

BIDDING DOCUMENTS



MUMBAI METRO LINE 3 (COLABA-BANDRA-SEEPZ)

CONTRACT MM3-CBS-DEQ-9-05

Design, Manufacture, Supply, Installation, Testing & Commissioning of

- A) Synchronized Under Floor Lifting System
- B) Synchronized Mobile Lifting Jacks, and
- C) Bogie Turn Tables

for Project "Mumbai Metro Line-3"

JICA Loan Agreement No ID- P 268 dated 29/03/2018.

Bidding Documents

PART 1- Bidding Procedures

PART 2- Employer's Requirements

PART 3- Conditions of Contract and Contract Forms

PART 4- Drawings

August - 2019

**Mumbai Metro Rail Corporation Ltd
MMRC Line 3 Transit Office,
Wing 'A', 'E' Block,
Bandra-Kurla Complex,
Bandra (East), Mumbai 400 051, India**



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PART 1 BIDDING PROCEDURES

Section I	Instructions to Bidders
Section II	Bid Data Sheet
Section III	Evaluation and Qualification Criteria
Section IV-A	Bidding Forms
Section IV-B	Pricing Document
Section V	Eligible Source Countries of Japanese ODA Loans

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Part 1

Bidding Procedures

Section I

Instructions to Bidders

August - 2019



Mumbai Metro Rail Corporation Ltd
MMRC Line 3 Transit Office,
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INSTRUCTIONS TO BIDDERS (ITB)

The Instructions to Bidders governing this bidding process are the “Instructions to Bidders included in Option A, Single-Stage Two-Envelope Bidding, Section I,” of the Standard Bidding Documents for Procurement of Plant Design, Supply and Installation (version 1.1) Published by JICA in February 2013. Those Instructions to Bidders are available on the JICA’s web site shown below:

http://www.jica.go.jp/english/our_work/types_of_assistance/oda_loans/oda_op_info/guide/tender/index.html

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Part 1

Bidding Procedures

Section II

Bid Data Sheet

August - 2019

Mumbai Metro Rail Corporation Ltd

MMRC Line 3 Transit Office,

Wing A, Block E,

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BID DATA SHEET (BDS)

A. General	
ITB 1.1	The number of the Invitation for Bids is MM3-CBS-DEQ-9-05
ITB 1.1	The Employer is Mumbai Metro Rail Corporation Ltd. (MMRC)
ITB 1.1	The name, identification and number of the lots (Contracts) comprising this International Competitive Bidding (ICB) are “Design, Manufacture, Supply, Installation, Testing & Commissioning” of A) Synchronized Under Floor Lifting System, one (01) set for 8-car train (hereinafter termed as Pit Jacks) B) Synchronized Mobile Lifting Jacks, one (01) set for 8-car train (hereinafter termed as Mobile Jacks) C) Bogie Turn Tables, four (04) Nos. (hereinafter termed as Turn Tables) as per the Employer’s Requirements, Section VI-A and VI-B, Part 2.
ITB 2.1	The Borrower is Government of India.
ITB 2.1	The number of the Loan Agreement is ID-P268. The amount of a Japanese ODA Loan is One hundred (100) billion Japanese Yen for Mumbai Metro Line 3 Project. The signed date of the Loan Agreement is 29th March 2018.
ITB 2.1	The name of the Project is Mumbai Metro Line 3 (Colaba-Bandra-SEEPZ).
ITB 2.2	The applicable Guidelines for Procurement under Japanese ODA Loans are those published in April 2012.
ITB 3.1(c)	A list of debarred firms and individuals is available at the World Bank’s website: www.worldbank.org/debarr
ITB 3.1(d)	Add new Sub-Clause ITB 3.1(d) Will recognize a Contractor as ineligible to be awarded a Contract if the Contractor or Sub Contractor has been debarred by Delhi Metro Rail Corporation and/or other Metro Rail Corporation chaired by Secretary of Ministry of Urban Development, Government of India, with the prior concurrence of JICA, as on the due date of submission of bid.
ITB 4.5	This bidding is not subject to prequalification.
B. Bidding Documents	
ITB 6.1	Replace Clause 6.1 with the following: The Bidding Documents consist of Parts 1, 2, 3 & 4 which include all the Sections indicated below and shall be read in conjunction with any Addenda issued in accordance with ITB 8.



	<p>Part 1 - Bidding Procedures</p> <p>Section I : Instructions to Bidders (ITB) Section II : Bid Data Sheet (BDS). Section III : Evaluation and Qualification Criteria. Section IV-A : Bidding Forms. Section IV-B : Pricing Document. Section V : Eligible Source Countries of Japanese ODA Loan.</p> <p>Part 2 - Employer's Requirements</p> <p>Section VI-A : Employer's Requirements – General Specifications. Section VI-B : Employer's Requirements – Technical Specifications.</p> <p>Part 3 - Conditions of Contract and Contract Forms</p> <p>Section VII : General Conditions of Contract (GC) Section VIII : Particular Conditions of Contract (PC) Section IX : Contract Forms</p> <p>Part 4 – Drawings</p> <p>Section X : Drawings</p> <p>The Bidder shall check the pages of all documents against page numbers given in the Contents Page to each Part/Section, and in the event of discovery of any discrepancy, the Bidder shall inform the Employer forthwith.</p>
<p>ITB 7.1</p>	<p>The Employer's address (for clarification purposes only) is: Attention: (Mr.) Rajeev, General Manager (RS) Mumbai Metro Rail Corporation Ltd, MMRC Line 3 Transit Office, Wing 'A', 'E' Block, Bandra-Kurla Complex, Bandra (East), Mumbai 400 051, India. Telephone: +91 22 26384638 Facsimile number: +91 22 26592005 Email Id: rajeev@mmrc.com</p>
<p>ITB 7.1</p>	<p>Replace the second sentence in ITB 7.1 with the following:</p> <p>The Employer will respond in writing to any request for clarification, provided that such request is received no later than twenty-one (21) days prior to the deadline for submission of Bids.</p>
<p>ITB 7.1</p>	<p>Responses to any request for clarification, if any, will be published on the Employer's web page: : www.mmrc.com</p>
<p>ITB 7.4</p>	<p>A pre-bid meeting will take place at the following date, time and place: Date: 24th Sept 2019 Time: 3:00 PM. Place: Mumbai Metro Rail Corporation Ltd, MMRC Line 3 Transit Office, Wing 'A', 'E' Block, Bandra-Kurla Complex, Bandra (East), Mumbai 400 051, India. No site visit will be conducted by the Employer.</p>



ITB 7.4	Add the following at the end of ITB 7.4: Attending pre-bid meeting is not mandatory.
ITB 8.2	Addenda, if any, will be published on the Employer's web page.
C. Preparation of Bids	
ITB 10.1	The language of the Bid as well as of all correspondence is English.
ITB 11.1	Insert the following sentence at the end of ITB 11.1: All documents must be spiral/hard bound. No loose papers will be accepted.
ITB 11.2(i)	The Bidder shall submit with its Technical Bid "Original Bid Documents including all addendums (if any) duly stamped and signed at each page."
ITB 11.3(d)	The Bidder shall submit with its Price Bid the following additional documents: None.
ITB 13.1	Alternative Bids are not permitted.
ITB 13.2	Bids showing a different Time Schedule will be rejected.
TB 14.2	Add new Sub-Clause ITB 14.2: Purchase Preference to local suppliers: Definitions: "Local Supplier" means a supplier or service provider whose product or service offered for procurement meets the minimum of 50% local content for the whole amount of the Contract. "Local Content" means the amount of value added in India which shall be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent. The Bidder who meets the requirements of Local Supplier shall be eligible for purchase preference. The margin of Purchase Preference for Local Suppliers shall be 10%. Local Suppliers shall give undertaking for certifying Local Content as per Bid Form 20 , Bid Forms, Section IV-A, Part 1.
ITB 15.2	Not applicable.
ITB 16.1 (b)	The period following completion of Plant and Installation Services during which spare parts, special tools, etc. shall be available for minimum 10 Years post-DLP.
ITB 18.1	Insert the following sentence at the end of ITB 18.1: Bidder shall quote for the entire Design, Manufacture, Supply, Installation, Testing & Commissioning on single responsibility basis.
ITB 18.3	Replace ITB 18.3 with the following: Bidders shall give a breakdown of the prices in the manner and detail called for in the Pricing Document Section IV-B.



