td>Non-compliance of clause 44.1 and 44.2</td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>Labour Welfare measures</td>
<td></td>
</tr>
<tr>
<td>i)</td>
<td>Non adherence of Labour welfare provisions of BOCWA</td>
<td>Rs.10,000 per single violation Compound to a maximum of Rs.50,000 at any single instance</td>
</tr>
<tr>
<td>ii)</td>
<td>Fail to register establishment and display the registration certificate at workplace</td>
<td></td>
</tr>
<tr>
<td>iii)</td>
<td>Absence of workers register and records</td>
<td></td>
</tr>
<tr>
<td>iv)</td>
<td>Absence of muster roll and wages register</td>
<td></td>
</tr>
<tr>
<td>v)</td>
<td>Fail to display an abstract of BOCWA and BOCWR</td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>Environmental Management</td>
<td></td>
</tr>
<tr>
<td>i)</td>
<td>Tyre wash facility not provided</td>
<td>Rs.10,000 per single violation Compound to a maximum of Rs.50,000 at any single instance</td>
</tr>
<tr>
<td>ii)</td>
<td>Spillage from vehicles not arrest</td>
<td></td>
</tr>
<tr>
<td>iii)</td>
<td>Air monitoring not practiced</td>
<td></td>
</tr>
<tr>
<td>iv)</td>
<td>Noise monitoring not practiced</td>
<td></td>
</tr>
<tr>
<td>v)</td>
<td>The values of air monitoring and noise monitoring not with in acceptable limits</td>
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<tr>
<td>vi)</td>
<td>Dust control measures at sites not</td>
<td></td>
</tr>
</tbody>
</table>
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
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,
(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

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

Signature:
Name:
Title:

Signed on
For and on behalf of (Contractor)

Signature:
Name:
Title:
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

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>1. Items</th>
<th>Relevant Sections / Rules in BOCWA and BOCWR and RBOCWR</th>
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<tbody>
<tr>
<td>2.</td>
<td>Registration of establishment</td>
<td>S – 7, R – 23 to 27</td>
</tr>
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<td>3.</td>
<td>Display of registration certification at workplace</td>
<td>R – 26 (5)</td>
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<td>4.</td>
<td>Hours of work</td>
<td>S – 28, R – 234 to 237</td>
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<td>5.</td>
<td>Register of overtime</td>
<td>S – 28; S – 29, R – 241(1) Form XXII</td>
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<td>6.</td>
<td>Weekly rest and payment at rest</td>
<td>R – 235</td>
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<td>7.</td>
<td>Night shift</td>
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<td>10.</td>
<td>Register of persons employed as building workers</td>
<td>R – 240</td>
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<td>11.</td>
<td>Muster roll and wages register</td>
<td>R – 241(1) (a); Form XVI and XVII</td>
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<td>12.</td>
<td>Payment of wages</td>
<td>R – 248</td>
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<td>13.</td>
<td>Display of notice of wages regarding</td>
<td>R – 249</td>
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<td>14.</td>
<td>Register of damage or loss</td>
<td>R – 241(1)(a); Form XIX, XX, XXI</td>
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<td>15.</td>
<td>Issue of wages book</td>
<td>R – 241(2)(a); Form XXIII</td>
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<td>16.</td>
<td>Service certificate for each workers</td>
<td>R – 241(2)(b); Form XXIV</td>
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<td>17.</td>
<td>Display an abstract of BOCWA and BOCWR</td>
<td>R – 241(5)</td>
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<td>18.</td>
<td>Annual return</td>
<td>R – 242; Form XXV</td>
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<td>19.</td>
<td>Drinking water</td>
<td>S – 32</td>
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<td>20.</td>
<td>Latrines and Urinals</td>
<td>S – 33, R – 243</td>
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<td>21.</td>
<td>Accommodation</td>
<td>S – 34</td>
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<td>22.</td>
<td>Creches</td>
<td>S – 35</td>
</tr>
<tr>
<td>23.</td>
<td>First-aid boxes</td>
<td>S – 36, R – 231 and Schedule III</td>
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<td>24.</td>
<td>Canteens</td>
<td>S – 37, R – 244</td>
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<tr>
<td>25.</td>
<td>Food stuff and other items served in the canteens</td>
<td>R – 245</td>
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<td>26.</td>
<td>Supply of tea and snacks in work place</td>
<td>R – 246</td>
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<td>27.</td>
<td>Food charges on no loss no profit basis</td>
<td>R – 247</td>
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<td>28.</td>
<td>Delhi BOCW welfare Board Rules</td>
<td>R – 250 to 296</td>
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</table>
| 29. | Safety committee | S – 38  
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| 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 into the causes of accidents | R – 211  |
| 33. | Responsibility of employer | S - 44  
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<p>| 34. | Responsibility of Architects, Project engineer and Designers | R – 6 |
| 35. | Responsibility of workmen | R – 8 |
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| 37. | Penalties and Procedures | S – 47; S – 55  |
| 38. | Excessive noise, vibration etc | R – 34 |
| 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 &amp; 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  |
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| 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  |
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| 69. | Structural frame and formworks | C – XVII; R – 181 to 185  |
| 70. | Stacking and unstaking | C – XVIII; R – 186 &amp; 187  |
| 71. | Scaffold | C – XIX; R – 188 to 205  |
| 72. | Coffers and Caissons | C – XX; R – 206 to 211  |
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| 75. | Medical Examination for building and other construction worker, Crane operator and Transport vehicle drivers | R – 81; R – 223(a)(iii) and Schedule XII  |</p>
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<tr>
<td>76.</td>
<td>Medical examination for occupational health hazards</td>
<td>R – 233(a)(iv)</td>
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<td>77.</td>
<td>Charging of workers for Medical Examination</td>
<td>R – 223(b)</td>
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<td>78.</td>
<td>Occupational health centres and Medical officers</td>
<td>R – 225 and Schedule X &amp; XI</td>
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<tr>
<td>79.</td>
<td>Ambulance van &amp; room</td>
<td>R – 226 &amp; 227 and Schedule IV &amp; V</td>
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<td>80.</td>
<td>Stretchers</td>
<td>R – 228</td>
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<td>81.</td>
<td>Occupational health service for building workers</td>
<td>R – 229</td>
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<td>82.</td>
<td>Medical examination for occupational health hazards</td>
<td>R – 223(a)(iv)</td>
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<tr>
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<td>Emergency care services and emergency treatment</td>
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<td>84.</td>
<td>Panel of experts and agencies</td>
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<td>Rajasthan Rule 277</td>
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<td>85.</td>
<td>Power of inspectors</td>
<td>Central rule 251</td>
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<td>Rajasthan rule 278</td>
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## CONTENT OF SHE PLAN

<table>
<thead>
<tr>
<th>Contract No</th>
<th>Contractor Name</th>
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</table>

1. **Project Highlights**  
   - i. Title of the content  
   - ii. Contractor Number  
   - iii. Brief scope of work  
   - iv. Location map/ key plan  
   - v. Period of the project

2. **SHE Policy**

3. **Site Organisation Chart**  
   Chart indicating reporting of SHE personnel

4. **Roles & Responsibility**  
   Individual responsibility of the  
   - i. Project Manager  
   - ii. Construction Manager  
   - iii. Construction Supervisors  
   - iv. SHE Committee Members  
   - v. SHE Incharge  
   - vi. Site Engineers  
   - vii. First Line Supervisors  
   - viii. Sub-contractors

5. **SHE Committee**  
   - 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**
<table>
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<tr>
<th></th>
<th>Occupational Health Measures</th>
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<td>11</td>
<td>Labour Welfare Measures</td>
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<tr>
<td>12</td>
<td>Risk assessment and mitigation procedures</td>
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<td>13</td>
<td>Safe Work Procedures</td>
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<td>14</td>
<td>Work a Height</td>
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<td></td>
<td>Structural Steel Erection</td>
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<td>Launching of segments</td>
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<td>Floor, Wall Openings and Stairways</td>
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<td></td>
<td>Welding, Cutting and Bracing</td>
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<td>Lifting appliances</td>
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<td></td>
<td>Work Permit Systems</td>
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<td></td>
<td>Electrical Equipments</td>
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<td>Mechanical Equipments</td>
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<td>Excavation</td>
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<td>Fire Prevention</td>
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<td>Hazardous Chemicals and Solvents</td>
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<td>Ionising Radiation</td>
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<td>Lighting</td>
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<td>Abrasive Blasting</td>
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<td>15</td>
<td>Work Permit System</td>
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<tr>
<td>16</td>
<td>List of standard job specific PPEs to be used in the site</td>
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<tr>
<td>17</td>
<td>Maintenance of Regime for construction Equipment and Machinery</td>
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<td>18</td>
<td>Traffic management</td>
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<tr>
<td>19</td>
<td>Housekeeping</td>
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<tr>
<td>20</td>
<td>Environmental Management</td>
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<td>21</td>
<td>Emergency Management</td>
</tr>
<tr>
<td>22</td>
<td>Visitors and Security arrangement</td>
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</table>
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.”


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).
### MINIMUM MANPOWER REQUIREMENTS OF SHE ORGANIZATION BASED ON CONTRACT VALUE

<table>
<thead>
<tr>
<th>Awarded Contract value (in Cr.)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tr>
<td>Chief SHE Manager</td>
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<tr>
<td>Senior SHE Manager</td>
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<tr>
<td>Junior SHE Manager</td>
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<tr>
<td>Safety Steward</td>
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<tr>
<td>Senior SHE (Electrical) Engineer</td>
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<tr>
<td>Junior SHE (Electrical) Engineer</td>
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<td>Upto 2</td>
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<td>1</td>
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<td>Upto 10</td>
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<td>Upto 25</td>
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<td>Refer Note 1</td>
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<td>Upto 100</td>
<td>1</td>
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<td>Refer Note 1</td>
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<td>Upto 250</td>
<td>1</td>
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<td>Refer Note 2</td>
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<td>More than 250</td>
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<td>*Junior SHE (Fire) Manager / **Senior SHE (Fire) Manager</td>
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<td>Occupational Health officer with Necessary Nursing Assistants (Refer Note3)</td>
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<td>Environmental Manager</td>
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<tr>
<td>Senior SHE (Traffic) Engineer (Refer Note4)</td>
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<td>Refer Note 5</td>
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<td>Ref</td>
<td>Refer Note 6</td>
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<td>Barricade Maintenance Squad (Refer Note4)</td>
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<td>House Keeping Squad</td>
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<td>1 with support staff</td>
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<td>Labour Welfare Officer</td>
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<td></td>
<td>1 with support staff</td>
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<td>1</td>
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| Upto 2                        | - | - | - | - | - | - | - |
| 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 | Refer Note 5 | Refer Note 6 | 1 |
| More than 250                 | 2** | 2 (FT) | 1 with support staff | 1 | 1 | 1 with support staff | 1 |

**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.
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
# Minimum Qualification and Experience for (SHE) Safety, Electrical, Environmental, Traffic Engg. and Occupational Health Professionals

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Designation</th>
<th>Qualification</th>
<th>Experience (in years)</th>
</tr>
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</table>
| 1      | Chief SHE Manager                     | The Chief SHE Manager shall have qualified in any of the following degree/diploma:  
  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  
  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)     | As stated in Sl. No:1 and in addition the following categories:  
  i) B.Sc.(Physics/Chemistry/Maths) with one year Full Time advanced Safety diploma from NICMAR, Hyderabad  
  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} |
<p>| 3      | Junior SHE Manager (Refer Note 3)     | i) Degree in Science / Diploma in Engineering with Govt. recognized safety diplomas from Correspondence | 2 {for category (i) only} |</p>
<table>
<thead>
<tr>
<th>Post Code</th>
<th>Post Name</th>
<th>Qualification</th>
<th>Required No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Safety Steward (Refer Note 3)</td>
<td>Any basic qualification with any SHE related certificate courses.</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Senior SHE (Electrical) Manager</td>
<td>Degree in Electrical Engineering + Govt. recognized Electrical Licence holder</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Junior SHE (Electrical) Manager</td>
<td>Diploma in Electrical Engineering + Govt. recognized Electrical Licence holder</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Senior SHE (Fire) Manager</td>
<td>i) B.E. (Fire) from National Fire Service College, Nagpur</td>
<td>2 (for category (i) and (ii) only)</td>
</tr>
<tr>
<td></td>
<td>ii) B.E (Fire &amp; Safety) from Cochin University</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>iii) Graduate with any Govt. recognized diploma in Fire Safety with 5 years of experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Junior SHE (Fire) Manager</td>
<td>Any Diploma holder with any Govt. recognized diploma in Industrial Fire Safety.</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Occupational Health Officer</td>
<td>MBBS with Govt. recognized degree/diploma in Industrial/occupational health</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Environment Manager</td>
<td>Govt. recognized PG Degree / PG Diploma / Degree in Environmental Engineering / Science</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>Senior SHE (Traffic) Engineer</td>
<td>Govt. recognized PG Degree / Degree / Diploma in Traffic/Transportation Engineering or Planning</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>House Keeping Squad - Manager</td>
<td>Any Diploma in Engineering</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Barricade Manager</td>
<td>Any Diploma in Engineering</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Labour Welfare Officer</td>
<td>Any Degree with Govt. Recognized Degree / Diploma / P G Diploma in Labour Welfare related fields like Law, Personnel / Industrial Relations etc.</td>
<td>2</td>
</tr>
</tbody>
</table>

**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.
MINIMUM REQUIREMENTS OF SHE MONITORING AND AUDIO-VISUAL EQUIPMENTS

1. For the purpose of minimum requirements of Audio-visual and Other equipment the contracts are categorized into the following groups:

<table>
<thead>
<tr>
<th>Contract Value (Initial awarded value of contract)</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto 25 Cr</td>
<td>A</td>
</tr>
<tr>
<td>Upto 100 Cr</td>
<td>B</td>
</tr>
<tr>
<td>Upto 250 Cr</td>
<td>C</td>
</tr>
<tr>
<td>More than 250 Cr</td>
<td>D</td>
</tr>
</tbody>
</table>

2. 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.