<p>ITB 18.4</p>	<p>Replace ITB 18.4 with the following:</p> <p>Pricing documents shall comprise of eight (08) schedules as given in Section IV-B and listed below. Schedules numbered 1-4 below shall be used for each of the elements of the Plant & Installation Services. The total amount from each Schedule corresponding to an element of the Plant and Installation Services shall be summarized in the Schedule titled Grand Summary (Schedule 6) giving the total Bid Price(s) to be entered in the Letter of Price Bid.</p> <p>Schedule No.1: Plant, to be supplied from abroad including offshore manufacture, dispatch, completion of shipping to port in India, inland transportation, delivery and receipt at Mumbai Metro Line 3 site.</p> <p>Schedule No.2: Plant, to be supplied; from within India, including Indigenous manufacture dispatch inland transportation in India delivery and receipt at Mumbai Metro Line 3 site.</p> <p>Schedule No.3: Design Services</p> <p>Schedule No.4: Installation, Testing & Commissioning, and Other Services.</p> <p>Schedule No.5: Provisional Sums (Deleted)</p> <p>Schedule No.6: Grand Summary comprised of Schedules 1 to 5</p> <p>Schedule No.7: Recommended Spare Parts</p> <p>Schedule No.8: Pricing for unqualified withdrawal of Nonmaterial Nonconformities, as submitted in "Statement of Nonmaterial Nonconformities", Section IV-A, Bid Form 3.</p>
<p>ITB 18.5</p> <p>ITB18.5 (a)</p> <p>ITB18.5 (b)</p> <p>ITB18.5 (c)</p> <p>ITB18.5 (d)</p>	<p>The Bidder shall quote their prices in lump sum that is by including all kinds of tax liabilities. The prices for various schedules shall be quoted as under:</p> <p>Schedule No. 1 - Plant, to be supplied from abroad The prices shall be quoted on DDP basis (including cost of carriage, customs duty and Insurance up to the destination) - Named place of destination is Mumbai Metro Line 3, Depot site, Mumbai, India. The scope of Contractor's works shall be as described in Schedule No. 1 of Pricing Document, Section IV-B.</p> <p>Schedule No. 2- Plant, to be supplied within the Employer's country The prices shall be quoted on FOR (Free on Road/Rail, including cost of carriage and insurance up to destination) basis - Named place of destination is Mumbai Metro Line 3, Depot site, Mumbai, India. The scope of Contractor's works shall be as described in Schedule No. 2 of Pricing Document, Section IV-B.</p> <p>Schedule No.3 - The prices shall be quoted for Design Services as described in Schedule No.3 of Pricing Document, Section IV-B.</p> <p>Schedule No.4 - The prices shall be quoted for Installation, Testing and Commissioning and other services as described in Schedule No.4 of Pricing Document, Section IV-B. Named place of final destination is Mumbai Metro Line 3, Depot site, Mumbai, India.</p>



ITB18.5 (e)	Schedule No. 7 – Recommended Spares
ITB18.5 (f)	Schedule No. 8– The prices shall be quoted for unqualified withdrawal of Nonmaterial Non-conformities, as submitted in “Statement of Nonmaterial Non-conformities”, Bid Form 3 , Bidding Forms, Section IV-A.
ITB 18.7	The Contract for Plant & Installation Service (Schedule No. 1 to 4) is a fixed price contract. The prices of Spares in Schedule No.7 shall be adjustable as per Clause 2, Appendix 2, Section IX, Contract Forms, Part 3.
ITB 19.1	The currency(ies) of the Bid shall be as follows: (a) Plant and Equipment to be supplied from abroad shall be quoted in JPY and/or USD and/or EURO and Indian Rupees. (b) Plant and Equipment to be supplied from within India shall be quoted in Indian Rupees. (c) Design, Installation, Testing & Commissioning and Other Services shall be quoted in JPY and/or USD and/or EURO and Indian Rupees depending upon the currency in which the costs are to be incurred.
ITB 20.1	The Bid validity period shall be One Hundred Eighty (180) days .
ITB 20.3(a)	The Contract Price shall be adjusted by the % change in WPI for Commodity Code 1318000000 for “Manufacture of Machinery and Equipment” published by Economic Advisor, Ministry of Commerce & Industry, Govt of India, published at website http://eaindustry.nic.in from the month in which the 56 th day after initial Bid validity falls to the month in which Notification of Award - Letter of Acceptance is issued.
ITB 21.1	The Bid Security amount shall be: of INR 40,00,000/- (Indian Rupees Forty Lakhs only) or USD 55000/- (US Dollars Fifty-five thousand only)
ITB 21.2(a)	Add the following at the end of 21.2 (a): The Bid Security should be in the form of a Bank Guarantee issued or confirmed by a Scheduled Commercial Bank in India.
ITB 21.2 (d)	The Bid Security shall also be accepted in the form of Demand Draft drawn in favour of MMRCL payable at Mumbai, India.
ITB 22.1	In addition to the original of the Bid, the number of copies to be submitted is two sets of hard copies and one soft/ electronic version (PDF on CD) .
ITB 22.2	The written confirmation of authorization to sign on behalf of the Bidder shall consist of the Power of Attorney and the document shall be notarized. In case of a foreign company, the document shall be Apostille or Authenticated by Indian Embassy/Consulate in that country, and shall be attached to the Bid.



D. Submission and Opening of Bids	
ITB 24.1	<p>For <u>Bid submission purposes</u> only, the Employer's address is</p> <p>Attention: The Managing Director, MMRC</p> <p>Address: Mumbai Metro Rail Corporation Ltd, MMRC Line 3 Transit Office, Wing 'A', 'E' Block, Bandra-Kurla Complex, Bandra (East), Mumbai- 400 051, India.</p> <p>Telephone: +91 22 2638 4638</p> <p>Facsimile number: +91 22 2659 2005</p> <p>The deadline for Bid submission is:</p> <p>Date: 26/11/2019</p> <p>Time: 15:00 hrs</p>
ITB 27.1	<p>The Technical Bid opening shall take place at:</p> <p>Address: Mumbai Metro Rail Corporation Ltd, MMRC Line 3 Transit Office, Wing 'A', 'E' Block, Bandra-Kurla Complex, Bandra (East), Mumbai,- 400 051, India.</p> <p>Date: 26/11/2019</p> <p>Time: 15:30 hrs</p>
E. Evaluation and Comparison of Bids	
ITB 37.1	<p>The currency to be used for Bid evaluation and comparison purposes shall be US Dollar (USD). Bid Price expressed in various currencies in Schedule No. 6 will be converted to USD.</p> <p>The source of exchange rate shall be Reserve Bank of India reference rate (foreign currency). The Date for the exchange rate shall be twenty-eight (28) days prior to the date of Bid Submission.</p> <p>If the source of the exchange rate for the Bidder's proposed currency cannot be found in the Reserve Bank of India reference rate (foreign currency), then the rate in the web site www.xe.com shall be used.</p>
Add new Sub-Clause ITB 38.6	
ITB 38.6	<p>Purchase preference to Local Supplier</p> <p>Purchase preference shall be given to local suppliers in the procurements undertaken by MMRC in the manner specified hereunder:</p> <p>The following procedure shall be followed:</p> <ol style="list-style-type: none">i. Among all qualified bids, the lowest bid will be termed as L1. If L1 is from a local supplier, the Contract will be awarded to L1.ii. If L1 is not from a local supplier, the lowest bidder among the local suppliers, will be invited to match the L1 price subject to local supplier's quoted price falling within the margin of purchase preference, and the Contract shall be awarded to such local supplier



	<p>subject to matching the L1 price.</p> <p>iii. In case such lowest eligible local supplier fails to match the L1 price, the local supplier with the next higher bid within the margin of purchase preference shall be invited to match the L1 price and so on and Contract shall be awarded accordingly. In case none of the local suppliers within the margin of purchase preference matches the L1 price, then the Contract may be awarded to the L1 bidder.</p>
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Part 1

Bidding Procedure

Section III

Evaluation and Qualification Criteria

August - 2019

Mumbai Metro Rail Corporation Ltd

MMRC Line 3 Transit Office,

Wing A, Block E,

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Bandra (East), Mumbai- 400 051, India.



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EVALUATION AND QUALIFICATION CRITERIA

1. EVALUATION

Pursuant to the criteria listed in ITB 35.1 (a) – (b), the following factors shall apply:

1.1. Technical Evaluation:

1.1.1. Personnel

The Bidder must demonstrate that it has the personnel for the key position that meet the following requirements:

Sr. No.	Position	Total Work Experience (years)	Experience in similar works (years)
1	Eqpt Project Manager	10	4
2	Site Engineer	7	3

Note:

- 1) The Eqpt Project Manager shall coordinate all activities including design, manufacture, inspection, delivery, installation, testing & commissioning for the complete & satisfactory execution of the Contract on behalf of the Contractor.
- 2) The Site Engineer shall undertake the responsibility of Installation, Testing & Commissioning activities of the Equipment under the Contract in addition to the interface requirements during these activities.

The Bidder shall provide details of the proposed personnel and their experience records in **Bid Form 1: PER.**

1.1.2. Technical Proposal

- a) The Employer will carry out a detailed technical evaluation of the Bids, in pursuant to ITB 33 and ITB 35, in order to determine whether the technical aspects of the Equipment proposed are in compliance with the Bidding Documents. The Employer will evaluate the technical suitability and acceptability of Bidder's Technical Proposal as per Employer's Requirements-General Specification and Technical Specification.
- b) Bidder shall furnish their Technical Proposal of the Equipment according to **Bid Form 2, Section IV-A, Part 1** and furnish all the attachments. Proposal shall be clear and concise in order to fully enable MMRC to evaluate compliance with the functional and other requirements, specified in the Employer's Requirements, Part 2.
- c) For the avoidance of doubt, any review, evaluation and acceptance by the Employer of a technical proposal shall not relieve the awarded Bidder from its obligations, undertakings under the Contract, Bidder's understanding of scope of work and interfacing with other Contractors.
- d) Bidder shall give their comments only against those Clauses where they wish to give any deviations, noncompliance, clarifications, remarks etc. All Deviations/ noncompliance shall be also recorded in **Bid Form 3 – Nonmaterial Nonconformities.**

1.1.3. Others

1.1.3.1 Project Implementation Plan

The Bidder shall submit a Project Implementation Plan, incorporating stage-wise activities, viz. Design, Manufacturing, Testing including FAT, delivery at Site, Testing & Commissioning at site and maintenance as per the Employer's Requirements in **Bid Form 4, Section IV-A, Part 1** indicating minimum time required for each stage of the project.

The Bidder shall take into consideration the Key dates requirements contained in



Appendix 1, Section VI-A, General Specifications and confirm compliance to these key dates.

1.1.3.2 The Bidder shall submit the details of the Certificate of Compliance.

- i) Certificate of Compliance provided in **Bid Form 8**, Section IV-A, Part 1.
- ii) Interace Requirement Undertaking in **Bid Form 9**. Section IV-A, Part 1.

1.1.4 Bidder's declaration of the adequacy of the bid document

The Bidding Documents do not purport to contain all relevant information in relation to the Contractor's activities or the works, and are provided solely on the basis that a Bidder will be responsible for making its own assessment of the matters referred to in the Bid Documents.

The Bidder is responsible for reviewing the Bid Documents (including all addenda) provided by the Employer to ensure that it has a complete copy of all documents.

Bidder shall submit the following Certificates along with the Bid.

- i) Form of Certificate confirming careful examination of all the Contents of Bidding Documents and signing of all pages of Bidder's Proposal in **Bid Form 6**, Section IV-A, Part 1.
- ii) Form of Certificate confirming receipt of all Bid Addenda in **Bid Form 7**, Section IV-A, Part 1

1.2. Economic Evaluation

In addition to the criteria listed in ITB 38.2 (a) – (e) the following criteria shall apply.

1.2.1. Quantifiable Nonmaterial Nonconformities

Pursuant to ITB 34.3 and ITB 38.2 (d), the cost of all quantifiable non-material nonconformities as submitted in Schedule No 8, Section IV-B, Pricing Document, Part 1, shall be considered for fair comparison of Bids.

In case any Bidder quotes apportioned price for Schedule 3 more than the maximum specified and for Schedule 4 less than the minimum specified, it will be treated as quantifiable Nonmaterial Nonconformity in accordance with ITB 38.2 (d), as it shall require faster stream of payment than specified. In such a case, the interest implication amount on early payment shall be added to the Bid Price for the purpose of comparison amongst Bidders for determination of the lowest evaluated Bid. The rate of annual interest for this purpose shall be 3 percentage points above the repo rate of RBI as on Base Date.

1.2.2. Other Factors

The following factors and methods will apply under ITB 38.2 (f):

(a) Time Schedule:

Time to complete the Plant and Installation Services from the effective date specified in Article 3 of the Contract Agreement (CF 2, Section IX, Part 3) for determining time for completion of all activities is as per the Key Dates specified in Appendix 1, Section VI-A, General Requirements, Part 2. Bids showing a different Completion Time will be rejected.

(b) Purchase preference to Local Suppliers:

The purchase preference to Local Suppliers shall be governed as per the provisions given in Part 1, Section 2, ITB 14.2 and new Clause ITB 38.6.



(c) **Functional guaranttes:**

The Bidder shall submit details, in '**Bid Form 22: Functional Guarantee**' of the functional guarantees corresponding to each parameter of the Equipment as listed in Clause 2.11, Section VI-B, Technical Specifications, Part 2.

(d) **Safety Plan:**

The Bidder shall submit information on safety aspects of the Equipment giving details of hazards likely to be experienced and the risk mitigation measures in **Bid Form 23: Safety Plan**.

2. Qualification

(i) **Exchange Rate for Qualification Criteria**

Wherever a Form in Section IV-A, Bidding Forms, requires a Bidder to state a monetary amount, Bidders shall indicate the USD equivalent using the rate of exchange determined as follows:

- a) For turnover or financial data required for each year - Exchange rate prevailing on the last working day of the respective calendar year shall be taken in to consideration. For the countries where the financial year is ending on 31st December and for the countries where the financial year is ending on 31st March, the Exchange rate prevailing on the last working day of the respective calendar year shall be taken for this purpose.
- b) Value of single Contract - Exchange rate prevailing on the date of the Contract.

Exchange rates shall be taken from the publicly available source **identified in BDS 37.1**.

(ii) **Qualification Criteria for Multiple Contracts**

Not Used.



Eligibility and Qualification Criteria		Compliance Requirements			Documentation		
No.	Factor	Requirement	Single Entity	Joint Venture (existing or intended)		Submission Requirements	
				All Parties Combined	Each Member		One Member
2.1 Eligibility							
2.1.1	Nationality	Nationality in accordance with ITB 4.3	Must meet requirement	N/A	Must meet requirement	N/A	Bid Form 10: ELI- 1 and Bid Form 11: ELI- 2, with attachments
2.1.2	Conflict of Interest	No conflicts of interest in ITB 4.2	Must meet requirement	N/A	Must meet requirement	N/A	Letter of Bid
2.1.3	JICA Ineligibility	Not having been declared ineligible by JICA, as described in ITB Sub-Clause 4.4	Must meet requirement	N/A	Must meet requirement	N/A	Letter of Bid Form ACK
2.2 Historical Contract Non-Performance							
2.2.1	History of Non-Performing Contracts	Non-performance of a Contract ⁽ⁱ⁾ did not occur as a result of Contractor's default since 1 st January 2017.	Must meet requirement ⁽ⁱⁱ⁾	N/A	Must meet requirement ⁽ⁱⁱ⁾	N/A	Bid Form 12: CON



Eligibility and Qualification Criteria		Compliance Requirements			Documentation		
No.	Factor	Requirement	Joint Venture (existing or intended)			Submission Requirements	
			Single Entity	All Parties Combined	Each Member		One Member
2.2.2	Pending Litigation	All pending litigation shall in total not represent more than Fifty percent (50 %) of the Bidder's net worth and shall be treated as resolved against the Bidder.	Must meet requirement ⁽ⁱⁱ⁾	N/A	Must meet requirement ⁽ⁱⁱ⁾	N/A	Bid Form 12: CON
2.2.3	Litigation History	No consistent history of court/arbitral award decisions against the Applicant ⁽ⁱⁱⁱ⁾ since 1st January 2014.	Must meet requirement ⁽ⁱⁱ⁾	N/A	Must meet requirement ⁽ⁱⁱ⁾	N/A	Bid Form 12: CON
<p>Notes for the Bidder:</p> <p>(i) Non-performance, as decided by the Employer, shall include all Contracts a) where non-performance was not challenged by the Contractor, including through referral to the Dispute Resolution Mechanism under the respective Contract, and b) that were so challenged but fully settled against the Contractor.</p> <p>Non-performance shall not include Contracts where Employers decision was overruled by the dispute resolution mechanism. Non-performance must be based on all information on fully settled disputes or litigation, i.e. dispute or litigation that has been resolved in accordance with the dispute resolution mechanism under the respective Contract and where all appeal instances available to the Applicant have been exhausted.</p> <p>(ii) This requirement also applies to Contracts executed by the Bidder as a JV member.</p> <p>(iii) The Bidder shall provide accurate information on the related Bidding Form about any litigation or arbitration resulting from Contracts completed or ongoing under its execution over the last five (05) years. A consistent history of awards against the Bidder or any member of a joint venture may result in rejection of the Bid.</p>							



Eligibility and Qualification Criteria		Compliance Requirements			Documentation	
No.	Factor/ Sub-Factor	Requirement	Single Entity	Joint Venture (existing or intended)		Submission Requirements
				All Parties Combined	Each Member	One Member
2.3 Financial Situation						
2.3.1	Financial Performance	The audited balance sheets or, if not required by the laws of the Bidder's country, other financial statements acceptable to the Employer, for the last 5 years ending 31 st March 2019 for the countries where the financial year ending on 31 st March , or for the last 5 years ending 31 st December 2018 for the countries where the financial year ending on 31 st December shall be submitted. As the minimum requirement, an Bidder's net worth calculated as the difference between total assets and total liabilities shall be positive for the last financial year during the above period.	Must meet requirement	N/A	Must meet requirement	N/A
2.3.2	Average Annual Turnover	Minimum average annual turnover as a prime Contractor (calculated as total certified payments received for Contracts	Must meet requirement	Must meet requirement	Must meet 25% of the requirement	Must meet 40% of the requirement
						Bid Form 13: FIN-1 with attachments
						Bid Form 14: FIN-2



Eligibility and Qualification Criteria		Compliance Requirements			Documentation		
No.	Factor/ Sub-Factor	Requirement	Single Entity	Joint Venture (existing or intended) All Parties Combined	Each Member	One Member	Submission Requirements
2.3 Financial Situation							
		<p>in progress and/ or completed) over the last 5 financial years (i.e. financial years ending on March 31, 2019 for the countries where the financial year ending on 31st March or ending on December 31, 2018 for the countries where the financial year ending on 31st December) divided by 5 years must be as given below;</p> <p>US\$ 6.0 million or the equivalent thereof.</p> <p>Note: To bring the Contract values at par, the turnover values will be calculated by assuming 5% inflation per annum for Indian Currency and 2% escalation per annum for foreign currency for first 4 years of turnover values.</p>					