3. 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.

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>SHE monitoring and Audio-Visual Equipment details</th>
<th>SHE monitoring and Audio-Visual equipment required for</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Group A Contract</td>
</tr>
<tr>
<td>1.</td>
<td>Portable hand held Digital Sound Level Meter (SLM)</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Portable hand held Digital Lux Meter</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>Laptop Computer with standard configuration including multimedia facilities</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>Colour Printer</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>Computer projector with screen</td>
<td>-</td>
</tr>
<tr>
<td>6.</td>
<td>Overhead projector</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>35mm Camera (For taking accident investigation photos in which case the images can not be easily altered)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>1</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------------------------------------</td>
<td>---</td>
</tr>
<tr>
<td>8.</td>
<td>Digital camera with flash of minimum 4 mega pixel and video facility</td>
<td>1</td>
</tr>
<tr>
<td>9.</td>
<td>Digital still camera with flash of minimum 4 mega pixel</td>
<td>1</td>
</tr>
<tr>
<td>10.</td>
<td>Portable loudspeaker (for tool-box talk and emergency purpose)</td>
<td>1</td>
</tr>
<tr>
<td>11.</td>
<td>Communication facility like mobile phone, walky-talky etc</td>
<td>For all supervisors and managers/engineers working in Safety, Health &amp; Environment</td>
</tr>
<tr>
<td>12.</td>
<td>Accident investigation Kit containing the following:</td>
<td>1</td>
</tr>
<tr>
<td>a)</td>
<td>Chalk piece for marking</td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>Measuring tape for measuring</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Flexible tape – 2m length</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Metal Foot long scale and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Metal tape – 30m</td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>Equipment tags</td>
<td></td>
</tr>
<tr>
<td>d)</td>
<td>Multipurpose Flash light</td>
<td></td>
</tr>
<tr>
<td>e)</td>
<td>Barrier tape of 20m length</td>
<td></td>
</tr>
<tr>
<td>f)</td>
<td>Accident investigation Forms and checklists</td>
<td></td>
</tr>
<tr>
<td>g)</td>
<td>Enough Paper for witness recording and other noting</td>
<td></td>
</tr>
<tr>
<td>h)</td>
<td>Emergency Phone Numbers list</td>
<td></td>
</tr>
</tbody>
</table>
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).
ID Card Format

(85 mm x 55mm)

Front side of ID Card:

Name & Address of Main/Sub Contractor

Location
Jaipur Metro Rail Project

Name:

Designation:

Blood Group:

Valid from:

Valid up to:

Backside of ID Card:

Employee Address:

________________________________

________________________________

________________________________

________________________________

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

Main contractors’ Address
SHE Training details for Managers and Supervisors

<table>
<thead>
<tr>
<th>1. The Law and Safety</th>
<th>2. Policy and Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statutory requirement</td>
<td>Effect of incentive on accident prevention</td>
</tr>
<tr>
<td>Appropriate regulations</td>
<td>Human relations</td>
</tr>
<tr>
<td>Duties of employer and employee</td>
<td>Consultation</td>
</tr>
<tr>
<td></td>
<td>Safety Officer: duties, aims, objectives</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety and efficient production go together</td>
<td>Attitudes of management, supervision and operations</td>
</tr>
<tr>
<td>Accidents affect morale and public relations</td>
<td>Methods of achieving safe operations</td>
</tr>
<tr>
<td></td>
<td>Accident and injury causes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. Site Inspection</th>
<th>6. Human Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>The role of management</td>
<td>Motivating agencies</td>
</tr>
<tr>
<td>Hazard Identification Procedure</td>
<td>Individual behavior</td>
</tr>
<tr>
<td>Records results</td>
<td>Environmental effects</td>
</tr>
<tr>
<td>Follow-up procedures</td>
<td>Techniques of persuasion</td>
</tr>
<tr>
<td>Feedback</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7. Site housekeeping</th>
<th>8. Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site organization</td>
<td>Medical examination</td>
</tr>
<tr>
<td>Relationship of site housekeeping to accident occurrence</td>
<td>Hazard to health on site</td>
</tr>
<tr>
<td>Site access</td>
<td>Sanitation and welfare</td>
</tr>
<tr>
<td>Equipment storage</td>
<td>Protective clothing</td>
</tr>
<tr>
<td>Material stacking</td>
<td>First Aid/CPR</td>
</tr>
<tr>
<td>Materials handling</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>9. Personal Protective Equipment</th>
<th>10. Electricity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye, face, hands, feet and legs</td>
<td>Appreciation of electrical hazards</td>
</tr>
<tr>
<td>Respiratory protective equipment</td>
<td>Power tools</td>
</tr>
<tr>
<td>Protection against ionizing radiation</td>
<td>Arc welding</td>
</tr>
<tr>
<td></td>
<td>Low voltage system</td>
</tr>
<tr>
<td></td>
<td>Lighting and power system on sites</td>
</tr>
<tr>
<td></td>
<td>ELCB, RRCB, Grounding/Ground fault circuit interrupters (GFCIs)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylinder storage and maintenance</td>
<td>Accidents related to moving parts of machinery</td>
</tr>
<tr>
<td>Condition and maintenance of valves, regulators, and gauges</td>
<td>Appreciation of principles of guarding</td>
</tr>
<tr>
<td>Condition and maintenance of hoses and fittings</td>
<td>Importance of regular maintenance</td>
</tr>
<tr>
<td>Pressures</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Topics</td>
</tr>
<tr>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td><strong>3. Transportation</strong></td>
<td>Transport to and from site, Hazard connected with site transport, Competent drivers, Dumpers, Tipping trucks, Movement near excavations</td>
</tr>
<tr>
<td><strong>14. Excavations</strong></td>
<td>Method of shoring, Precautions while shoring, Precautions at edge of excavations, Removal of shoring, Sheet steel piling</td>
</tr>
<tr>
<td><strong>15. Working platforms, Ladders, and Scaffolding</strong></td>
<td>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</td>
</tr>
<tr>
<td><strong>16. Cranes and other Lifting Machines</strong></td>
<td>Licensing, certification and training required for operation of cranes, Slinging 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</td>
</tr>
<tr>
<td><strong>17. Lifting Tackle</strong></td>
<td>Slings - single and multi-legged, Safe working loads (SWLs), Safety hooks and eyebolts, Cause of failure, Maintenance and examination</td>
</tr>
<tr>
<td><strong>18. Fire Prevention and Control</strong></td>
<td>Principle causes determining fire, Understanding fire chemistry, Fire fighting equipment, Fire fighting training</td>
</tr>
<tr>
<td><strong>19. Communications</strong></td>
<td>Effective methods of communication (particular interest to non-English speaking workers), Method and preparation of reports, Safety committees, Safety meeting</td>
</tr>
</tbody>
</table>
**SHE Training Matrix**

<table>
<thead>
<tr>
<th>Types of training</th>
<th>Management</th>
<th>Supervisor</th>
<th>Specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHE/Occupation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHE Leadershie</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>SHE Plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHE Improvement Plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHE Audit &amp; Inspection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHE Emergency Response &amp; Preparedness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incident Investigation &amp; Reporting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHE Communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHE Promotion &amp; Awareness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazard Identification &amp; Risk Analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour &amp; Health Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment Monitoring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour &amp; Welfare Measures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incident/Accident Investigation &amp; Reporting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job/Task Safety Analysis LSA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety, Training Observation Programme (STCP)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incident, Accident Investigation &amp; Certification</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety/Erection &amp; Inspection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Inspection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical/Mechanical Inspection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explosive Handling &amp; Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disaster/Handling &amp; Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy Lifting Operation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot/Cold Working</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welding Cutting &amp; Brazing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Actuated Tool</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical/Mechanical Erection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metal Work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>False Work Erection/Dismantling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Painting in Confined Area</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Project Manager**

- Sr. Construction Managers
- Quality Manager
- Planning Engineer
- Construction Managers
- Construction Supervisors
- Construction Foreman
- Machinery Operators
- Material Handlers
- Station Building Workers
- Steel Workers
- Mechanical Workers
- Other Civil workers
- Electrical workers
- Radiographers
- Transportation Drivers
- Security Officers
- Medical Staff
- Medical Doctor
- Sr. SHE Managers
- Jr. SHE Managers
- SHE Supervisors

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**JAIPUR METRO RAIL CORPORATION LTD.**

**General Instruction : JMRC/SHE/G1/007**

**November 2013**
### DAYS TO BE OBSERVED FOR CREATING SHE AWARENESS

**JAIPUR METRO RAIL CORPORATION LTD.**

**General Instruction : JMRC/SHE/GI/008**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Monday to Sunday of January</td>
<td>Road Safety Week (Subjected to confirmation from Ministry of Road Transport, Govt. of India every year.)</td>
</tr>
<tr>
<td>16th February</td>
<td>Kyoto Protocol Day</td>
</tr>
<tr>
<td>March</td>
<td>Red Cross Month</td>
</tr>
<tr>
<td>May 1 to 7</td>
<td>Emergency Preparedness Week</td>
</tr>
<tr>
<td>4th March</td>
<td>National Safety Day</td>
</tr>
<tr>
<td>7th April</td>
<td>World Health Day</td>
</tr>
<tr>
<td>14th April</td>
<td>Fire Safety Day</td>
</tr>
<tr>
<td>April 18 to 22</td>
<td>Earth Week</td>
</tr>
<tr>
<td>20th April</td>
<td>Earth Day</td>
</tr>
<tr>
<td>20th April</td>
<td>Noise Awareness Day</td>
</tr>
<tr>
<td>28th April</td>
<td>ILO World Day for Safety and Health at Work Day</td>
</tr>
<tr>
<td>5th June</td>
<td>World Environmental Day</td>
</tr>
<tr>
<td>12th June</td>
<td>World Day against Child Labours</td>
</tr>
<tr>
<td>9th July</td>
<td>Occupational Health Day</td>
</tr>
<tr>
<td>17th October</td>
<td>World Trauma Day</td>
</tr>
<tr>
<td>1st December</td>
<td>World AIDS Day</td>
</tr>
</tbody>
</table>
Minimum Requirements of SHE Communication Posters / Signage / Video

1. For the purpose of Minimum requirements of SHE Communication Posters / Signages / Video the contracts are categorized into the following groups:

<table>
<thead>
<tr>
<th>Contract Value (Initial awarded value of contract)</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto 25 Cr</td>
<td>A</td>
</tr>
<tr>
<td>Upto 100 Cr</td>
<td>B</td>
</tr>
<tr>
<td>Upto 250 Cr</td>
<td>C</td>
</tr>
<tr>
<td>More than 250 Cr</td>
<td>D</td>
</tr>
</tbody>
</table>

2. 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

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>SHE Poster Title</th>
<th>Minimum No. of concepts in each title</th>
<th>No. of Posters / Signage / Video</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Group A Contract</td>
</tr>
<tr>
<td>1.</td>
<td>Safety Culture</td>
<td>5</td>
<td>Each 10</td>
</tr>
<tr>
<td>2.</td>
<td>Daily Safety Oath</td>
<td>1 English &amp; 1 Hindi</td>
<td>Each 100</td>
</tr>
<tr>
<td>3.</td>
<td>Mandatory PPE Usage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td><strong>Signages</strong> to display the messages like PPE ZONE, NO PPE ZONE, HARD HAT AREA etc.</td>
<td>2 types of sizes made up of metal sheet to be mounted at different locations</td>
<td>Each 25</td>
</tr>
<tr>
<td>b)</td>
<td>Helmet</td>
<td>5</td>
<td>Each 25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>c)</strong> Shoe</td>
<td>5</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>d)</strong> Goggles &amp; Ear Protection</td>
<td>5</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>e)</strong> Full Body Harness</td>
<td>5</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>f)</strong> Hi-Vi Jacket</td>
<td>5</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>4.</strong> Emergency Management Plan</td>
<td>5</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>5.</strong> Working at Heights</td>
<td>10</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>a)</strong> Ladder, Stairway, Scaffold - <strong>Signages</strong> to display the messages like SAFE, UNSAFE, FIT FOR USE, AVOID USE etc.</td>
<td>5</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>6.</strong> Site Electricity</td>
<td>5</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>7.</strong> Crane Safety</td>
<td>5</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>8.</strong> Slings</td>
<td>5</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>9.</strong> Rigging Procedures</td>
<td>5</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>10.</strong> Excavation</td>
<td>5</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>11.</strong> Occupational Health (Mosquito Control, HIV/AIDS awareness, Dust Control, Noise Control, No Smoking/Spitting, etc.)</td>
<td>10</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>12.</strong> First – Aid</td>
<td>3</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>13.</strong> Labour Welfare Measures (Payment of Minimum Wages, Avoidance of Child labour, Signing in the Muster Roll, In case of accidents-what to do? etc)</td>
<td>5</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>14.</strong> Importance of “Safety Handbook”</td>
<td>1</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td><strong>15.</strong> Traffic Safety (Speed limit, safe crossing and working within barricaded area etc.)</td>
<td>5</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>16.</strong> Environmental Monitoring (Spillage of Muck, hazardous material, Improper drainage, water spray for dust containment etc.)</td>
<td>5</td>
<td>Each 25</td>
<td>Each 50</td>
</tr>
<tr>
<td><strong>17.</strong> Video in Hindi on PPE usage – 15 minutes duration</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
**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**