Eligibility and Qualification Criteria		Compliance Requirements			Documentation		
No.	Factor/ Sub-Factor	Requirement	Single Entity	Joint Venture (existing or intended)		Submission Requirements	
				All Parties Combined	Each Member		One Member
2.3 Financial Situation							
2.3.3	Financial Resources	<p>(i) The Bidder shall demonstrate that it has access to, or has available, liquid assets, lines of credit, and other financial means (independent of any Contractual advance payment) sufficient to meet the cash flow requirements estimated as under: US\$ 1,800,000 or the equivalent thereof for subject Contract net of the Bidder's other commitments.</p> <p>(ii) The Bidder shall also demonstrate, to the satisfaction of the Employer, that it has adequate sources of finance to meet 25% of the total commitments on works currently in progress on the date of Bid submission.</p>	Must meet requirement	Must meet requirement	Must meet 15% of the requirement	Must meet 50% of the requirement	Bid Form 15 FIR-1 and Bid Form 16 FIR-2



Eligibility and Qualification Criteria		Compliance Requirements			Documentation		
No.	Factor/ Sub-Factor	Requirement	Single Entity	Joint Venture (existing or intended)		Submission Requirements	
			All Parties Combined	Each Member	One Member		
2.4 Experience							
2.4.1	General Experience	Experience under Contracts in the role of prime Contractor (single entity or JV member) for at least the last five (5) years starting 1 st January 2014.	Must meet requirement	N/A	Must meet requirement	N/A	Bid Form 18: EXP-1
2.4.2	Specific Experience	A) Contracts (Design, Manufacture, Supply, Installation, Testing & Commissioning) for a minimum number, as specified below, of similar ⁽ⁱ⁾ Equipment for the respective item has been satisfactorily and substantially ⁽ⁱⁱ⁾ completed for Metro/Railway/MRT systems as a prime Contractor, viz, OEM (single entity or JV member) ⁽ⁱⁱⁱ⁾ between 1 st January 2009 and the latest Bid submission date. Pit Jacks- Eight (08) sets for 3 car-train and above including at least two (02) sets of 6-car train and above.	Must meet requirement	Must meet requirements ^(v)	N/A	N/A	Bid Form 19: EXP-2



Eligibility and Qualification Criteria		Compliance Requirements			Documentation	
No.	Factor/ Sub-Factor	Requirement	Single Entity	Joint Venture (existing or intended)		Submission Requirements
			All Parties Combined	Each Member	One Member	
2.4 Experience						
		<p>Mobile Jacks- Eight (08) sets of 3-car train and above including at least two (02) sets of 6-car train and above.</p> <p>Turn Tables- Ten (10) numbers.</p> <p>B) Out of the above Contracts completed, at least one (01) Contract shall have been completed outside the country of manufacture of the Equipment or in India for each of the three (03) items under the Contract.</p> <p>C) A minimum number of respective Equipment, as specified below shall be in operation in Metro/Railway/ MRT systems with satisfactory performance over a minimum period of two (02) years after commissioning and supported by a performance certificate from the</p>				



Eligibility and Qualification Criteria		Compliance Requirements			Documentation	
No.	Factor/ Sub-Factor	Requirement	Single Entity	Joint Venture (existing or intended)		Submission Requirements
				All Parties Combined	Each Member	
2.4 Experience						
		<p>end-client. Out of the these Equipment, at least one (01) Equipment of each type shall have been in operation outside the country of manufacture or in India.</p> <p>Pit Jacks- Three (03) sets for 3-car train and above including at least one (01) set of 6-car train and above.</p> <p>Mobile Jacks- Three (03) sets for 3-car train and above including at least one (01) set of 6-car train and above.</p> <p>Turn Tables- Three (03) numbers of static load 10 Tons and above.</p>				
<p>Notes for the Bidder:</p> <p>(i) The similarity shall be as under</p> <p>A) Pit Jacks - All supplies of Pit Jacks for Metro trains/ MRT/ Railways in Standard Gauge/ Broad Gauge capable to lift a car of weight 30 tons minimum.</p> <p>B) Mobile Jacks - All supplies of Mobile Jacks of capacity 10 Tons per jack and above.</p> <p>C) Turn Tables - All supplies of Turn Tables of capacity of Static Load 10 Tons and above and roll over capacity of 20 tons.</p> <p>(ii) Substantial completion shall be based on 80% or more works completed under the Contract.</p>						



Eligibility and Qualification Criteria		Compliance Requirements			Documentation	
No.	Factor/ Sub-Factor	Requirement	Single Entity	Joint Venture (existing or intended)		Submission Requirements
				All Parties Combined	Each Member	
2.4 Experience						
(iii) For Contracts under which the Bidder participated as a JV member, only the Bidder's share, by value, shall be considered to meet this requirement.						
(iv) In case of a JV, the value of Contracts completed by its members shall not be aggregated to determine whether the requirement of the minimum value of a single Contract has been met. Instead, each Contract performed by each member shall satisfy the minimum value of a single Contract as required for single entity. In determining whether the JV meets the requirement of total number of Contracts, only the number of Contracts completed by all members each of value equal or more than the minimum value required shall be aggregated.						



2.5 Bid Capacity

The Bidders will be qualified only if their available bid capacity is more than the approximate cost of the work. The available bid capacity shall be more than

USD 32,00,000 and will be calculated as under;

Available Bid Capacity = $2 * A * N - B$.

Where,

A = Maximum value of Supplies of all equipment manufactured in any one year during the last five financial years starting from 1st January 2014 for the countries where the financial year ending on 31st December and 1st April 2014, for the countries where the financial year ending on 31st March (value of supplies of all equipment manufactured will be updated to 31st March 2019, by assuming 5% escalation for Local Currency portion per year and 2% escalation for Foreign Currency portion per year). The value of Supplies executed shall be converted to USD using RBI's exchange rate shown on their website on the last day of the respective financial year. If the exchange rate cannot be found on RBI's website, then it shall be obtained from www.xe.com.

N = No. of years taken as 1.5.

B = Value of existing commitments for ongoing Supplies of Equipment (During period of completion of work under this bid).

In the case of a consortium/JV, the above formula will be applied to each member to the extent of his percentage share in the execution of facilities under this Bid. The Bidder shall fill in the **Bid Form 17: Bid Capacity** to establish his Bid capacity. However, it would suffice if any one member satisfies the bid capacity criteria to the full on its own.

Bidders, which do not qualify bid capacity criteria, shall not be considered for further evaluation and shall be rejected.

Note:

- (a) Value of Supplies of all Equipment for the last five financial years has to be taken from **Bid Form 14 FIN-2: Average Annual Turnover**.
- (b) Value of existing commitments for on-going Equipment Manufacturing during period of completion of facilities under this bid has to be submitted by the Bidder in **Bid Form 16 FIR-2: Current Contract Commitments**. These data shall be certified by the chartered accountant/statutory auditor with his stamp and signature.



2.6 Subcontractors/Manufacturers

- 2.6.1 Subcontractors/ manufacturers for the major items of supply or services as listed at Clause No 2.10, Section VI-B, Technical Specifications, Part 2 must meet the following minimum criteria:
- (a) The subcontractors/manufacturers for the major items of supply, referred in Clause 2.6.1 above must have a cumulative experience of minimum five (05) years in the design and manufacturing of respective item.
 - (b) The subcontractors/manufacturers for the major items of services, referred in Clause 2.6.1 above must have a cumulative experience of minimum three (03) years in the similar nature of work.
 - (c) The subcontractors/manufacturers for the major items of supply must have supplied similar item for at least four (04) Contracts of similar equipment in last ten (10) years.
 - (d) The subcontracted major item supplied by the subcontractor/manufacturer shall have been in use with satisfactory service in at least two (02) different locations for a period of two (02) years in any Metro/ Railway project. The Contractor shall produce a certificate with supporting documents of satisfactory performance of the major item from the Client before taking NoNO for the Sub-contractor after award of the Contract.
- 2.6.2 The Bidder shall submit the details of proposed Sub-contractors of major items of supply as per sub-clause 2.6.1 in **Bid Form 24: SUB-Contractors/ Manufacturers'**
- 2.6.3 In the case of a Bidder who offers to instal major items of supply under the Contract the Bidder did not manufacturer or otherwise produce, the Bidder shall provide the manufacturer's authorization, using '**Bid Form 21: MAN'** provided in Section IV-A, Bidding Forms, Part 1, showing that the Bidder has been duly authorized by the manufacturer or producer of the major item of supply to install the item in the Equipment under the Contract. The Bidder shall be responsible for ensuring that the manufacturer of the major item of supply complies with the requirements of ITB 4 and ITB 5 and meets with the minimum criteria listed above for that item.
-



BIDDING DOCUMENTS



MUMBAI METRO LINE 3 (COLABA-BANDRA-SEEPZ)

CONTRACT MM3-CBS-DEQ-9-05

Design, Manufacture, Supply, Installation, Testing & Commissioning of

- A) Synchronized Under Floor Lifting System
 - B) Synchronized Mobile Lifting Jacks, and
 - C) Bogie Turn Tables
- for Project "Mumbai Metro Line-3"

Part 1

Bidding Procedures

Section IV-A

Bidding Forms

August – 2019



Mumbai Metro Rail Corporation Ltd
MMRC Line 3 Transit Office,
Wing A, Block E,
Bandra-Kurla Complex,
Bandra (East), Mumbai- 400 051, India.