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Item</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Posters – Standard</td>
<td>17”x22” –135 GSM 4 Colour Printing</td>
</tr>
<tr>
<td>2.</td>
<td>Posters – Special (Wherever required)</td>
<td>17”x22” card laminated FA Poster</td>
</tr>
<tr>
<td>3.</td>
<td>Posters - Mega size (Wherever required)</td>
<td>32”x40” Flex FA Poster</td>
</tr>
<tr>
<td>4.</td>
<td>First-Aid Booklet</td>
<td>6”x4”</td>
</tr>
<tr>
<td>5.</td>
<td>Safety Handbook</td>
<td>6”x4”</td>
</tr>
<tr>
<td>6.</td>
<td>Signages</td>
<td>Small : 12”x6”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Big : 24”x12”</td>
</tr>
<tr>
<td>7.</td>
<td>Road Traffic Sign Boards</td>
<td>Strictly as per Indian Road Congress (IRC) specifications</td>
</tr>
</tbody>
</table>

**Table No.: 3 – Safety Signage Colour (as per IS 9457)**

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Type of signage</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mandatory</td>
<td>Blue</td>
</tr>
<tr>
<td>2</td>
<td>Danger</td>
<td>Yellow</td>
</tr>
<tr>
<td>3</td>
<td>Prohibitory</td>
<td>Red</td>
</tr>
<tr>
<td>4</td>
<td>Safe conditions</td>
<td>Green</td>
</tr>
</tbody>
</table>
## Experts / Agencies for SHE Services

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Organisation</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Bureau Veritas India Pvt. Ltd., B-21 &amp; 22, First Floor, Sector-16, NOIDA-201 301 (U.P.)</td>
<td>• External SHE Audit&lt;br&gt;• SHE Management / Technical Training</td>
</tr>
<tr>
<td></td>
<td>Phone: 0120 – 2515055, Fax: 0120 - 2515248&lt;br&gt;E-mail: <a href="mailto:enp.delhi@in.bureauveritas.com">enp.delhi@in.bureauveritas.com</a></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Central Labour Institute&lt;br&gt;Post box no: 17851&lt;br&gt;N.S.Monikar Marg&lt;br&gt;Sion, Mumbai- 400 022&lt;br&gt;Tel.: 022- 4092203, Fax: 022 – 4071986&lt;br&gt;E-mail: <a href="mailto:cli@dgfasli.nic.in">cli@dgfasli.nic.in</a></td>
<td>• SHE Management / Technical Training</td>
</tr>
<tr>
<td>3.</td>
<td>Construction Industry Development Council&lt;br&gt;801, 8\textsuperscript{th} Floor,&lt;br&gt;Hemkunt Chambers,&lt;br&gt;89, Nehru Place,, New Delhi – 110 019</td>
<td>• SHE Management / Technical Training</td>
</tr>
<tr>
<td>4.</td>
<td>Delhi Productivity Council&lt;br&gt;1E/10, Swami Ramtirth Nagar&lt;br&gt;New Delhi – 110 055&lt;br&gt;Tel.: 23522835</td>
<td>• SHE Management / Technical Training</td>
</tr>
<tr>
<td>5.</td>
<td>Det Norske Veritas AS,&lt;br&gt;203, Savitri Sadan 1,&lt;br&gt;11 Preet Vihar Community Centre,&lt;br&gt;New Delhi-110 092&lt;br&gt;Phone: 011-2253 1502/2253/1503,&lt;br&gt;2242 7688/2253 1278&lt;br&gt;Fax: 011-2253 0247&lt;br&gt;Website: <a href="http://www.dnv.com">www.dnv.com</a></td>
<td>• External SHE Audit&lt;br&gt;• SHE Management / Technical Training</td>
</tr>
<tr>
<td>6.</td>
<td>Dr. A. V. Baliga Memorial trust&lt;br&gt;Link House&lt;br&gt;Bagadur Shah Zafar Marg&lt;br&gt;Press Area, New Delhi – 110 002&lt;br&gt;Phone: 011 – 23311119</td>
<td>• HIV / AIDS awareness</td>
</tr>
<tr>
<td>No.</td>
<td>Company Name</td>
<td>Address</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>7.</td>
<td>DuPont Safety Resources, E.I. DuPont India Private Limited, Arihant Nitco Park 6th Floor, 90, Dr. Radhakrishnan Salai, Mylapore, Chennai-600 004</td>
<td>Phone: 044-2847 2800, 2847 3752 Fax: 044-2847 3800 Mobile: 9381201040 Website: in.dupont.com</td>
</tr>
<tr>
<td>8.</td>
<td>EQMS INDIA PVT. LTD. E-49, 1st Floor, Dazzle House, Jawahar Park, Main Vikas Marg, Laxmi Nagar, Delhi-110 092</td>
<td>Phone: 91-11-220 17639/2204 4754 Fax: 91-91 2201 5150 E-mail: <a href="mailto:eqms@eqmsindia.org">eqms@eqmsindia.org</a> Website: <a href="http://www.eqmsindia.com">www.eqmsindia.com</a></td>
</tr>
<tr>
<td>9.</td>
<td>Green Cross Consultants 59, 7th Cross, 1st Floor, Jai Bharath Nagar, Banglore-560 033</td>
<td>Phone: 080-2549 6782 E-mail: <a href="mailto:etgrangan@yahoo.com">etgrangan@yahoo.com</a></td>
</tr>
<tr>
<td>10.</td>
<td>HSRRTC, PENTASAFE, 201, 2nd Floor, Town Centre, Andheri Kurla Road, Marol, Andheri (East), Mumbai-400 059</td>
<td>Phone: 022-2850 2210/20/50 Fax: 022-2850 2260 E-mail: <a href="mailto:training@penta-safe.com">training@penta-safe.com</a> Website: <a href="http://www.penta-safe.com">www.penta-safe.com</a></td>
</tr>
<tr>
<td>12.</td>
<td>Institute for Research, Development &amp; Training of Construction Trades &amp; Management, An Educational Institute, Society and Trust, 1st Floor, UVCE Alumni Association Building, K.R. Circle, Bangalore-560 001</td>
<td>Phone: 080-22294291/22243257 Fax: 080-22243257 E-mail: <a href="mailto:ubrco@vsnl.com">ubrco@vsnl.com</a> Website: <a href="http://www.instructindia.org">www.instructindia.org</a></td>
</tr>
<tr>
<td></td>
<td>Company Name and Address</td>
<td>Services Offered</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 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 | • 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.intenco.net | • 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.lpaindia.org | • 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 | • First-aid Training |
| 17. | Modicare Foundation  
4 Community Centre,  
New Friends Colony,  
New Delhi – 110 065  
Phone: 011 – 5167235059  
Fax: 011 – 26915469  
Website: www.modicarefoundation.org | • 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 | • SHE Management / Technical Training |
| 19. | NICMAR (National Institute of Construction Management and Research)  
910,9th Floor, Hemkunt Chambers,  
89, Nehru Place,  
New Delhi – 110 019  
Phone: 011 – 51618415, 51618417, 51618418  
Fax: 011 – 51618416 | • SHE Management / Technical Training |
<table>
<thead>
<tr>
<th></th>
<th>Organization Name</th>
<th>Contact Details</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.</td>
<td>Quality Growth Services Pvt. Ltd.</td>
<td>H-13, Kirti Nagar, New Delhi – 110 015, Fax: 011 – 25431737 / 25438598 / 25918332, E-mail: <a href="mailto:qgs@qgspl.com">qgs@qgspl.com</a>, Website: <a href="http://www.qgspl.com">www.qgspl.com</a></td>
<td>ISO Certification</td>
</tr>
<tr>
<td>21.</td>
<td>Safety Engineers Association / Safety Educational Trust – India</td>
<td>2/257, First Floor, Dr. Ambedkar Nagar, Manapakkam, Chennai – 600 116, Phone: 044 – 22523461, E-mail: <a href="mailto:safetrustindia@rediffmail.com">safetrustindia@rediffmail.com</a></td>
<td>SHE Management / Technical Training</td>
</tr>
<tr>
<td>22.</td>
<td>SHE Management Consultancy &amp; Support Services, 145 A, Pocket-VI, (DDA Flats),</td>
<td>Kondli Gharoli, Mayur Vihar-II, Delhi-110 096, Fax: 011-2262 5015, Mobile: 9811153873, E-mail: <a href="mailto:r_k_p@vsnl.net">r_k_p@vsnl.net</a></td>
<td>SHE Management / Technical Training</td>
</tr>
<tr>
<td>23.</td>
<td>St. Johns’ Ambulance</td>
<td>Red Cross Road, New Delhi – 110 001</td>
<td>First-aid Training</td>
</tr>
<tr>
<td>24.</td>
<td>Vexi Business Process Services Pvt. Ltd.</td>
<td>208, A/4, Savitri Nagar, New Delhi – 110 017, Mobile: 9350232714, 9810283201, 9350232716, E-mail: <a href="mailto:info@vexilbps.com">info@vexilbps.com</a>, Website: <a href="http://www.vexilbps.com">www.vexilbps.com</a></td>
<td>Emergency Preparedness Mock drill, SHE Management / Technical Training</td>
</tr>
<tr>
<td>25.</td>
<td>Welding Research Institute</td>
<td>Bharat Heavy Electricals Ltd. (BHEL), Trichirappalli, Tamil Nadu – 620 014, Phone: 0431 – 2577029, 2577283, Fax: 0431 – 2520770, E-mail: <a href="mailto:wri@bheltry.co.in">wri@bheltry.co.in</a></td>
<td>SHE Practical Field Training for Welding Safety</td>
</tr>
<tr>
<td>26.</td>
<td>Dr Cris Research Centre for Occupational Health &amp; Safety</td>
<td>306, Guru Arjuna Dev Bhawan, Ranjit Nagar Complex, New Delhi-08, Ph: 9810040406, Fax: 011-25702929, E-mail: <a href="mailto:team@drcris.com">team@drcris.com</a>, <a href="http://www.drcris.com">www.drcris.com</a></td>
<td>Ambulance, Communication Material, First Aid Training, HIV/AIDS Awareness, ID Card, Medical Facilities, SHE training</td>
</tr>
</tbody>
</table>
### Minimum Lighting Requirements

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Facility or Function</th>
<th>Luminance – lx (lm/ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. 1.</td>
<td>Administrative areas (offices, drafting and meeting rooms, etc.)</td>
<td>540 (50)</td>
</tr>
<tr>
<td>C. 2.</td>
<td><strong>Construction areas</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- general indoor</td>
<td>55 (5)</td>
</tr>
<tr>
<td></td>
<td>- general outdoor</td>
<td>33 (3)</td>
</tr>
<tr>
<td></td>
<td>- tunnel and general underground work areas (minimum 110 lux required at tunnel and shaft heading during drilling, mucking and scaling)</td>
<td>55 (5)</td>
</tr>
<tr>
<td>E. 3.</td>
<td><strong>Access ways</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- exit ways, walkways, ladders, stairs</td>
<td>110 (10)</td>
</tr>
<tr>
<td>G. 4.</td>
<td><strong>Maintenance / Operating areas / shops</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- vehicle maintenance shop</td>
<td>325 (30)</td>
</tr>
<tr>
<td></td>
<td>- carpentry shop</td>
<td>110 (10)</td>
</tr>
<tr>
<td></td>
<td>- outdoors field maintenance area</td>
<td>55 (5)</td>
</tr>
<tr>
<td></td>
<td>- refueling area, outdoors</td>
<td>55 (5)</td>
</tr>
<tr>
<td></td>
<td>- shops, fine details work</td>
<td>540 (50)</td>
</tr>
<tr>
<td></td>
<td>- shops, medium detail work</td>
<td>325 (30)</td>
</tr>
<tr>
<td></td>
<td>- welding shop</td>
<td>325 (30)</td>
</tr>
<tr>
<td>5.</td>
<td>Mechanical/electrical equipment rooms</td>
<td>110 (10)</td>
</tr>
<tr>
<td>6.</td>
<td>Hoists, Elevators, freight and passenger</td>
<td>215 (20)</td>
</tr>
<tr>
<td>7.</td>
<td><strong>Warehouses and storage rooms/area</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- indoor stockroom, active/bulk storage</td>
<td>110 (10)</td>
</tr>
<tr>
<td></td>
<td>- indoor rack storage</td>
<td>270 (25)</td>
</tr>
<tr>
<td></td>
<td>- outdoor storage</td>
<td>33 (3)</td>
</tr>
<tr>
<td>8.</td>
<td>Health Centers and First aid stations and infirmaries</td>
<td>325 (30)</td>
</tr>
<tr>
<td>9.</td>
<td>Toilets, wash and dressing rooms</td>
<td>110 (10)</td>
</tr>
<tr>
<td>10.</td>
<td>Work areas – general (not listed above)</td>
<td>325 (30)</td>
</tr>
<tr>
<td>11.</td>
<td>Parking areas</td>
<td>33 (3)</td>
</tr>
<tr>
<td>12.</td>
<td>Visitor areas</td>
<td>215 (20)</td>
</tr>
<tr>
<td>13.</td>
<td>Laboratories</td>
<td>540 (50)</td>
</tr>
</tbody>
</table>
SIGNAGE

All dimensions are in “mm”
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
4. Others concerned

Date: Signed By: --------------------------
CHAIRMAN
## MINUTES OF SHE COMMITTEE MEETING

<table>
<thead>
<tr>
<th>Contract No.</th>
<th>Contractor Name</th>
<th>Contract Title</th>
<th>Meeting No.</th>
<th>Date of Meeting</th>
<th>Location of Meeting</th>
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</table>

<table>
<thead>
<tr>
<th>MEMBERS PRESENT</th>
<th>INVITEES</th>
<th>MEMBERS ABSENT</th>
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## REPORT SENT TO

<table>
<thead>
<tr>
<th>No. of Copies</th>
<th>Name / Dept.</th>
<th>No. of Copies</th>
<th>Name / Dept.</th>
<th>No. of Copies</th>
<th>Name / Dept.</th>
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</table>

Prepared by: Location: Date:

## MINUTES OF SHE MEETING

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description of Discussion</th>
<th>Action By</th>
<th>Target</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Complaints received from Clients and corrective and preventive action</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Review of MOM of previous meeting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>NCR’s / Observation from third party</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>First - Aid cases / Reportable accident cases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Future jobs and specific requirement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Status of implementation of Safety plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
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Procurement of Plant
Design, Supply and Installation
JAIPUR METRO RAIL CORPORATION LIMITED
BIDDING DOCUMENT
for
Procurement
of
NCB No.-JP/EW/1B/E3

PART-III CONDITIONS OF CONTRACTS AND CONTRACTS FORMS
Section 7 – General Conditions of Contracts (GCC)
Section 8 – Special Conditions of Contracts (SCC)
Section 9 – Contract Forms (COF)

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.

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General Conditions of Contract

A. Contract and Interpretation

1. Definitions

1.1 The following words and expressions shall have the meanings hereby assigned:

“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.


“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,

(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 1er, 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 participate\(^1\) 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 labour, 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

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\(^1\) 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).
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 arbitrage 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
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
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 an Dispute Board for determination in accordance with GCC Subclause 45.3 hereof. If such dispute or difference is referred to an 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
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 Labour

22.2.1 Engagement of Staff and Labour

(a) Except as otherwise stated in the Specification, the Contractor shall make arrangements for the engagement of all staff and labour, 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 labour as is necessary for the proper and timely execution of the Contract. The Contractor is encouraged to use local labour 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 labour 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 labour from amongst the Employer’s Personnel.

22.2.3 Labour Laws

(a) The Contractor shall comply with all the relevant labour
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 labour of its Subcontractors.

(c) The Contractor shall, in all dealings with its labour and the labour 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 labour.

22.2.4 Rates of Wages and Conditions of Labour

(a) The Contractor shall pay rates of wages, and observe conditions of labour, 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 Labour

(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 Labour
The contractor shall not employ "forced or compulsory labour" in any form. "Forced or compulsory labour" 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 Labour
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 an 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)
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
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 during 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
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 labour, 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 labour 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.
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.

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1. Sub Clause 1.1 Definitions

The Employer is: Jaipur Metro Rail Corporation (JMRC) and its legal successors or permitted assigns.

The Project Manager/Engineer is: Authorized Officer of DMRC

The Bank is: Asian Development Bank

Country of Origin: As per list of Eligible countries defined in section-5

2. Sub Clause 5.1 Law and Language

The Contract shall be interpreted in accordance with the laws of: India

Sub Clause 5.2 The ruling language is: English

Sub Clause 5.3 The language for communications is: English

3. Sub Clause 7.3 Scope of Facilities

The Contractor agrees to supply spare parts for a period of years: Two Years of Defect Liability Period

The Contractor shall carry sufficient inventories to ensure an ex-stock supply of consumable spares for the Plant. In addition, in the event of termination of the production of spare parts, advance notification will be made to the Employer of the pending termination, with sufficient time to permit the Employer to procure the needed requirement. Following such termination, the Contractor will furnish to the extent possible and at no cost to the Employer the blueprints, drawings and specifications of the spare parts, if requested.

The Contractor shall supply spare parts as per the Employers requirement.

1.1 (a) The Contractor shall submit a schedule of spare parts duly indicating, for each item of spares, its description, part number, drawing 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, and also the unit price with escalation/de-escalation clause.

1.2 (b) The Employer may, during a period of ten years from the date of taking-over of the whole of the Works, purchase as many parts as required by him, at the rates indicated in the pricing document and accepted by the Employer.

1.3 (c) If during the period of ten years, the Contractor intends to discontinue the manufacture of spare or replacement parts for the any equipment / Machine 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 such spare or replacement parts as the Employer requires in relation to the anticipated life of the equipment.

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).

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.

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.

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.

(d) 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.

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<td>The Contractor shall commence work on the Facilities within 7 days</td>
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from the date of issue of Letter of Acceptance (LOA).

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5. **Sub Clause 10.**

**Employer's Responsibilities**

The following responsibilities are also of employer:

The Engineer may from time to time assign duties and delegate authority to assistants, and may also revoke such assignment or delegation. These assistants may include a resident engineer, Project Manager, and/or independent inspectors appointed to inspect and/or test items of Plant and/or Materials. The assignment, delegation or revocation shall be in writing and shall not take effect until copies have been received by both Parties.

Assistants shall be suitably qualified persons, who are competent to carry out these duties and exercise this authority, and who are fluent in the language for communications defined in Clause 2 of SCC.

Each assistant, to whom duties have been assigned or authority has been delegated, shall only be authorised to issue instructions to the Contractor to the extent defined by the delegation. Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by an assistant, in accordance with the delegation, shall have the same effect as though the act had been an act of the Engineer. However:

(a) any failure to disapprove any work, Plant or Materials shall not constitute approval, and shall therefore not prejudice the right of the Engineer to reject the work, Plant or Materials;

(b) if the Contractor questions any determination or instruction of an assistant, the Contractor may refer the matter to the Engineer, who shall promptly confirm, reverse or vary the determination or instruction

In addition to the duties mentioned in General Conditions of Contract, the Engineer:

(a) Shall watch and inspect the Works, monitor the test results and examine any material to be used and workmanship employed by the Contractor in connection with the Works;

(b) Shall carry out such duties and exercise such powers vested in the Engineer in accordance with the provisions of the Contract;

(c) Shall issue instructions which in his opinion are necessary for the execution of the Works; and

(d) May issue any other instruction which in his opinion is desirable in connection with the Works.

Notwithstanding the obligation, as set out above to obtain approval, if
in the opinion of the Engineer, an emergency occurs affecting the safety of life or of the Works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibility under the Contract, instruct the contractor to execute all such work or to do all such things as may, in the opinion of the engineer, be necessary to abate or reduce the risk. The contractor shall forthwith comply, despite the absence of approval of the Employer, with any such instruction of Engineer. The Engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with variation clause and shall notify the Contractor accordingly, with a copy to the Employer.

In case The Engineer is employee of any agency hired by the Employer, the Engineer shall take the approval of the Employer for all technical and financial matters otherwise he shall be considered deemed to have taken the approval of the Employer.

6. Sub Clause 11.1

Contract Price

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.

The rates and prices quoted in the Bill of Quantities shall be quoted separately in the following currencies:

a) For inputs to the Works, which are expected to be supplied from within India, in Indian Rupees.

b) For those inputs to the Works, which are expected to be supplied from outside India, in foreign currencies.

1.4 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.

1.5 The Bidder is required to note the following while quoting his prices:-

1.6 As this project is funded by Asian Development Bank (ADB), the project is governed by the following exemptions.

A. Custom Duty and Excise Duty


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
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.

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 contract.

B. VAT, Rajasthan Entry Tax and Service Tax:

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:

1. Rajasthan Tax on Entry of Goods into Local Areas Act, 1999:
   a. Notification No. F.12 (100)FD/Tax/10-81 dated 6th October 2010 issued by Finance Department (Tax Division) of Government of Rajasthan.
      i. Amendment No. F.12(100)FD/Tax/10-76 dated 08th December 2011
      ii. Amendment No. F.12(100)FD/Tax/2010-10 dated 17th April 2013

   a. Notification No. F.12 (100)FD/Tax/10-78 dated 6th October 2010 issued by Finance Department (Tax Division) of Government of Rajasthan.
      i. Amendment No. F.12(100)FD/Tax/10-73 dated 08th December 2011
      ii. Amendment No. F.12(100)FD/Tax/10-11 dated 24th April 2013
   b. Notification No. F.12 (100)FD/Tax/10-79 dated 6th October 2010 issued by Finance Department (Tax Division) of Government of Rajasthan.
      i. Amendment No. F.12(100)FD/Tax/10-74 dated 08th December 2011

i. Amendment No. F.12(100)FD/Tax/10-80 dated 06th October 2010

ii. Amendment No. F.12(100)FD/Tax/10-75 dated 08th December 2011

3. Service Tax

Exemption on construction, erection, commissioning or installation of original works pertaining to monorail or metro as per 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- Service Tax, 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 provisions of the Act and service tax may be leviable on 40% of total value @ 15% = 6% on gross value plus cess/surcharge etc as applicable.

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 notifications are attached as Annexure – I to the SCC.

Note:2 In addition to above exemptions (Custom Duty, Excise Duty, VAT and Rajasthan Entry 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.

C. Bid Evaluation:-

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., 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.

D. Taxes and duties paid to the sub-vendors shall not be paid separately and therefore are to be included in the price.

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<td>(b) Advance Payment: The advance shall be paid interest free against acceptable bank guarantee. Total advance payment shall be 10% of the Accepted Contract Amount. The first instalment shall be five percent (5%) payable within 21 days from the date of receipt of guarantees acceptable to the Employer. The second instalment shall be five percent (5%) payable on submission of proof of utilization of the first instalment for the works and the Employer is satisfied that the utilization has been done in purposeful manner and contractor has achieved the Key Dates of detailed Engineering and submitted the technical proposal of major equipments. Advance shall be payable in the currencies and proportions in types and proportions of the currencies mentioned BOQ.</td>
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<td>(c) Recovery of Advance:-</td>
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<td>(d) 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 completion date whichever is earlier. As far as possible the recovery of advances shall be limited to 30% of an account bill.</td>
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<td>(e) No advance shall be given after 40% of the original contract amount has been paid.</td>
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<td>(f) The contractor shall always have the option to have the recoveries commenced and/or completed earlier, and/or to have recoveries affected in instalments of higher amount and also to repay part or whole of the advance by direct payment rather</td>
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than through on-account bills.

(g) In case the contract is terminated due to default of the contractor or rescinded/foreclosed due to any other 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 3% per annum or 12% per annum whichever is higher shall be charged on the unrecovered amount of such advances from 16 days onwards till the same is returned by the contractor.

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<td>13.3.1 The amount of performance security, as a percentage of the Contract Price for the Facility or for the part of the Facility for which a separate Time for Completion is provided, shall be 10% of the contract value in types and proportions of currencies in which the contract price is payable.</td>
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<tr>
<td>13.3.2 The performance security shall be in the form of the bank guarantee as perform included in Section 9 (Contract Forms).</td>
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<tr>
<td>13.3.3 The performance security shall not be reduced on the date of the Operational Acceptance. The value of Bank Guarantee can be revised “Once in a year” during the Contract period by the contractor with the consent / approval of the Employer. The reduction in the amount of Performance Security will be proportionate to the Equipment for which the DLP obligations have been completed.</td>
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<thead>
<tr>
<th>Forfeiture</th>
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<tbody>
<tr>
<td>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.</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>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 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.</td>
</tr>
</tbody>
</table>
The Engineer 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:

a) Failure by the contractor to extend the validity of the Performance Security, in which event the Engineer 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 Engineer.

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.

### Release

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 Engineer, in accordance with GCC Clause 24. 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 18.

10. Not Used

11. **Sub Clause 19**

### Sub-contracting

a) Contractor need to submit the technical proposal for makes as specified in the contract

For major sub-contracts (each costing over Rs Five Million), it will be obligatory on the part of the Contractor to obtain consent of the Employer. The Employer will give his consent after assessing and satisfying himself of the capability, experience and equipment resources of the sub-contractor. In case the Employer intends to withhold his consent, he should inform the Contractor within 21 days to enable him to make alternative arrangements to fulfill his programme.

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.

In the case of sub-contracts for, which the Contractor intends to
Section 8 - Special Conditions of Contract

<table>
<thead>
<tr>
<th>12. Sub Clause 18.3</th>
<th>Progress Report</th>
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<tbody>
<tr>
<td></td>
<td>(c) monitoring of the obligations in Sub-Clauses 21.1, 22.1.1, 22.2.3 (d), 22.2.7 (d), 22.2.15, 22.2.16 and 53</td>
</tr>
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<thead>
<tr>
<th>13. Sub Clause 20</th>
<th>Design and Engineering</th>
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<tr>
<td>Following shall be read in conjunction with GCC clause:</td>
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</table>

**General Obligations/Statutory Requirements**

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.

**Construction and/or Manufacture Documents**

The Contractor shall submit drawings and documents, as required by the Contract, to the Engineer in accordance with any submittal schedule agreed with the Engineer. This submittal shall be made sufficiently before the Works are to be carried out to give the Engineer and the Employer reasonable time to examine the drawings or other documents, to prepare comments and for any changes to be
Where the consent of the Engineer is required, the Engineer 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.

If the Engineer has reasonable cause for being dissatisfied with the proposals set out in the Contractor's drawings or documents, the Engineer shall, within a period of 28 days from the date of submittal, require the Contractor in writing to make such amendments thereto as the Engineer 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 Engineer's consent.

Within 14 days of notification of the Engineer's consent the Contractor shall provide the Engineer with the type and number of sets of the relevant drawings or documents as stipulated in the Employer's Requirement.

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 Engineer has previously notified his consent, the Contractor shall, at his own expense, make such alterations or additions as, in the opinion of the Engineer, 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 Engineer.

No examination by the Engineer of the drawings or documents submitted by the Contractor, nor any consent of the Engineer in relation to 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.

Prior to commencement of the Tests on completion, the Contractor shall prepare, and submit to the Employers' Representative, As Built Drawings of the system and interactive Operation & Maintenance Manuals in soft copy and hard copy with Four (4) sets of each as in accordance with the Employer's Requirements and in sufficient detail for the Employer to operate, maintain, dismantle, reassemble, adjust and repair the Works. The Works shall not be considered to be completed for the purposes of Completion until such Operation and Maintenance Manuals have been submitted to the Employer's Representative and received his consent.