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Bidding Documents

Composition of Documents

Part 1	Bidding Procedures
Section I	Instructions to Bidders
Section II	Bid Data Sheet
Section III	Evaluation and Qualification Criteria
Section IV-A	Bidding Forms
Section IV-B	Pricing Document
Section V	Eligible Source Countries of Japanese ODA Loans
Part 2	Employer's Requirements
Section VI-A	Employer's Requirements - General Specifications
Section VI-B	Employer's Requirements - Technical Specifications
Part 3	Conditions of Contract and Contract Forms
Section VII	General Conditions of Contract (GC)
Section VIII	Particular Conditions of Contract (PC)
Section IX	Contract Forms
Part 4	Drawings
Section X	Drawings



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BIDDING FORMS

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Letter of Technical Bid

Date: *[insert date of Bid submission]*
Loan Agreement No.: ID-P268
IFB No.: MM3-CBS-DEQ-9-05

To: **Mumbai Metro Rail Corporation Ltd.**

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): *[insert the number and issuing date of each Addendum]*;
- (b) We, including any Sub-Contractors/ manufacturers, for any part of the Contract, meet the eligibility requirements in accordance with ITB 4 and ITB 5;
- (c) We, including any Sub-Contractors/ manufacturers, for any part of the Contract, have no conflict of interest in accordance with ITB 4;
- (d) We offer to Design, Manufacture, Supply, Installation, Testing & Commission in conformity with the Bidding Documents, the following Plant and Installation Services:
 - (A) **Synchronized Under Floor Lifting System,**
 - (B) **Synchronized Mobile Lifting Jacks, and**
 - (C) **Bogie Turn Tables.**
- (e) Our 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;
- (f) We are not participating, as a Bidder or as a Sub-Contractor/ manufacturer, in more than one Bid in this Bidding process in accordance with ITB 4.2 (c).
- (g) We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in any type of fraud and corruption.

Name of the Bidder**[insert complete name of the Bidder]*

Name of the person duly authorized to sign the Bid on behalf of the Bidder** *[insert complete name of person duly authorized to sign the Bid]*

Title of the person signing the Bid *[insert complete title of the person signing the Bid]*

Signature of the person named above *[insert signature of person whose name and capacity are shown above]*

Date signed *[insert date of signing]* day of *[insert month]*, *[insert year]*

*: In the case of the Bid submitted by a Joint Venture specify the name of the Joint Venture as Bidder.

** : Person signing the Bid shall have the power of attorney given by the Bidder to be attached with the Bid.



Letter of Price Bid

Date: *[insert date of Bid submission]*

Loan Agreement No.: ID-P268

IFB No.: MM3-CBS-DEQ-9-05

To: **Mumbai Metro Rail Corporation Ltd.**

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): *[insert the number and issuing date of each Addendum]*;

We offer to Design, Manufacture, Supply, Installation, Testing & Commission in conformity with the Bidding Documents, the following Plant and Installation Services:

(A) Synchronized Under Floor Lifting System,

(B) Synchronized Mobile Lifting Jacks, and

(C) Bogie Turn Tables.

- (b) The total price of our Bid, excluding any discounts offered in item (c) below is:
[in words and figures, indicating the various amounts and the respective currencies]
- (c) The discounts offered and the methodology for their application are:
The discounts offered are: *[specify in detail each discount offered]*
The exact method of calculations to determine the net price after application of discounts is shown below: *[specify in detail the method that shall be used to apply the discounts]*;
- (d) Our 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;
- (e) If our Bid is accepted, we commit to obtain a Performance Security in accordance with the Bidding Documents;
- (f) We understand that this Bid, together with your written acceptance thereof included in your Letter of Acceptance, shall constitute a binding Contract between us, until a formal Contract is prepared and executed; and
- (g) We understand that you are not bound to accept the lowest evaluated Bid or any other Bid that you may receive.

Name of the Bidder**[insert complete name of the Bidder]*

Name of the person duly authorized to sign the Bid on behalf of the Bidder** *[insert complete name of person duly authorized to sign the Bid]*

Title of the person signing the Bid *[insert complete title of the person signing the Bid]*

Signature of the person named above *[insert signature of person whose name and capacity are shown above]*

Date signed *[insert date of signing]* day of *[insert month]*, *[insert year]*

*: In the case of the Bid submitted by a Joint Venture/ Consortium, specify the name of the Joint Venture/ Consortium as Bidder.

** . Person signing the Bid shall have the power of attorney given by the Bidder to be attached with the Bid



Bid Form 1: Form PER: Proposed Personnel

Date: [insert day, month, year]

Bidder's Legal Name: [insert full name], or

Joint Venture Party Legal Name: [insert full name]

IFB No.: MM3-CBS-DEQ-9-05

The Bidder shall provide the details of suitably qualified personnel for each of the personnel listed in Clause 1.1.1, Section III, Part 1 to meet the specified requirements stated therein.

1. Title of Position* _____.
2. Name _____.
3. Job Title _____.
4. Name of Employer _____.
5. Summary of last 10 years professional experience:

From (mm-yyyy)	To (mm-yyyy)	Company	Relevant work experience

- As listed in Section III



Bid Form 2: Bidder's Technical Proposal of Equipment

The following is the minimum documentation that shall be supplied by the Bidder to enable technical evaluation of the Bid. The Bidder shall include any further information necessary to demonstrate the suitability of his proposal.

The Bidder shall provide the following information:

A. Technical Details of offered Equipment	
A1	A detailed technical note including description of the equipment and all major assemblies must be given along with main dimensions and weight of the Equipment. It must cover Material Construction of equipment, Operating principle, Operational requirement to meet the scope of work.
A2	Sufficient Design data with Drawings to make a reasonable assessment of: i. The equipment as a whole ii. The Working System and sub system.
A3	A list of major subassemblies accompanied with brief technical description.
A4	Bidder shall also detail maintenance provision of the Equipment.
A5	References and characteristics of main parts.
B. General	
B1	Details of limitations, deviations with respect to Employer's Requirements, as also listed in Bid Form 3, shall be submitted. Deviations and non-compliance of the offered equipment and cost implications thereof, if any, shall be given in respective Statement in the Pricing Document.
B2	Details of internal inspections, FAT, Delivery, Installation, Testing and Commissioning of Plant and Equipment giving estimated time for each activity.
B3	Details of interfacing and final integration of equipment with relevant Interfacing Contractors. The Bidder shall give details of System Support Requirements (Interface requirements), e.g. requirements of power, water supply, compressed air, civil structures, flooring, cable ducts, trenches, lighting, environment, fire safety, etc. whichever is applicable.
C. Spare Parts, Special tools, Test Equipment & Maintenance Facilities	
C1	List of consumables and regular wear spare parts with tentative life.
C2	Bidder shall give the list of proposed vendors for the major items outsourced
C3	For firms, out of Mumbai, the details of the local maintenance agency including: Company Profile: Maintenance facilities: Number of years maintaining similar equipment: Repair arrangement for faulty components on emergency basis:
D. Contractor Organisation	



D1	The Bidder shall submit the organization chart indicating the key persons responsible for different functions, viz. Design, Manufacturing, Quality, Testing, Commissioning etc.
----	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Note: It is accepted that the design data provided at the Bidding stage may be subject to change, during the design development process.

Bidder Company Name:

Bidder's Representative Name:

Signature:

Date of Submission:

Company Seal:



Bid Form 3: Statement of Nonmaterial Nonconformities

Reference: Clause 1.1.2 (d), Section III, Part 1

[Bidder shall list the items of nonmaterial nonconformities (if any) below.]

Clause Number	Details of Nonmaterial Nonconformities	Remarks explaining reasons for Nonmaterial Nonconformities and why it may be considered by the Employer

1. We hereby confirm that all implicit and explicit nonconformities, i.e. deviations, omissions, comments and remarks found elsewhere in our proposal shall be treated as NULL and VOID and stand withdrawn.
2. We hereby confirm that except for the nonconformities noted in this Bid Form 3, our offer is fully and truly compliant.
3. All nonconformities have been listed in this Bid form 3 and priced in Schedule No. 8, Section IV-B, Part 1. Nonconformities not priced will be treated as null and void and stand withdrawn at nil price.

Note:

Where there is no Nonconformity, the statement shall be returned duly signed with an endorsement indicating 'No Nonconformity'. In case, Performa of nonconformities is not submitted or submitted as blank, it will be construed that the Bidder has not proposed any nonconformity from Bidding Documents and will provide all Equipment as per specifications and Bidding Documents.

Bidder Company Name: _____

Bidder's Representative Name: _____

Signature: _____

Date of Submission: _____

Company Seal: _____



Bid Form 4: Project Implementation Plan

[The Bidder shall provide Project Implementation Plan as described in Clause no 1.1.3 (a), Section III, Part 1]

The Bidder shall indicate the timeline planning of the different activities of Part A of the Project giving the minimum time required for each activity and sub-activities ensuring compliance with Key dates as per Appendix 1, Section VI-A, Part 2.