The interactive Operation and Maintenance Manuals and drawings submitted by the Contractor shall, if required, be updated by him during the Defects Liability Period and re-submitted and approved by the Engineer.
<table>
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<tr>
<th>14.</th>
<th>Sub Clause 21.1</th>
<th>Material</th>
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<tr>
<td></td>
<td>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.</td>
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<tr>
<th>15.</th>
<th>Sub Clause 22.1.1</th>
<th>Bench Mark</th>
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<tr>
<td></td>
<td>The Contractor shall comply with</td>
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<td></td>
<td>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 – IV to the SCC, to the extent it concerns impacts on affected people during construction; and</td>
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<td></td>
<td>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</td>
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<tr>
<th>16.</th>
<th>Sub Clause 22.2.3</th>
<th>Labour laws</th>
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<tbody>
<tr>
<td></td>
<td>(d) 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.</td>
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<td></td>
<td>The Contractor shall provide equal wages and benefits to men and women for work of equal value or type.</td>
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<th>17.</th>
<th>Sub Clause 22.2.7</th>
<th>Installation</th>
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<tr>
<td></td>
<td>22.2 Labour</td>
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<td>22.2.5 Working Hours</td>
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<td></td>
<td>(a) Normal working hours are: 8 Hours per day</td>
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<tr>
<th>18.</th>
<th>Sub Clause 22.2.7</th>
<th>Health and Safety</th>
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<td></td>
<td>(d) The Contractor shall throughout the contract (including the Defect Liability Period):</td>
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<td></td>
<td>(i) conduct Information, Education and Consultation Communication (IEC) campaigns, at least every other month, addressed to all the Site staff and labour (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,</td>
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</table>
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 labour 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 labour.

The Contractor shall include in the program to be submitted for the execution of the Facilities under Subclause 18.2 an alleviation program for Site staff and labour 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 shall indicate when, how and at what cost the Contractor plans to satisfy the requirements of this Subclause 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 the preparation and implementation this program shall not exceed the amount dedicated for this purpose.

The Contractor shall conduct health and safety programs for workers employed under the project, and shall include information on the trafficking of women and the risk of sexually transmitted diseases, including HIV/AIDS in such programs.

19. **Sub Clause 22.2.8** **Funeral Arrangements**

Funeral arrangements: The bidder shall be responsible for making funeral arrangements if required.

20. **Sub Clause 22.2.16** **Prohibition of Harmful Child Labour**

“Child” means a child below the statutory minimum age specified under applicable national, provincial or local law of India.”

21. **Sub Clause 24.9** **Completion of Facilities**

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.”

22. **Sub Clause 25.2.2** **Commissioning and Operational Acceptance**

The Guarantee Test of the Facilities shall be successfully completed within 3 months from the date of Completion.
23. **Sub Clause 26.2**

**Completion Time Guarantee**

Time is the essence of the contract and therefore if the work is delayed on account of the contractor, liquidated damage shall be recovered @ 0.01% of the contract value per one week delay of the individual KD (Key Dates). However the total liquidated damage is subjected to 10% of the contract value. The liquidated damage of 0.01% is for two stations (Choti Chaupar and Badi Chaupar) which will be distributed equally for each station and the same shall be levied only for the station(s) where key date is not achieved”.

The liquidated damages are recovered by the Employer from the Contractor for delay and not as penalty.

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.

The Contractor shall use and continue to use his best endeavours to avoid or reduce further delay to the Works, or any relevant Stages.

At any time after the Employer has become entitled to liquidated damages, the Engineer 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.

24. **Sub Clause 26.3**

No bonus will be given for earlier Completion of the Facilities or part thereof.

25. **Sub Clause 27.2**

**Defect Liability**

Defect liability period shall be 24 months from the date of issue of Completion certificate for the facilities or any part thereof. 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 fulfill his obligations during the Defects Liability Period as laid down in GCC and Employer’s Requirements. A penalty of Rs.10000/- per day in DLP period will be imposed if major equipment (as defined in the contract documents) or any complete system is not working for more than 24 Hrs.

- Maintenance during Defects Liability Period

  Contractor shall establish an office for the purpose with communication facility so as to facilitate communication for
reporting failures and liaison with maintenance staff manning the stations round the clock. The supervisor in-charge should be provided with mobile communication facility to ensure his presence at the site immediately after reporting. Contractor shall ensure restoration /rectification/replacement, within reasonable time, to the satisfaction of Engineer. The Engineer in case of the delay as deems fit shall be empowered to carry out the maintenance at the risk and cost of the Contractor.

- Routine Maintenance
  Submit Monthly status report to the Engineer – in – Charge.
- Repairs
  All equipment that requires repairing shall be immediately serviced and repaired.
- Complaints
  The Contractor shall receive calls for any and all problems experienced in the operation of the systems, attend to these within 120 minutes of receiving the complaints and shall take steps to immediately correct any deficiencies that may exist.
- Maintenance Log Book.
  The Contractor shall maintain a Maintenance Log Book at each Station, the format for which shall be approved by Engineer – in – charge. In the Maintenance Log book the details about date of Routine Maintenance, Routine Maintenance activities performed, Details of Call – out visit / Break – down maintenance, etc. shall be maintained. Copy of relevant pages of the Log book to be submitted to the Engineer – in – charge with the Monthly status report.
- Failure Analysis Report.
  The Contractor shall submit a report for the Failure Analysis in the format approved by the “Engineer” giving the details of the type of fault, cause of fault, analysis of faulty component, etc correlated with the details of last preventive maintenance activity performed.

The Contract shall not be considered to be completed until the Performance Certificate has been signed by the Engineer 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 Engineer’s satisfaction. Only the Performance Certificate shall be deemed to constitute approval of the Works.

<table>
<thead>
<tr>
<th>26.</th>
<th>Sub Clause 30.1</th>
<th>Limitation of Liability</th>
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<tbody>
<tr>
<td></td>
<td>(b) The multiplier of the Contract Price is: One</td>
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</table>
### Section 8 - Special Conditions of Contract

<table>
<thead>
<tr>
<th>27. Sub Clause 35.3</th>
<th><strong>Unforeseen Conditions</strong></th>
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<tr>
<td></td>
<td>In addition to notice of any Unforeseeable physical conditions, the Contractor shall provide the Engineer with a written notice of any unanticipated environmental or resettlement risks or impacts that arise during construction, implementation or operation of the Plant or Permanent Works, which were not considered in the initial environmental examination, the environmental management plan or the resettlement plan attached as Annexure – IV to the SCC.</td>
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<tr>
<th>28. Sub Clause 39.</th>
<th><strong>Change in the Facilities</strong></th>
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<tr>
<td></td>
<td>Following is added to the clause 39 of GCC</td>
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<td></td>
<td>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 Engineer, 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.</td>
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<td></td>
<td>ii) Such variations shall be paid as follows:</td>
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<tr>
<td></td>
<td>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.</td>
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<td>b) In case of foundation work, no variation limit applies and Contractor shall carry out the Work, at rates stipulated in the Contract irrespective of any variation.</td>
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<td></td>
<td>c) In case of earth work, the aforesaid variation limit of 25% shall apply to the gross quantity of earth work and variation in the quantity of individual classifications of soil will not be subject to this limit where any variation can take place.</td>
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<tr>
<td></td>
<td>d) 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.</td>
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<td></td>
<td>e) Variation in the quantity of items individually costing up to 1% of the total contract value, shall be payable at the rates stated in the Contract, notwithstanding the magnitude of</td>
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variation upto 2% of the original Contract Value for each item.

f) 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 Engineer and the Contractor and mutually agreed rates arrived at before actual execution of the extra quantity.

g) In case Engineer 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:

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.

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.

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.

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 trades shall not be counted as Plant & Machinery for this purpose.

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.

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 Engineer, of at least 7 days before the need for their execution arises.
h) In the event of disagreement in respect of items (f) and (g) above, the Engineer 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 Engineer 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 Engineer shall be free to get such additional quantities beyond 25% new items executed through any other agency. However, if the Engineer 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.

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<tr>
<th>29. Sub Clause 45.1</th>
<th>Disputes and Arbitration</th>
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<td></td>
<td>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:</td>
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<tr>
<td>(a)</td>
<td>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 Engineer for the purpose of obtaining his decision. No decision given by the Engineer in accordance with the foregoing provisions shall disqualify him from being called as a witness and giving evidence before the 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</td>
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communication shall be English.

(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.

(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.

Interest on Arbitration Award
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.

Cost of Arbitration
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.

Jurisdiction of Courts
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.

Suspension of Work on Account of Arbitration
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, Engineer 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 made in terms of the Contract.

<table>
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<tr>
<th>Sub Clause 45.2</th>
<th>Appointment (if not agreed) to be made by: Employer</th>
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<tr>
<td>Sub Clause 45.2</td>
<td>Rules of procedure for arbitration proceedings: As per law of the Republic of India</td>
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<tr>
<td>30. Additional Clause</td>
<td>Claims, Disputes and Conciliation</td>
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(i) Procedure for Claims
If the Contractor intends to claim any additional payment under any clause of these Conditions or otherwise, the Contractor shall give notice to the Engineer as soon as possible and in any event within 28 days of the start of the event giving rise to the claim.
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 Engineer. Without admitting the Employer’s liability, the Engineer shall, on receipt of such notice, inspect such records and may instruct the Contractor to keep further contemporary records. The Contractor shall permit the Engineer to inspect all such records, and shall (if instructed) submit copies to the Engineer.

Within 28 days of such notice, or such other time as may be agreed by the Engineer, the Contractor shall send to the Engineer 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 Engineer 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 Engineer, the Contractor shall send a final account within 28 days of the end of the effects resulting from the event.

If the Contractor fails to comply with this Sub-Clause, he shall not be entitled to claim any additional payment.

(ii) Payment for Claims

The Contractor shall be entitled to have included in any Interim Payment Certificate such amount for any claim as the Engineer 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.

(iii) No legal action Till Dispute Settlement Procedure is Exhausted

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 shall have arisen with which it may be or may have been connected.

(iv) Notice of Dispute

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 Engineer.

(v) Two Stages for Dispute Resolution

Disputes shall be settled through two stages:

a. 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;

b. Arbitration procedures undertaken as provided by “The Arbitration and Conciliation Act -1996” (as amended from time to time) and in accordance with this Clause.

(vi) Conciliation

Within 60 days of receipt of Notice of Dispute, either party shall refer the matter in dispute to conciliation.

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.

The Conciliator shall assist the parties to reach an amicable settlement in an independent and impartial manner.

(vii) Conciliation Procedure

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 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.

The Employer and the Contractor shall in good faith cooperate 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.
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.

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.

When the parties sign the settlement agreement, it shall be final and binding on the parties and persons claiming under them respectively.

The Conciliator shall authenticate the settlement agreement and furnish a copy thereof to each of the parties.

As far as possible, the conciliation proceedings should be completed within 60 days of the receipt of notice by the Conciliator.

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.

(viii) Termination of Conciliation Proceedings

The conciliation proceedings shall be terminated:

a. by the signing of the settlement agreement by the parties on the date of agreement; or

b. 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

c. 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

d. 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.

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
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<tr>
<th>31.</th>
<th>Sub Clause 46</th>
<th>Eligibility</th>
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<td>46.1 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.</td>
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<td>46.2 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.</td>
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<td>46.3 For purposes of SCC 46.2, “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.</td>
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<th>32.</th>
<th>Additional Clause</th>
<th>Quantity Variation</th>
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<td>The quantities of items shown in the Bill of Quantities are approximate, and liable to vary during the actual execution of the work. The Contractor shall be bound to carry out and complete the stipulated work irrespective of variation in individual items, at the same rate as specified in the Bill of Quantities subject to variation in the value of the Contract being limited to 25% of the total original/enhanced value of the contract.</td>
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<td>The variations can be implemented anywhere in the network of JMRC.</td>
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<th>33.</th>
<th>Additional Clause</th>
<th>Retention Money</th>
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<td>Retention money equal to 10 percent of the amount due to the Contractor from each on account payment will be retained, so as to maintain a reserve in the hands of the Employer equal to 5 percent of the Contract Price. Contractor will have the option to submit Bank Guarantee in lieu of deduction of retention money.</td>
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<td>The Retention money shall be held by the Employer without obligation to invest them or account for interest thereon or to place them in a designated account. No interest of whatsoever nature and type will be payable by the Employer in respect of Retention monies.</td>
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<td>Retention money shall become due to the Contractor on the date of</td>
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### Section 8 - Special Conditions of Contract

**34. Additional Clause**


The Contractor shall submit complete documents and information pertaining to the methods of manufacture, construction, execution, supply, installation, testing and commissioning (including Integrated Testing and Commissioning) which the Contractor proposes to adopt or use. The Engineer 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.

The Engineer shall inform the Contractor in writing within a reasonable period after receipt of the above information;

a) that the Contractor’s proposed methods of manufacture, construction, execution, testing and commissioning (including Integrated Testing and Commissioning) have the approval of the Engineer; or

b) in what respects, in the opinion of the Engineer, the Contractor’s proposed methods of manufacture, construction, execution, etc:
   
   I. fail to comply with the Employer’s Requirements;
   
   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 Engineer to properly assess the proposed methods of manufacture, etc.

In the event that the Engineer does not give his approval, 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 Engineer’s requirements and to obtain his approval. The Contractor shall not change the methods of manufacture, construction, execution, supply, installation, testing and commissioning (including Integrated Testing and Commissioning) which have received the Engineer’s approval without further review and approval in writing of the Engineer.