Bidder Company Name:

Bidder's Representative Name:

Signature:

Date of Submission:

Company Seal



Bid Form 5: Structure of the Bidder (Refer Clause 11.2 (e) of Section I, ITB, Part 1)

The Bidder shall supply a chart particularizing the structure of the Bidder (identifying all companies comprising the Bidder in the event that the Bidder is a joint venture or consortium) and the ownership of each of the companies comprising the Bidder, identifying all respective intermediate and ultimate holding companies.

Composition of the Bidder

1. A notarized copy of Memorandum of Understanding (MOU) relating to the composition of the Bidder shall be submitted. For guidance, if the Bidder is a joint venture or a consortium then the joint venture or consortium agreement is to be submitted by the Bidder. If the Bidder is an entity established or to be established for this Contract, details of the shareholders' agreement or proposed shareholders' agreement shall be supplied together with the percentage participation and percentage equity in the agreements.
2. The Contractual arrangements and copies of agreements in relation thereto must, as a minimum, provide information on all members or participants involved, their respective participation in the Bid, the management structure, ownership and control of the members or participants comprising the Bidder and if, appropriate, the name of the member or participant who would have overall lead management responsibility for the Works, the registered addresses of all parties and the names of their respective senior partners, chairmen or managing directors as appropriate. Such agreements shall also reflect the joint and several liabilities of the members to the Employer in the event that the Contract is awarded to them and provide "deadlock" provisions in the event that decisions of the joint venture or consortium cannot be reached by unanimous agreement.
3. The Bidder shall furnish the details, in the agreement, of the scope split of facilities amongst the Consortium/Joint Venture members.
4. The Bidder shall provide written confirmation that:
 - a) The agreement or agreements submitted represent the entire agreement between the members or participants comprising the Bidder as to the Bidder's legal persona;
 - b) There is or are no other agreements relating to the Bidder's incorporation, powers or organization which may affect in any way his ability to carry out the Facilities; and
 - c) No changes will be made to any such agreements during the tender period or during the Contract period (if Contract awarded) without first obtaining the Employer's agreement to the proposed change or changes.

Bidder Company Name: _____

Bidder's Representative Name: _____

Signature: _____

Date of Submission: _____



**Bid Form 6: Form of Certificate Confirming Careful Examination
of all the Contents of Bidding Documents and signing of
all Pages of Bidder's Proposal**

This is to certify that we, M/s -----[*Name of the company] ----- have carefully examined all the contents of the Bidding Documents including Bid Addenda (if any) and all the pages of our proposal have been signed and stamped (by each constituent member in case of a joint venture or consortium).

1. Bid Addendum No
2. Bid Addendum No
3. ...

(Mention above all the addendums received by the Bidder)

Bidder Company Name:

Bidder's Representative Name:

Signature:

Date of Submission:

Company Seal



Bid Form 7: Form of Certificate confirming receipt of all Bid Addenda

This is to certify that we, M/s _____ [* Name of the Company]
have received all Bid Addenda to Bid “MM3-CBS-DEQ-9-05”, as listed below:

1. Addendum No.
2.
3.
4.
-
-
-

Bidder Company Name:

Bidder’s Representative Name:

Signature:

Date of Submission:

Company Seal



Bid Form 8: Certificate of Compliance

This Certificate is issued in the full knowledge that the Technical Proposals submitted by us, are in Clause-by-Clause Compliance with the Employer's Requirements and other specifications, including Addenda thereon, except as noted in **Bid Form 3: Statement of Nonmaterial Deviations** accompanying this Certificate.

Bidder Company Name:

Bidder's Representative Name:

Signature:

Date of Submission:

Company Seal



Bid Form 9: Interface Requirement Undertaking

We hereby confirm that our offer is fully compliant with the interfacing requirement with other Interfacing Contractors/ Authorities/ Systems.

Bidder Company Name:

Bidder's Representative Name:

Signature:

Date of Submission:

Company Seal



Bid Form 10 ELI-1: Bidder Information

Date: [insert day, month, year]

IFB No.: MM3-CBS-DEQ-9-05

Page [insert page number] of [insert total number] pages

[The Bidder shall provide the following information]

1. Bidder's legal name: [Insert full name] -----,
2. In case of JV/ Consortium, legal name of the representative member and of each member: [Insert full name of each member in the JV and specify the representative member] -----
3. Bidder's actual or intended country of registration: [insert country of registration]
4. Bidder's actual or intended year of incorporation: [insert year of incorporation]
5. Bidder's legal address in country of registration: [insert street/number/town or city/country]
6. Bidder's authorized representative information Name: [insert full name] Address: [insert street/number/town or city/country] Telephone/Fax numbers: [insert telephone/fax numbers, including country and city codes] Email Address: [insert E-mail address]
7. Attached are copies of original documents of: <input type="checkbox"/> Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of registration of legal entity named above, in accordance with ITB 4.3. <input type="checkbox"/> In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB 4.1.
8. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.

Company Seal



Bid Form 11 ELI-2: Bidder's Party Information

Date: [insert day, month, year]

IFB No.: MM3-CBS-DEQ-9-05

Page [insert page number] of [insert total number] pages

[The following form is additional to 'Bid Form10 ELI-1' and shall be completed to provide information relating to each JV member (in case the Bidder is a JV) as well as any specialist Sub Contractor proposed to be used by the Bidder for any part of the Contract resulting from this process.]

1. Bidder's legal name: [insert full name] -----
2. Bidder's Party legal name registered with the government: [Insert full name of Bidder's Party] -----
3. Bidder's Party country of registration: [insert country of registration] -----
4. Bidder's Party year of incorporation: [insert year of incorporation] -----
5. Bidder's Party legal address in country of registration: [insert street/number/town or city/country] -----
6. Bidder's Party authorized representative information Name: [insert full name] ----- Address: [insert street/number/town or city/country] ----- Telephone/Fax numbers: [insert telephone/fax numbers, including country and city codes] ----- E-mail address: [insert E-mail address] -----
7. Attached are copies of original documents of <input type="checkbox"/> Articles of Incorporation (or equivalent documents of constitution or association), and/or registration documents of the legal entity named above, in accordance with ITB 4.3.
8. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.

Signature & Company Seal



Bid Form 12 CON: Historical Contract Non-Performance

[The following table shall be filled in for the Bidder and for each member of a JV.]

Date: [insert day, month, year]
 Bidder's Legal Name: [insert full name]
 Joint Venture Party Legal Name: [insert full name]
 IFB No.: MM3-CBS-DEQ-9-05
 Page [insert page number] of [insert total number] pages

1. History of Non-Performing Contracts

Non-Performing Contracts			
<input type="checkbox"/> Contract non-performance did not occur since 1 st January 2014, in accordance with the Section III, Evaluation and Qualification Criteria, Sub-Factor 2.2.1, as appropriate.			
<input type="checkbox"/> Contract(s) not performed since 1 st January 2014, in accordance with the Section III, Evaluation and Qualification Criteria, Sub-Factor 2.2.1, as appropriate, is(are) indicated below:			
Year	Non- performed portion of Contract	Contract Identification	Total Contract Amount (current value, currency, exchange rate and USD equivalent)
[insert year]	[insert amount and percentage]	<ul style="list-style-type: none"> Contract Identification: [indicate complete Contract name, number, and any other identification] Name of Employer: [insert full name] Address of Employer: [insert street/city/country] Reason(s) for non-performance: [indicate main reason(s)] 	[insert amount]



2. Pending Litigation

Pending Litigation				
<input type="checkbox"/> No pending litigation in accordance with the Section III, Evaluation and Qualification Criteria, Sub-Factor 2.2.2, as appropriate.				
<input type="checkbox"/> Pending litigation in accordance with the Section III, Evaluation and Qualification Criteria, Sub-Factor 2.2.2, as appropriate, is indicated below.				
Year of dispute	Amount in dispute (currency)	Outcome as Percentage of Net Worth	Contract Identification	Total Contract Amount (current value, currency, exchange rate and USD equivalent)
[insert year]	[insert amount]	[insert percentage]	<ul style="list-style-type: none"> • Contract Identification: [indicate complete Contract name, number, and any other identification] • Name of Employer: [insert full name] • Address of Employer: [insert street/ city/ country] • Matter in dispute: [indicate main issues in dispute] • Status of dispute: [indicate if it is being treated by the Adjudicator, under Arbitration or being dealt with by the Judiciary] 	[insert amount]



3. Litigation History

Litigation History		
<input type="checkbox"/> No court/arbitral award decisions against the Bidder since 1 st January 2014, in accordance with the Section III, Evaluation and Qualification Criteria, Sub-Factor 2.2.3, as appropriate.		
<input type="checkbox"/> Court/arbitral award decisions against the Bidder since 1 st January 2014, in accordance with the Section III, Evaluation and Qualification Criteria, Sub-Factor 2.2.3, as appropriate, are indicated below:		
Year of award	Contract Identification	Total Contract Amount (current value, currency, exchange rate and USD equivalent)
[insert year]	<ul style="list-style-type: none"> Contract Identification: [indicate complete Contract name, number, and any other identification] Name of Employer: [insert full name] Address of Employer: [insert street/city/country] Matter in dispute: [indicate main issues in dispute] Party who initiated the dispute: [indicate "Employer" or "Contractor"] Status of dispute: [indicate if it is being treated by the Adjudicator, under Arbitration or being dealt with by the Judiciary] 	[insert amount]

Signature & Company Seal



Bid Form 13 FIN-1: Financial Situation

[The following table shall be filled in for the Bidder and for each member of a JV/ Consortium.]