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 approval of the Engineer, the Contractor shall not be
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<th>Section</th>
<th>Additional Clause</th>
<th>Description</th>
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<tr>
<td>35.</td>
<td><strong>Operation and Maintenance</strong></td>
<td>The Contractor shall provide Expert team for Maintenance till the end of DLP and assistance in operation for initial 6 months from R.O.D. The deployment of these Experts and team shall be continuous. These Experts and team shall work under the administrative control of the Employer. These Experts and team shall also ensure that the Client’s maintenance staff acquire necessary skills and follow correct procedures and practices in the maintenance, overhaul and repair of various components for the system as well as for the maintenance of the related software (if any) after the DLP. The qualification and experience of the Experts to be deployed by the Contractor shall be as prescribed in the Employer’s Requirements. Prior approval of the Employer shall be necessary before the Experts are deployed for maintenance and operation. The Contractor shall replace promptly, Contractor’s experts who are not considered suitable by the Engineer.</td>
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<tr>
<td>36.</td>
<td><strong>Deployment of Personnel by the Employer</strong></td>
<td>The Contractor shall deploy personnel sponsored by the Employer during the Contract Period in areas stipulated in the Employer’s Requirements. 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.</td>
</tr>
<tr>
<td>37.</td>
<td><strong>Indemnity Bond</strong></td>
<td>The contractor shall submit an Indemnity Bond in the format given in Annexure-II against payments made for Plant and Equipment delivered to Jaipur.</td>
</tr>
<tr>
<td>38.</td>
<td><strong>Digitised Data</strong></td>
<td>All Drawings, Proposal, Manuals, Design, Correspondence, Final Bid (Contract) documents and submittals etc. should be submitted in digitized form along with the Hard Copy. Price if any to be included in the quoted price.</td>
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<tr>
<td>39.</td>
<td><strong>Technology Transfer</strong></td>
<td>The Contractor shall provide the Transfer of Technology as stipulated in bid document.</td>
</tr>
</tbody>
</table>
| 40. | **Quality Plan** | The detailed Quality Plan shall be developed from the Outline Quality
### Plan to meet the stipulations of the Employer’s Requirements.

Upon the Engineer 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 Engineer gives his consent to any amended or varied version thereof. The Contractor shall cause any sub-contractors to adhere to this Plan.

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.

The Contractor shall provide all necessary access, assistance and facilities to enable the Engineer 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 cost of the Work under this element shall be deemed to be included in the Contract Price.

### Work by persons other than the Contractor

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 Engineer in accordance with the Contract within a reasonable time, the Engineer 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.

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 Engineer, be urgently necessary and the Contractor is unable or unwilling at once to do such remedial or other work, the Engineer 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 Engineer is work, which, in the Engineer’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 Engineer shall, as soon after the occurrence of any such emergency as may be reasonably practicable, notify the Contractor thereof in writing.
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<th>42.</th>
<th>Additional Clause</th>
<th>Entry with full preparation as per SHE</th>
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<td>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 engineer), lighting, Water Supply, Ventilation Facility, Toilet Facility, Tea &amp; Coffee facility, Cleaning arrangement etc (this list is indicative not exhaustive). The engineer shall approve after inspection and shall issue no objection certificate for erection of the equipment.</td>
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<th>43.</th>
<th>Additional Clause</th>
<th>Nuisance</th>
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<td>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</td>
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<th>44.</th>
<th>Additional Clause</th>
<th>Interface Requirement</th>
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<td></td>
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<td>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.</td>
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<th>45.</th>
<th>Additional Clause</th>
<th>Site Progress</th>
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<td>The contractor shall prepare Performa in consultation with the engineer and submit to engineer the monthly progress report and will be required to deliver the Power Point presentation as and when instructed by the engineer.</td>
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<th>46.</th>
<th>Additional Clause</th>
<th>Maintaining the Site</th>
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<td></td>
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<td>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.</td>
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<td>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.</td>
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<td>In case of repeated aberrations noticed by the engineer a minimum penalty of Rs. 5000/- shall be imposed for each instance.</td>
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<th>47.</th>
<th>Additional Clause</th>
<th>Material not as per approved makes</th>
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<td>Once the contractor has got the vendor approved the contractor shall procure the material from the ‘approved’ sources. In the event, material found at site from the unapproved sources, the engineer can decide not to pay the BOQ price for the same.</td>
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<tr>
<td>48.</td>
<td>Additional Clause</td>
<td>BOCW (Building and Other Construction Works) Cess</td>
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<td>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 shall be inclusive of BOCW charges.</td>
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<td>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.</td>
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<th>49.</th>
<th>Additional Clause</th>
<th>Bank Guarantee for Supplementary Agreement</th>
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<td>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.</td>
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<th>50.</th>
<th>Additional Clause</th>
<th>Service Tax for AMC Work</th>
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<td>The contractor shall submit his offer for AMC works beyond DLP inclusive of service tax.</td>
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<th>51.</th>
<th>Additional Clause</th>
<th>Professional Indemnity Insurance (PII)</th>
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<td>The Contractor shall effect and maintain professional indemnity insurance, preferably in the name of JMRC, for the amount in Indian Rupees stipulated in Contract forms 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.</td>
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<td>The Engineer 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.</td>
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<td>The Contractor shall, within the respective periods stated in the Bid documents (calculated from the Commencement Date), submit to the Employer:</td>
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<td>(a) evidence that the insurances described in this Clause have been effected, with an Insurance Company operating in India, and</td>
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<td>(b) copies of the policies for the insurances.</td>
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<td>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 engineer of so doing.</td>
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<td>The contractor shall effect all insurances for which he is responsible</td>
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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.

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.

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.

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 shall be borne by the contractor.

The Contractor shall submit to the Engineer, the details of all claims made with the insurer and claims accepted by the insurer or any other details as required by the Engineer on monthly basis.

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<th>52.</th>
<th>Additional Clause</th>
<th>Extension of time of completion</th>
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<td>The site shall be made available progressively and if some part is not made available then the extension of time shall be allowed only to the work/KD of that particular part.</td>
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<th>53.</th>
<th>Additional Clause</th>
<th>The Contractor shall comply with all applicable national, provincial, and local environmental laws and regulations.</th>
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<td>The Contractor shall (a) establish an operational system for managing environmental impacts, (b) carry out all of the monitoring and mitigation measures set forth in the [Initial Environmental Examination (&quot;IEE&quot;) or [Environmental Management Plan (&quot;EMP&quot;) and (c) allocate the budget required to ensure that such measures are carried out. The Contractor shall submit semi-annual reports on the carrying out of such measures to the Employer.</td>
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<td>More particularly, the Contractor shall comply with (i) the measures</td>
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and requirements set forth in the initial environmental examination and the environmental management plan attached as Annexure – IV to the SCC and (ii) any corrective or preventative actions set out in safeguards monitoring reports that the Employer will prepare from time to time to monitor implementation of the initial environmental examination and the environmental management plan.

The Contractor shall allocate a budget for compliance with these measures, requirements and actions.”
Notification No. 108/95-CE, Dt. 28-6-95


In exercise of the powers conferred by subsection (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 or part 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 the international organisation that the said goods are intended for such use;

(b) in case 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 been approved by the Government of India;

(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 been approved by the government of India;

(Above (ii) have been substituted vide Cen. Exc. No. 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

Page: 1 of 5
Annexure and

(Above c) has been amended vide Cen Exc NOT 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 previous 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 Children's Fund,
3. Food and Agricultural Organization,
4. International Labour Organisation,
5. World Health Organization,
6. United Nations Population Fund,
7. United Nations World Food Programme
Bidding Document for JP/EW/1B/E3
Procurement of Plant
Single-Stage: Two-Envelope
In exercise of the powers conferred by sub-section (1) of section 26 of the Customs Act, 1952 (42 of 1952), 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 section 58 of the Customs Tariff Act, 1975 (51 of 1975), the whole of the additional duty of customs leviable thereon under section 9 of the said Customs Tariff Act and the whole of the additional 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 to the Government of India, in the concerned 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).
ANNEXURE

1. United Nations Development Programme,
2. United Nations International Children's Fund,
3. Food and Agricultural Organization,
4. International Labour Organization,
5. World Health Organization,
6. United Nations Population Fund,
7. United Nations World Food Programme,

Cus NIF 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.8492/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, or

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..."
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/-

(Pushpender Singh)
Under Secretary to the Government of India

Issued by:

Ministry of Finance Department of Revenue
New Delhi.
Section 8 - Special Conditions of Contract

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 8 of the Rajasthan Value Added Tax Act, 2005 (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, 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, 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, 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,

(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 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, MRC.
8. PS to Secretary, Finance (Revenue).
9. Director, Public Relations, Jaipur.
10. SA, Finance (Computer Cell) Department, Secretariat, Jaipur.

Deputy 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

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
awardee 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 awardee 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 Redressel 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.

Deputy Secretary to Government
GOVERNMENT OF RAJASTHAN
FINANCE DEPARTMENT
(TAX DIVISION)

NOTIFICATION

Jaipur, Dated: 10.10.2010

In exercise of the powers conferred by sub-section (2) of section 20 of the Rajasthan Value Added Tax Act, 2006 (Act No. 4 of 2006), 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/2006-07 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(14) FD/Tax/10-80]
By Order of the Governor,

(Bhupinder Singh Dhillon)
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 to send 10 copies of this notification may sent to this department and 30 copies along with bill may be sent Commissioner, Commercial Taxes Department, 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, 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, JMRCL.
8. PS to Secretary, Finance (Revenue).
9. Director, Public Relations, Jaipur.
10. SA, Finance (Computer Cell) Department, Secretariat, Jaipur.

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 (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.

(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(e) 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, 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

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of Goods</th>
<th>S.No.</th>
<th>Name of Goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Steel</td>
<td>11.</td>
<td>Sanitary fittings/wares</td>
</tr>
<tr>
<td></td>
<td>(a) TQR, TMT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(b) HTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(c) Binding wire</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(d) Plate, structural Steel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(i) Angle</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(ii) Channel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(iii) SMB etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(b) Pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Aggregate</td>
<td>12.</td>
<td>Sheet A/C/G/other</td>
</tr>
<tr>
<td>6.</td>
<td>Ratten-wooden</td>
<td>15.</td>
<td>Stainless steel pipe/hollow section</td>
</tr>
<tr>
<td>7.</td>
<td>Hardware -Nail etc</td>
<td>16.</td>
<td>Paint/snow-seenpetty etc</td>
</tr>
<tr>
<td>8.</td>
<td>Bearing</td>
<td>17.</td>
<td>Diesel/petrol</td>
</tr>
<tr>
<td></td>
<td>i. Neoprene</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ii. IP/P/T/TH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Bentonite</td>
<td>18.</td>
<td>Tyre</td>
</tr>
</tbody>
</table>

Bidding Document for JP/EW/1B/E3  Procurement of Plant  Single-Stage: Two-Envelope
**List of electrical equipment:**

1. **25 Kw. (S.P.) A.C. Traction:** All equipment used for erection of overhead (25 KV - A.C. traction System including: Contact wire, catenary wire, Droggers, 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, interbreaks (220 KV, 132 KV, 25 KV single phase) for traction load and 33 KV side for Auxiliary loads, lightning 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 Signage on P.F & Slab Bldg's**

---

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.</td>
<td>Ready mix concrete</td>
</tr>
<tr>
<td>20.</td>
<td>Judo</td>
</tr>
<tr>
<td>21.</td>
<td>O/B/C/P/V/O/S Pipa</td>
</tr>
<tr>
<td>22.</td>
<td>J/E, excavator, loader, truck, Car, Jeep, dumper, tractor, trailer, cranes, battery plant, concrete pump, pipe, crane, transit mixer, gantry, launching girder, piling rig</td>
</tr>
<tr>
<td>23.</td>
<td>Bricks/masonry</td>
</tr>
<tr>
<td>24.</td>
<td>Aluminum</td>
</tr>
<tr>
<td>25.</td>
<td>Woodwork/doors</td>
</tr>
<tr>
<td>26.</td>
<td>Spare part of 4 wheeler dumper, Tractor, Crane, Gantry</td>
</tr>
<tr>
<td>27.</td>
<td>Electrical cable fitting</td>
</tr>
<tr>
<td>28.</td>
<td>Sign &amp; tolecon cable &amp; fittings equipment</td>
</tr>
<tr>
<td>29.</td>
<td>Rail</td>
</tr>
<tr>
<td>30.</td>
<td>PSC sleeper, C1 inserts</td>
</tr>
<tr>
<td>31.</td>
<td>Track fittings - Points and crossing, panel box, rubber end base</td>
</tr>
<tr>
<td>32.</td>
<td>Ballast</td>
</tr>
</tbody>
</table>
ANNEXURE-'B'

DECLARATION FOR GOODS BROUGHT INTO LOCAL AREA

No. [blank]

Dated: [blank]

To,

…………………………………………………………

(Name of the assessing authority of the registered dealer)

It is hereby certified that the goods …………… brought by Mr[s] …………… brought by Mr[s], …………… into the local area with 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,

[Signature]

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 to send 10 copies of this notification along with soft copy in CD to the Commissioner, Commercial Taxes, Department Rajasthan, Jaipur, and 20 copies along with bill may be sent to the 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, JR.

8. PS to Secretary, Finance (Revenue).

9. Director, Public Relations, Jaipur.

10. SA, Finance (Computer Cell) Department, Secretariat, Jaipur.


Deputy Secretary to Government

[Signature]
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

(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 SDC)
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(e) 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 Signalling, 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
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 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.

[Signature]
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of Goods</th>
<th>S.No.</th>
<th>Name of Goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cement</td>
<td>17.</td>
<td>Marble/granite/Red kota stone</td>
</tr>
<tr>
<td>2.</td>
<td>Steel</td>
<td>18.</td>
<td>Sanitary fitting/valves</td>
</tr>
<tr>
<td></td>
<td>(a) TQR, TMT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(b) HTS</td>
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</tr>
<tr>
<td></td>
<td>(ii) Channel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(iii) SMR etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(iv) Pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Aggregate</td>
<td>19.</td>
<td>Sheet AC/G/other</td>
</tr>
<tr>
<td>4.</td>
<td>Sand</td>
<td>20.</td>
<td>Paver blocks/CC blocks</td>
</tr>
<tr>
<td>7.</td>
<td>Hardware-Nail etc.</td>
<td>23.</td>
<td>Paint/white-cream/petty etc</td>
</tr>
<tr>
<td>8.</td>
<td>Bearing</td>
<td>24.</td>
<td>Diesel/petrol</td>
</tr>
<tr>
<td></td>
<td>i. Neoprene</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ii. Poly-PTFE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Ready mix concrete</td>
<td>26.</td>
<td>Spare part of 4 wheeler dumper, Tractor, Crane, Gantry</td>
</tr>
<tr>
<td>11.</td>
<td>Jacks</td>
<td>27.</td>
<td>Electrical cable fitting</td>
</tr>
<tr>
<td>13.</td>
<td>JCB, excavator, loader, truck, Car, jeep, dumper, tractor, trailer, cranes, battery plant, concrete pump, placer, transit mixer, gantry, launching girders, piling rig</td>
<td>29.</td>
<td>Rail</td>
</tr>
<tr>
<td>14.</td>
<td>Bricks/stone</td>
<td>30.</td>
<td>PSC sleeper, CI inserts</td>
</tr>
<tr>
<td>15.</td>
<td>Aluminium</td>
<td>31.</td>
<td>Track fittings - Points and crossing, pad/clip, rubber pad, liner</td>
</tr>
<tr>
<td>16.</td>
<td>Wooden/ply doors</td>
<td>32.</td>
<td>Ballast</td>
</tr>
</tbody>
</table>
List of electrical equipment:

1. 25 Km. (S.P.) A.C. 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, Farthing System 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, lightning 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 (chandpoole) 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 & Bin Bldg’s
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,

(Bhawna Pushpa Delha)
Deputy Secretary to Government

C:\Users\User1\Documents\Scan\Decla.png
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.