Date: [insert day, month, year]

Bidder's Legal Name: [insert full name]

Joint Venture Party Legal Name: [insert full name]

IFB No.: MM3-CBS-DEQ-9-05

Page [insert page number] of [insert total number] pages

1. Financial data

Type of Financial information in (currency)	Historic information for previous five (5) years (amount, currency, exchange rate, USD equivalent)				
	Year 1	Year 2	Year 3	Year 4	Year 5
Statement of Financial Position (Information from Balance Sheet)					
Total Assets (TA)					
Total Liabilities (TL)					
Net Worth (NW)					
Current Assets (CA)					
Current Liabilities (CL)					
Information from Income Statement					
Total Revenue (TR)					
Profits Before Taxes (PBT)					
Profits After Taxes (PAT)					

2. Financial documents

The Bidder and its Parties shall provide audited/ CA certified copies of the financial statements for 5 years pursuant to the Section III, Evaluation and Qualifications Criteria, Sub-factor 2.3.1. The financial statements shall:

- (a) reflect the financial situation of the Bidder or in case of JV/ Consortium member, of each member, and not an affiliated entity (such as parent company or group member).
- (b) be independently audited or certified in accordance with local legislation.
- (c) be complete, including all notes to the financial statements.
- (d) correspond to accounting periods already completed and audited.

Attached are copies of financial statements for the 5 years required above; and complying with the requirements.

Signature & Company Seal



Bid Form 14 FIN-2: Average Annual Turnover

[The following table shall be filled in for the Bidder and for each member of a JV.]

Date: [insert day, month, year]

Bidder's Legal Name: [insert full name]

Joint Venture Party Legal Name: [insert full name]

IFB No.: MM3-CBS-DEQ-9-05

Page [insert page number] of [insert total number] pages

Annual Turnover Data (Supplies of all equipment) as a Prime Contractor (defined as certified payments received for equipment supply Contracts in progress and/or completed) during the last 5 years			
Year	Amount and Currency	Exchange rate	USD equivalent
[indicate year]	[insert amount and indicate currency]	[insert applicable exchange rate]	[insert amount in USD equivalent]
Average Annual Turnover *			

* The Bidder and its Parties shall provide audited/ CA certified copies of the above financial statement for 5 years pursuant to the Section III, Evaluation and Qualifications Criteria, Sub-factor 2.3.2.

* Total USD equivalent for all years divided by the total number of years, in accordance with the Section III, Evaluation and Qualification Criteria, Sub Factor 2.3.2, as appropriate.

Signature & Company Seal



Bid Form 15 FIR-1: Financial Resources

[The following table shall be filled in for the Bidder and for each member of a JV.]

Date: [insert day, month, year]

Bidder's Legal Name: [insert full name]

Joint Venture Party Legal Name: [insert full name]

IFB No.: MM3-CBS-DEQ-9-05

Page [insert page number] of [insert total number] pages

[Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject Contract or Contracts as indicated in Section III, Evaluation and Qualification Criteria Sub-Factor 2.3.3].

Financial Resources		
No.	Source of financing	Amount (USD equivalent)
1		
2		
3		
4		

- The Bidder and its Parties shall provide audited/ CA certified copies of the above financial statement pursuant to the Section III, Evaluation and Qualifications Criteria, Sub-factor 2.3.3.

Signature & Company Seal



Bid Form 16 FIR-2: Current Contract Commitments

[The following table shall be filled in for the Bidder and for each member of a JV.]

Date: [insert day, month, year]

Bidder's Legal Name: [insert full name]

Joint Venture Party Legal Name: [insert full name]

IFB No.: MM3-CBS-DEQ-9-05

Page [insert page number] of [insert total number] pages

[Bidders and each member of a JV shall 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 accordance with Section III, Evaluation and Qualification Criteria Sub-Factor 2.3.3]

Current Contract Commitments					
S.No.	Name of Contract	Employer's Contact Address, Tel, Fax	Value of all outstanding manufactured Equipment Supplies [Current USD Equivalent]	Estimated Completion Date	Average Monthly Invoicing Over Last Six Months [USD/month]
1					
2					
3					
4					
5					

Note: The Bidders and each member of a JV shall provide audited/ CA certified copies of the above financial statement pursuant to the Section III, Evaluation and Qualifications Criteria, Sub-factor 2.3.3.

Signature & Company Seal



Bid Form 17: Bid Capacity

[The following table shall be filled in for the Bidder and for each member of a JV.]

Date: [insert day, month, year]

Bidder's Legal Name: [insert full name]

Joint Venture Party Legal Name: [insert full name]

IFB No.: MM3-CBS-DEQ-9-05

Page [insert page number] of [insert total number] pages

Bid Capacity Calculation of Single Entity or Members of Consortium/JV

S. No	Bidder/ Each Member Name	Maximum value of 'Supplies of all Equipment manufactured' done in any one financial year during the last five years (Updated to 31 Mar 2019 price level) (A)	Total Value of existing commitments of "all manufacturing' (During period of completion of work commencing from 1 st April 2019 under this bid) (B)	No. of years, N=1.5 (N)	Bid Capacity (million USD) (2*A*N-B)



Bid Form 18: Form EXP - 1: General Experience

[The following table shall be filled in for the Bidder and for each member of a JV.]

Date: [insert day, month, year]

Bidder's Legal Name: [insert full name]

Joint Venture Party Legal Name: [insert full name]

IFB No.: MM3-CBS-DEQ-9-05

Page [insert page number] of [insert total number] pages

[Identify Contracts that demonstrate continuous work over the past [number] years pursuant to Section III, Evaluation and Qualification Criteria, Sub-Factor 2.4.1. List Contracts chronologically, according to their commencement (starting) dates.]

General Experience			
Starting Year	Ending Year	Contract Identification	Role of Bidder
[indicate year]	[indicate year]	<ul style="list-style-type: none"> Contract name: [insert full name] Brief description of the works performed by the Bidder: [describe works performed briefly] Amount of Contract: [insert amount, currency, exchange rate and USD equivalent] Name of Employer: [indicate full name] Address: [indicate street/number/town or city/country] 	[insert "Prime Contractor" (Single entity or JV member) or "Sub Contractor" or "Management Contractor"]

Signature & Company Seal



Bid Form 19: Form EXP - 2: Specific Experience

[The following table shall be filled in for Contracts performed by the Bidder and by each member of a JV.]

Date: [insert day, month, year]

Bidder's Legal Name: [insert full name]

Joint Venture Party Legal Name: [insert full name]

IFB No.: MM3-CBS-DEQ-9-05

Page [insert page number] of [insert total number] pages

[Fill out one (1) form per Contract, in accordance with Section III, Evaluation and Qualification Criteria (Without Prequalification), Sub-Factor 2.4.2.]

Similar Contract No. [insert number] of [insert number of similar Contracts required]	Information		
Contract Identification	[insert Contract name and reference identification number, if applicable]		
Award date	[insert day, month, year, e.g., 15 June, 2015]		
Completion date	[insert day, month, year, e.g., 03 October, 2017]		
Role in Contract	Prime Contractor Only		
Total Contract Amount	[insert Contract amount(s) and currency(ies)]	USD [insert exchange rate and total Contract amount in USD equivalent]	
If member in a JV, specify participation in total Contract amount	[insert percentage of participation]	[insert amount(s) and currency(ies) of participation]	USD [insert exchange rate and amount of participation in USD equivalent]
Employer's Name	[insert full name]		
Address	[indicate street/number/town or city/country]		
Telephone/fax number	[insert telephone/fax numbers, including country and city area codes]		
E-mail	[insert E-mail address, if available]		



Similar Contract No. <i>[insert number of similar Contracts required]</i>	Information
Description of the similarity in accordance with Sub-Factor 2.4.2 of Section III:	
1. Physical size of required works items	<i>[insert physical size of items]</i>
2. Complexity	<i>[insert description of complexity]</i>
3. Methods/Technology	<i>[insert specific aspects of the methods/technology involved in the Contract]</i>
4. Other Characteristics	<i>[insert other characteristics as described in Section VI, Employer's Requirements]</i>

Signature & Company Seal



Bid Form 20: Certification of Minimum Local Content for availing Purchase Preference

We, the Bidder, do hereby certify that the Facilities offered under the Contract meet the minimum local content required for availing Purchase Preference as per Clause 1.2.2 (b), Section III, Eligibility and Qualification Criteria, Part 1.

The local content in the proposed Bid shall be _____ % of the total value of the Contract.