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, 2001 (Act No. 4 of 2001), 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(109)FD/Tax/2010-78 dated 06-10-2010, namely:

AMENDMENTS

(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(109)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 Signalling, 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,

(Akkiya 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, UDM & 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. GIRD File.

[Signature]
Deputy Secretary to the Government
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 95 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 lakhs 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 Programme 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 entry 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 –

“(b) 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.

(b) 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 meters 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;
Section 8 - Special Conditions of Contract

(xii) in entry 25, -

(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; -

(ix) in entry 26, after clause (p), the following clause shall be inserted, namely -

"(q) Nirmaaya 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 (15 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 Farmers' 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 Director 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 (od), the following clause shall be inserted, namely:-

'(ged) "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.354/8/2016 -TRU]
Section 8 - Special Conditions of Contract

(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 30th 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.
Section 8 - Special Conditions of Contract

Annexure-E

(Refer Clause 26 of SCC)
(To be stamped in accordance with Stamp Act)

**INDENTURE FOR STAGE PAYMENT**

THIS INDENTURE made on ........ between ...........(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 Verification, Detail Engineering, Supply, Installation, Testing and Commissioning of Environment Control System (ECS), Tunnel Ventilation System (TVS), Electrical and Mechanical System (E&M) and Building Management System (BMS) for two underground Metro Stations at Chhatli 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 Engineer / 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 Engineer/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 Engineer/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, Khanj Bhawan, Tilak Marg, C-Scheme, Jaipur (Rajasthan), India, PIN-302 005, (Client) and ____________________________ (Contractor).

IN WITNESS whereof the said contractor and by the order under the direction of JMRC Ltd has here set their respective hands this day and years first above written.

Signed, Sealed & Delivered by the said Contractor:

IN THE PRESENCE OF:

WITNESS:

1. NAME: ____________________________

Signature: ____________________________

Bidding Document for JP/EW/1B/E2
Procurement of Plant
Single-Stage: Two-Envelope
SIGNED BY (ADDRESS)
BY THE ORDER AND DIRECTION OF THE JMRC LTD IN THE PRESENCE OF:

SIGNATURE:

WITNESS

(NAME AND ADDRESS)
### REQUIREMENTS UNDER GCC/SCC

<table>
<thead>
<tr>
<th>S.N</th>
<th>DESCRIPTION</th>
<th>Clause Ref.</th>
<th>REQUIREMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Amount of Performance Security</td>
<td>Clause 9 of the SCC</td>
<td>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.</td>
</tr>
<tr>
<td>ii</td>
<td>Latest ‘date for commencement’ of the Works</td>
<td>Clause 4 of the SCC</td>
<td>7 days from the date of LOA or Employer’s Notice to Proceed</td>
</tr>
<tr>
<td>iii</td>
<td>‘Time for completion’ of the work from the date of commencement of the work</td>
<td>Clause 8.2 of the GCC</td>
<td>As per key dates</td>
</tr>
<tr>
<td>iv</td>
<td>Liquidated Damages</td>
<td>Clause 17 of the SCC</td>
<td>As per the referred clauses of SCC</td>
</tr>
<tr>
<td>v</td>
<td>‘Defects Liability Period’ for the whole of the Works</td>
<td>Clause 18 of the SCC</td>
<td>As per clause 18 of SCC after the date of issue of Completion Certificate for the Part of the Works or from the date of ROD for the equipments and systems employer starts using and accepted by employer for DLP.</td>
</tr>
<tr>
<td>vi</td>
<td>Amount of advance payment</td>
<td>Clause 8 of the SCC</td>
<td>As per the referred clauses of SCC</td>
</tr>
<tr>
<td>vii</td>
<td>Amount of Professional Indemnity Insurance (PII). (for the contracts having Design in scope of work)</td>
<td>Clause 43 of SCC</td>
<td>AOA (any one accident) limit equal to 6% of the contract value against BOQ in respect of ‘design and construct’ with A0Y (any one year) limit of 2 Incidents in a year. In the Professional Indemnity insurance Policy the deductible amount shall not be more than 5% of AOA limit. PII Policy shall be obtained within four weeks from ‘date of commencement’ and shall be valid for five years after date of issue of</td>
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### Section 8 - Special Conditions of Contract

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<tr>
<td>viii</td>
<td>Insurance cover for Contractor's All Risk and other requirements as specified in the GCC</td>
<td>Clause 34 of the GCC</td>
</tr>
<tr>
<td>ix</td>
<td>Amount of Third Party Insurance</td>
<td>Clause 34 of GCC</td>
</tr>
<tr>
<td>x</td>
<td>Period in which all insurances have to be submitted</td>
<td>Clause 34 of GCC</td>
</tr>
<tr>
<td>xi</td>
<td>Contract Key Dates</td>
<td>As per Appendix-2 of Contract Agreement</td>
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# ADB Environment Management Plan

## Section 8

**- Special Conditions of Contract**

### Single-Stage Two-Envelope Procurement of Plant

**Bidding Document for JP/EW/1B/E**

<table>
<thead>
<tr>
<th>SN</th>
<th>Project Activity</th>
<th>Potential Impact</th>
<th>Mitigation measures</th>
<th>Institutional Responsibilities</th>
<th>Cost Estimate</th>
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<td></td>
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<td>Contractor and CSC</td>
<td>Part of Contractor's cost</td>
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</tbody>
</table>

**Pre-Construction**

| PC1 | Contractor Preparatory Works (Due to Notice of Notice to Proceed) | The Contractor will submit the following activities no later than 30 days upon issuance of Notice to Proceed: 1. Submit appointment letter and resume of the Contractor's Health and Safety Officer (HSC) and environmental focal person to CSC 2. HSC will engage CSC-Environment Specialist to make a meeting to discuss in detail the DPR, seek clarification and recommend corresponding measures if necessary 3. HSC will request CSC-EPC copy of monthly monitoring report and execution deadlines for submission 4. HSC will submit for CSC-EPC 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 machinery and not mix plants, (ii) transportation of hazardous materials (e.g. fuel, lubricants, lubricants), (iii) waste disposal sites and disposal management plan, (iv) temporary storage location, (v) water use, and (vi) 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. HSC will submit for approval of CSC-EPC the construction plan layout before its establishment | Contractor and CSC | Part of Contractor's cost |   |

| PC2 | Coordinate with the Jaster Development Authority on Traffic Management Plan | Nuisance from traffic congestion | Contractor and CSC | Part of Contractor's cost |   |

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 problems 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.
## Special Conditions of Contract

### Bidding Document for JP/EW/1B/E

#### Procurement of Plant

**Single-Stage: Two-Envelope**

<table>
<thead>
<tr>
<th>SN</th>
<th>Project Activity</th>
<th>Potential Impact</th>
<th>Mitigation Measures</th>
<th>Institutional Responsibilities</th>
<th>Cost Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC1</td>
<td>Community Liaison</td>
<td>Compounds</td>
<td>To ensure that ongoing feedback is provided on the progress of the JHPP together with feedback on the environmental management performance of the project. Contractor will provide a minimum of two (2) weeks' notification to directly affected residents, businesses and other relevant groups in the intended construction commencement data, in providing a mechanism for communication between the contractor and the community and informing the public of construction details (timing, expected impacts), the contractor's representatives will undertake consultation and information activities.</td>
<td>Contractor, ECC and JMRP Safeguards cell</td>
<td>Part of Contractor's cost</td>
</tr>
<tr>
<td>PC2</td>
<td>GroundLowering</td>
<td>Chance find of artifacts</td>
<td>At least 30 days before the start of tunnelling, the Contractor with the supervision from the Archaeology Department will employ a ground penetrating radar (GPR) to detect the presence of buried artifacts along the tunnel alignment. The Contractor, on behalf of the JMRP, will coordinate with the Archaeology Department to designate an on-site representative during the entire duration of the project.</td>
<td>Contractor, ECC</td>
<td>Part of construction cost</td>
</tr>
<tr>
<td>PC3</td>
<td>Briefing on working near heritage resource</td>
<td>Damage to heritage resource</td>
<td>All workers will undergo a briefing with the Archaeology Department to ensure safeguarding of heritage resources and sustainable practices. A proof of compliance to this requirement to include the name of the participants and time and location of briefing will form part of the monthly report to the ECC</td>
<td>Contractor, ECC</td>
<td>Part of construction cost</td>
</tr>
<tr>
<td>GLU</td>
<td>Tunnel boring and cut and fill</td>
<td>Damage to heritage resources. Tunnel boring near Champaan Ghat, Kedina Temple, Isar Loh, Jantar Mantar, Polcia Muhir, Choti Chaura, and Roli Chaura.</td>
<td>No heritage resources are inadvertently damaged during construction.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN</td>
<td>Project Activity</td>
<td>Potential Impact</td>
<td>Mitigation measures</td>
<td>Institutional Responsibilities</td>
<td>Cost Estimate</td>
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</tr>
<tr>
<td>C1.1</td>
<td>Ground Settlement under the Chakdole Gate</td>
<td>Ground settlement</td>
<td>The contractor will ensure that no irreversible damage is incurred to the Chakdole gate. Ground settlement cannot be avoided in tunneling works due to the loss of volume loss, which is estimated at 0.05% for the JAM. Subsidence settlement under the Chakdole gate is less than 0.5% The contractor will ensure that the design value is not exceeded and the trigger value = 5.0mm and Allowable value = 4.2 meters are implemented.</td>
<td>Contractor and CSC</td>
<td>Contractor's cost</td>
</tr>
<tr>
<td>C1.2</td>
<td>Vibration from the tunnel boring machine</td>
<td>Crack in the tunnel boring machine</td>
<td>Expected vibration at the Chakdole Gate during tunneling is 0.652 m/s which is lower than internationally accepted limits. However, to be on the safe side and as a precautionary measure, the Contractor is to ensure that vibration levels at the Chakdole Gate foundation will not exceed 2.0 m/s</td>
<td>Contractor and CSC</td>
<td>Part of Contractor's cost</td>
</tr>
<tr>
<td>SN</td>
<td>Project Activity</td>
<td>Potential Impact</td>
<td>Mitigation measures</td>
<td>Institutional Responsibility</td>
<td>Cost Estimate</td>
</tr>
<tr>
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</tr>
<tr>
<td>C1.3</td>
<td>Surface noise from excavating equipment in Choti and Bidai Choupad</td>
<td></td>
<td>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 Contractor are:</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Damage and nuisance to Krishna temple, Jantar Mantar, and Vanet Mahal. Disruption of amenities in the Pink City Hospital near Chhopad, Chaudhary Hospital, Mejapara, at the corner of Choti Choupad.</td>
<td>1. Base with local residents on how to best minimize construction noise along the Choti 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. Equipments compounds will be located off-site. 4. Noise barriers will be installed at critical work areas particularly around the Chospada. 5. Enforce especially noisy activities at 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 in the same time to minimize the duration of exposure. Notes: 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, conformity with speed limits, and construction vehicles will only use routes specified in the traffic management plan.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1.4</td>
<td>Demolition of Choti and Bidai Choupad</td>
<td>Loss of heritage structures</td>
<td>The project calls for the demolition of the Choti and Badi Choupads and its restoration to be original condition as a requirement from Jaipur Development Authority. The demolition and restoration will be under the supervision and control of these agencies.</td>
<td>Contractor, JDA</td>
<td>Part of construction cost</td>
</tr>
</tbody>
</table>
## Section 8 - Special Conditions of Contract

**Single Stage: Two Envelope Procurement of Plant**

### Bidding Document for JP/EW/1B/E

<table>
<thead>
<tr>
<th>SN</th>
<th>Project Activity</th>
<th>Potential Impact</th>
<th>Mitigation Measures</th>
<th>Institutional Responsibilities</th>
<th>Cost Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1.4.1</td>
<td>Channal heritage finds during the cut and fill operations</td>
<td>Please refer to FIDIC Sec. 4.24 Female. Recording (including chain of custody) will be made by the contractor to be validated by the CSC, and expert verification will be made by the JAPAN Archaeology Department. Temporary work stoppage in the immediate area of the channal find for up to 32 hours or longer for the on-site representative of Archaeology Department to visit the site to make an assessment and provide instructions. Work in the areas adjacent to the channal find will continue as provided in the detailed design.</td>
<td>Contractor and CSC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>Soil Disposal (Kibabari Village)</td>
<td>Generate sediment adzes runoff from the work site during monsoon. Contamination of disposal sites from construction debris. Community hazard of uncontrolled and improperly disposed materials.</td>
<td>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) Excavated spoils be 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 i) dump size, layout, and form, ii) means of controlling water and wind erosion, iii) measures to prevent soil and contaminant contamination, vegetation, and public access. 4) Explore the possibility of using spoil materials to rehabilitate borrowpits 5) All hauling vehicles should be maintained at an acceptable working order and serviced regularly 6) Road vehicles should be routed away from noise sensitive areas 7) Speed limit in built up areas is 35 km/hr. 8) All haul vehicles should be covered or soil sprayed with water before leaving the site especially during dry season. 9) Spoil dumps should have ramps at least 10 m high. 10) Final shaping, compacting, and immediate revegetation from. 11) No vehicles are to be allowed to enter a waterfed spoil dump.</td>
<td>Contractor and CSC</td>
<td></td>
</tr>
<tr>
<td>C3</td>
<td>Groundwater Extraction</td>
<td>Depletion of groundwater Compacts with existing groundwater users</td>
<td>Water conservation and recycling will be observed in all aspects of construction to include water main breaks, watering roads for dust control, spraying concrete, equipment cleaning and site cleanup.</td>
<td>Contractor and CSC</td>
<td>Part of Construction Cost</td>
</tr>
<tr>
<td>SN</td>
<td>Project Activity</td>
<td>Potential Impact</td>
<td>Mitigation measures</td>
<td>Institutional Responsibilities</td>
<td>Cost Estimate</td>
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</tr>
<tr>
<td>C4</td>
<td>Interruption of essential services</td>
<td>Nuisance from temporary damage or shifting of utilities particularly buried water pipes and electrical lines</td>
<td>The Contractor will ensure that the public will be minimally affected when constructing in close proximity to essential services through: 1) coordinating and securing necessary permits for utility shifting with the Jaguar Development Authority and other service utility agencies to locate all services prior to construction in any particular area 2) informing residents of planned interceptions through local media, fliers, and public address system 3) all planned interruptions schedules will be submitted to the safeguards cell JERC no later than 10 working days before the interception 4) all affected consumers, tenants, institutions, and businesses to be notified in writing prior to commencement and kept updated of 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</td>
<td>Contractor and CSC</td>
<td>Part of construction cost</td>
</tr>
<tr>
<td>C5</td>
<td>Construction dust, portioning clay and casting yard operations, and occupational safety</td>
<td>Soil and liquid waste generation, Communicable diseases, Hazardous materials storage, Stabilisation, Lighting, Emergency preparedness, Excavation and tunneling Personal protective equipment, Energy management</td>
<td>Please refer to SI-E.</td>
<td>Contractor and CSC</td>
<td>Part of construction cost</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>No.</th>
<th>Potential Impact</th>
<th>Details of Impact</th>
<th>Institution/Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Noise and Vibration</td>
<td>Noise may disrupt the local environment</td>
<td>Contractor/Buyer, Local Authorities, and Community</td>
</tr>
<tr>
<td>C2</td>
<td>Other</td>
<td>Additional costs for noise mitigation</td>
<td>Contractor/Buyer</td>
</tr>
</tbody>
</table>

**Operating Cost**

- The contractor shall ensure that the noise levels are maintained within the specified limits as per the environmental regulations.

**Operating Cost**

- The contractor shall ensure that the noise levels are maintained within the specified limits as per the environmental regulations.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>ADB Environmental Monitoring Plan</th>
<th>Standards</th>
<th>ADB Internal Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ADB Environmental Monitoring Plan**

- Observation of ambient air quality standards
- Observation of ambient noise standards
- Observation of occupational air quality standards

**Standards**

- ADB
- International
- National

**ADB Internal Standards**

- Performance standards
- Operational standards
- Monitoring standards

**ADB Procurement of Plant**

- Single-Stage: Two-Envelope
<table>
<thead>
<tr>
<th>Level Indicators</th>
<th>Parameters</th>
<th>Methods/Guidelines</th>
<th>Tentative Location</th>
<th>Frequency and duration</th>
<th>Standards</th>
<th>Approx. Cost</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration</td>
<td>PPV/m/s</td>
<td>Accelerometer</td>
<td>Krishna Temple, Jantar Mantar, Near Kishanpura, Chaudhary Hospital, Rajpur, School at the corner of Choti Chaudhary</td>
<td>Monthly</td>
<td>Commercial</td>
<td>Rs 1,00,000</td>
<td>Contractor</td>
<td>CSC</td>
</tr>
<tr>
<td>Underground water</td>
<td>None</td>
<td>Ground Penetrating Radar</td>
<td>Along the entire tunnel length</td>
<td>Once 30 days before tunneling</td>
<td>None</td>
<td>Rs 2,00,000</td>
<td>Contractor</td>
<td>CSC</td>
</tr>
<tr>
<td>Water Quality</td>
<td>COD, Total, Total solids, pH, E.C., TSS, Oil and Grease and TDS</td>
<td>Water and Analyses</td>
<td>Krishna Temple, Jantar Mantar, Near Kishanpura, Chaudhary Hospital, Rajpur, School at the corner of Choti Chaudhary</td>
<td>Annually</td>
<td>Domestic</td>
<td>Rs 49,000</td>
<td>JhWQ</td>
<td>SPDOB</td>
</tr>
<tr>
<td>Vibration</td>
<td>PPV/m/s</td>
<td>Noose-meter</td>
<td>Krishna Temple, Jantar Mantar, Near Kishanpura, Chaudhary Hospital, Rajpur, School at the corner of Choti Chaudhary</td>
<td>Annually</td>
<td>Commercial</td>
<td>Rs 1,00,000</td>
<td>JhWQ</td>
<td>Department of Archaeology</td>
</tr>
</tbody>
</table>
Section 9 - Contract Forms

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Notification of Award

[Employer's letterhead]

Letter of Acceptance

[date]

To: [Name and address of the contractor]

This is to notify you that your Bid dated [date] for execution of the JP/EW/1B/E3: “Design, Manufacture, Supply, Installation, Testing and Commissioning (including Integrated Testing and Commissioning) and Maintenance for Two Years During Defect Liability Period for Part-A Machine Room Less Elevators and Part-B Escalators for Underground Section of Jaipur Mass Rapid Transit System Project Phase - 1B" 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 our Agency.

You are requested to furnish the Performance Security within 28 days in accordance with the Conditions of Contract, using for that purpose one of the Performance Security Forms included in Section 9 (Contract Forms) of the Bidding Document.

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 LTD., a corporation incorporated under the laws of [country of employer] and having its principal place of business at Khanij Bhawan, Tilak Marg, C-Scheme, Jaipur (Rajasthan), India, PIN–302 005 (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, Supply, Installation, Testing and Commissioning (including Integrated Testing and Commissioning) and Maintenance for Two Years During Defect Liability Period for Part –A Machine Room Less Elevators and Part-B Escalators for Underground Section of Jaipur Mass Rapid Transit System Project Phase - 1B for two underground Metro Stations at Chhoti Chaupar and Badi Chaupar on East–West Corridor of Jaipur Metro Phase- 1B NCB No. JP/EW/1B/E3:” (“the 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 Appendices hereto
(b) Letter of Price Bid and Price Schedules submitted by the Contractor
(c) Employer’s requirements
   (i) Technical and General Specifications
   (ii) Drawings
   (iii) Other requirements
(d) Special Conditions of Contract
(e) List of Eligible Countries that was specified in Section 5 of the Bidding Document
(f) General Conditions of Contract
(g) Other completed Bidding Forms submitted with the Letters of Technical and Price Bids
(h) Any other documents part of the Employer’s Requirements
   (i) Letter of Technical Bid and Technical Proposal submitted by the Contractor

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)
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 Bill of Quantities (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)
The terms and procedures of payment according to which the Employer will reimburse the Contractor are given in the Volume-3 of Section 6 (Employer’s Requirements).

The Employer shall instruct its bank to issue an irrevocable confirmed documentary credit made available to the Contractor in a bank in the country of the Contractor. The credit shall be for an amount of [. . . amount equal to the total named in Schedule 1 less the advance payment to be made for plant and mandatory spare parts supplied from abroad . . .]; and shall be subject to the Uniform Customs and Practice for Documentary Credits 1993 Revision, ICC Publication No. 500.1

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 shall be as specified in the Letter of Acceptance.

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

1Or Uniform Customs and Practice for Documentary Credits 2007 Revision, ICC Publication No. 600 (or the latest version).
[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

Please refer Price Schedules in Section-4 Vol-2 (BoQ, Preamble) of Bid document
Appendix 2 - Price Adjustment

Prices payable to the Contractor, in accordance with the Contract, shall be subject to adjustment during performance of the Contract to reflect changes in the cost of material components during manufacturing of equipments, in accordance with the following formula:

\[ P_f = P_0 \times \left( a + b \frac{L_1}{L_0} + c \frac{M_1}{M_0} \right) - P_0 \]

in which:

\( P_f \) = adjustment amount payable to the Contractor
\( P_0 \) = Contract price of the equipment (base price)
\( a \) = percentage of fixed element in Contract price (\( a = 0.15 \))
\( b \) = percentage of labour component in Contract price (\( b = \% \)). For Supply/delivery \( b = 0.2 \).
\( c \) = percentage of material and equipment component in Contract price (\( c = \% \)). For Supply/delivery \( c = 0.65 \).
\( L_0, L_1 \) = labour indices applicable as issued by Ministry of Labour & Employment, GOI (Consumer Price Index numbers) as applicable to the place of execution of the contract on the base date and the date for adjustment, respectively
\( M_0, M_1 \) = Wholesale Price Indices (for basic metals, alloys & Metal Product) as issued by RBI, on the base date and the date for adjustment, respectively

Conditions Applicable to Price Adjustment

The base date shall be the date 28 days prior to the deadline for submission of the Bid.

The date of adjustment shall be the mid-point of the period of manufacture of the component or Plant.

Note: Incase, if the corresponding date is not available in the data for this purpose, then the data of the month having major period shall be considered.

The following conditions shall apply:

a. The price adjustment shall only be applicable for the supply/delivery items in the contract for the items as specified.

b. No price increase will be allowed beyond the original delivery date unless covered by an extension of time awarded by the Employer under the terms of the Contract. No price increase will be allowed for periods of delay for which the Contractor is responsible. The Employer will, however, be entitled to any price decrease occurring during such periods of delay.

c. If the currency in which the Contract price, \( P_0 \), is expressed is different from the currency of the country of origin of the labour and/or materials indexes, a correction factor will be applied to avoid incorrect adjustments of the Contract price. The correction factor shall correspond to
the ratio of exchange rates between the two currencies on the base date and the date for adjustment as defined above.

d. No price adjustment shall be payable on the portion of the Contract price paid to the Contractor as an advance payment against the equipment if applicable.

e. The price adjustment shall be applicable for the following only:

<table>
<thead>
<tr>
<th>SL No</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Elevator</td>
</tr>
<tr>
<td>02</td>
<td>Escalator</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Amount [in currency(ies)]</th>
<th>Deductible limits [in currency(ies)]</th>
<th>Parties insured [names]</th>
<th>From [place]</th>
<th>To [place]</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

(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.

<table>
<thead>
<tr>
<th>Amount [in currency(ies)]</th>
<th>Deductible limits [in currency(ies)]</th>
<th>Parties insured [names]</th>
<th>From [place]</th>
<th>To [place]</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

(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.

<table>
<thead>
<tr>
<th>Amount [in currency(ies)]</th>
<th>Deductible limits [in currency(ies)]</th>
<th>Parties insured [names]</th>
<th>From [place]</th>
<th>To [place]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

(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:

<table>
<thead>
<tr>
<th>Amount [in currency(ies)]</th>
<th>Deductible limits [in currency(ies)]</th>
<th>Parties insured [names]</th>
<th>From [place]</th>
<th>To [place]</th>
</tr>
</thead>
</table>

The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GCCSubclause 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 GCCSubclause 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.

(h) Professional Indemnity Insurance (PII)  
Amount of Professional Indemnity Insurance (PII). (for the contracts having Design in scope of work):- Clause 51 of the SCC:-
AOA (any one accident) limit equal to 6% of the contract value against BOQ in respect of 'design and construct' with AOY (any one year) limit of 2 incidents in a year. In the Professional Indemnity insurance Policy the deductible amount shall not be more than 5% of AOA limit. PII Policy shall be obtained within four weeks from ‘date of commencement’ and shall be valid for five years after date of issue of ‘Performance Certificate’. Wherever the contractor submits policy for shorter period /annual renewable policy, the same shall be renewed before its expiry date. In such situation, the performance guarantee (5% of contract value) shall be retained till required validity period. The contractor’s submission of such shorter period /renewable policy shall be construed as their irrevocable consent for retention of the performance guarantee.
## Appendix 4 - Time Schedule

*All number refer to weeks from Commencement Dates of the Works*

<table>
<thead>
<tr>
<th>Key Dates</th>
<th>Description</th>
<th>Key Date in Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>KD-1</td>
<td>Submission of Preliminary Design</td>
<td>6</td>
</tr>
<tr>
<td>KD-2</td>
<td>Submission Definitive Design</td>
<td>18</td>
</tr>
<tr>
<td>KD-3</td>
<td>Delivery of Major Equipment to site</td>
<td>36</td>
</tr>
<tr>
<td>KD-4</td>
<td>Installation and Testing &amp; Commissioning of Equipments</td>
<td>56</td>
</tr>
<tr>
<td>KD-5</td>
<td>Integrated Testing and Taking over</td>
<td>60</td>
</tr>
</tbody>
</table>

Note:

a) All the key dates are from the date of commencement.

b) For the part week, full week will be considered for this purpose.

c) The site shall be made available progressively and if some part is not made available then the extension of time shall be allowed only to the work/KD of that particular part.
Appendix 5- List of Major Items of Plant and Services and List of Approved Subcontractors

Not Used
Appendix 6 - Scope of Works and Supply by the Employer

N/A
Appendix 7 - List of Documents for Approval or Review

N/A
Appendix 8 - Functional Guarantees

N/A
Performance Security

Bank name, and address of issuing branch or office

Beneficiary: Name and address of employer

Date:

Performance Guarantee No.: 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 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 (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) 24 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 ,

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.

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.
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 name, and address of issuing branch or office

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 figures (. 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 figures (. 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 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 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 Bidder

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.