Authorized Signatory

[Insert name of signatory; title]

For and on behalf of *[Insert name of the Bidder]*

Date:

Notes:

- 1) The above Certificate is to be submitted only by those Bidders who wish to avail Purchase Preference as per Clause 1.2.2 (b), Section III, Eligibility and Qualification Criteria, Part 1.
- 2) In case of procurement for a value (Quoted in Schedule No. 6) is more than Rs 10 crores, the Bidder shall provide a certificate from the statutory auditor or cost auditor of the company (in case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.
- 3) For procurements up to Rs 10 crores, the Bidder shall submit self-certification of the percentage of local content.
- 4) If any false declarations regarding local content is found, this will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which the Bidder or its successor can be debarred for a period of 3 years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under the law.
- 5) A Bidder who has been debarred by any procuring entity for violation of the conditions of purchase preference shall not be eligible for preference for procurement by any other entity for the duration of the debarment. The debarment for such other procuring entities shall take effect prospectively from the date on which it comes to the notice of the other procuring entities.



Bid Form 21 MAN: Manufacturer's Authorization

[The Bidder, in case of major items of supply installed in the Equipment and procured from subcontractors (Manufacturers), shall require the Manufacturer to fill in this Form in accordance with the instructions indicated Clause 2.5.6, Section III, Part 1. This letter of authorization shall be signed by a person with the proper authority to sign documents that are binding on the Manufacturer].

Date: [insert date (dd-mm-yyyy) of Bid Submission]
IFB No.: MM3-CBS-DEQ-9-05

To: [insert complete name of Purchaser]

WHEREAS

We [insert complete name of Manufacturer or Manufacturer's authorized agent], who are official manufacturers of [insert type of goods manufactured], having factories at [insert full address of Manufacturer's factories], do hereby authorize [insert complete name of Bidder] to submit a Bid the purpose of which is to provide the following goods, manufactured by us [insert name and/or brief description of the goods], and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with Clause 27, Defect Liability, of the General Conditions of Contract, with respect to the goods offered by the above firm.

Name: [insert complete name of person signing the Bid]

In the capacity of [insert legal capacity of person signing the bid]

Signed: [insert signature of person whose name and capacity are shown above]

Duly authorized to sign the bid for and on behalf of: [insert complete name of Bidder]

Dated on _____ day of _____, _____ [insert date of signing]



Bid Form 22: Form FUNC: Functional Guarantee

The Bidder shall copy in the left column of the table below, the identification of each functional guarantee required in the Specifications and stated by the Employer in para 1.2.2 (c) of Section III, Evaluation & Qualification Criteria for Single Stage Bidding Evaluation, and in the right column, provide the corresponding value for each functional guarantee of the proposed Plant and Equipment.

The Contractor shall submit appropriate procedures and actions to be taken to establish compliance of the Functional Guarantees. The minimum (or maximum) requirements stated in the Specification for major functional guarantees required in the Specification are listed in Section VI-B, Technical Specifications, Part 2. The list is not limited to the given items but includes all the requirements given in the Technical Specifications.

Sr. No.	Required Functional Guarantee	Value of Functional Guarantee of the Proposed Plant and Equipment
1	Reliability Requirements	Clause 2.11, Section VI-B, PART 2
2	Availability Requirements	Clause 2.11, Section VI-B, PART 2
3	Maintainability Requirements	Clause 2.11, Section VI-B, PART 2



Bid Form 23: Safety Plan

The Bidder shall detail the list of likely hazards in maintenance and operation of Equipment and the risk mitigation methods for each hazard. In particular, the Bidder shall furnish details of following hazards:

- 1) Requirements for personal protective equipment for O&M staff,
- 2) Safety instructions and control measures for hazardous situations,
- 3) Uncontrolled machine functions,
- 4) Fire hazard elimination and containment,
- 5) Failure of hydraulic or pneumatic systems,
- 6) Electrical earthing issues,
- 7) Electrocutation;
- 8) Working in confined spaces- in tunnel.
- 9) Any other hazard.



Bid Form 24: SUB-Contractors/ Manufacturers

Proposed Sub-Contractor				
Total Experience of Sub-Contractor				
Refer Part 1, Section III, Evaluation and Qualification Criteria, Clause 2.6.2 "Sub Contractors".				
Evidence of previous service history				
Item	Country (Origin of Sub-Contractor)	Client's Name	Year of Supply	Nos. of Units



Form ACK Acknowledgement of Compliance with the Guidelines for Procurement under Japanese ODA Loans

- A) I, *[insert name and position of authorized signatory]*, being duly authorized by *[insert name of Bidder/members of joint venture ("JV")]* (hereinafter referred to as the "Bidder") to execute this Acknowledgement of Compliance with Guidelines for Procurement under Japanese ODA Loans, hereby certify on behalf of the Bidder and myself that all information provided in the Bid submitted by the Bidder for [Loan No ID-P268 and project Mumbai Metro Line 3 (Colaba – Bandra – SEEPZ)] is true, correct and accurate to the best of the Bidder's and my knowledge and belief. I further certify, on behalf of the Bidder, that:
- (i) the Bid has been prepared and submitted in full compliance with the terms and conditions set forth in the Guidelines for Procurement under Japanese ODA Loans (hereinafter referred to as the "Guidelines"); and
 - (ii) the Bidder has not, directly or indirectly, taken any action which is or constitutes a corrupt, fraudulent, collusive or coercive act or practice in violation of the Guidelines and is not subject to any conflict of interest as stipulated in the relevant section of the Guidelines.

<If debarment for more than one year by the World Bank Group is NOT imposed, use the following sentence B).>

- B) I certify that the Bidder has NOT been debarred by the World Bank Group for more than one year since the date of issuance of Invitation for Bids.

<If debarment for more than one year by the World Bank Group has been imposed BUT three (3) years have passed since the date of such debarment decision, use the following sentence B').>

- C) I certify that the Bidder has been debarred by the World Bank Group for a period more than one year BUT that on the date of issuance of Invitation for Bids at least three (3) years had passed since the date of such debarment decision. Details of the debarment are as follows:

Name of the debarred firm	Starting date of debarment	Ending date of debarment	Reason for debarment

- D) I certify that the Bidder will not enter into a subcontract with a firm which has been debarred by the World Bank Group for a period more than one year, unless on the date of the subcontract at least three (3) years have passed since the date of such debarment decision.
- E) I certify, on behalf of the Bidder, that if selected to undertake services in connection with the Contract, the Bidder shall carry out such services in continuing compliance with the terms and conditions of the Guidelines.
- F) I further certify, on behalf of the Bidder, that if the Bidder is requested, directly or indirectly, to engage in any corrupt or fraudulent action under any applicable law, such as the payment of a rebate, at any time during a process of public procurement, negotiations, execution or implementation of Contract (including amendment thereof),



the Bidder shall report all relevant facts regarding such request to the relevant section in JICA (details of which are specified below) in a timely manner.

JICA's information desk on fraud and corruption (A report can be made to either of the offices identified below.)

(1) JICA Headquarters: Legal Affairs Division, General Affairs Department

URL: <https://www2.jica.go.jp/en/odainfo/index.php>

Tel: +81 (0)3 5226 8850

(2) JICA India office,

2nd Floor, Dr. Gopal Das Bhawan, 28, Barakhambha Road, New Delhi - 110001

Tel: +91 11 47685500

FAX: +91 11 47685555

URL <http://www.jica.go.jp/india/english/office/index.html>

The Bidder acknowledges and agrees that the reporting obligation stated above shall NOT in any way affect the Bidder's responsibilities, obligations or rights, under relevant laws, regulations, Contracts, guidelines or otherwise, to disclose or report such request or other information to any other person(s) or to take any other action, required to or allowed to, be taken by the Bidder. The Bidder further acknowledges and agrees that JICA is not involved in or responsible for the procurement process in any way.

If any of the statements made herein is subsequently proven to be untrue or incorrect based on facts subsequently determined, or if any of the warranties or covenants made herein is not complied with, the Bidder will accept, comply with, and not object to any remedies taken by the Employer and any sanctions imposed by or actions taken by JICA.



Authorized Signatory

[Insert name of signatory; title]

For and on behalf of [Insert name of the Bidder]

Date:

Form DBR

[The following statement shall be signed and stamped by the Bidder and by each member of a JV as well as any specialist Sub Contractor proposed to be used by the Bidder for any part of the Contract]

By virtue of my signature below, I confirm that the Bidder represented by me for submitting Bid for Mumbai Metro Line-3 - Design, Manufacture, Supply, Installation, Testing & Commissioning of **Pit Jacks, Mobile Jacks and Turn Tables** [MM3-CBS-DEQ-9-05] is/are not **DEBARRED/BLACKLISTED** by Delhi Metro Rail Corporation and/or other Metro Rail Corporation chaired by Secretary of Ministry of Urban Development, Government of India as on the due date of submission of Bid.

Signed: _____

Date: _____

NOTE: Copy of the Notification of such Debarment/Blacklist shall be submitted in the Bid, in the case the Bidder is Debarred/Blacklisted.



Form of Bid Security (Bank Guarantee)

(To be stamped in accordance with the Stamp Act of the Country of Issuing Bank)

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: Mumbai Metro Rail Corporation Ltd, MMRC Line 3 Transit Office, Wing 'A', 'E' Block, Bandra-Kurla Complex, Bandra (East), Mumbai 400 051, India.

IFB No.: [MM3-CBS-DEQ-9-05]

Date: [insert date of issue]

BID GUARANTEE No.: [insert guarantee reference number]

Guarantor: [insert name and address of place of issue, unless indicated in the letterhead]

We have been informed that [insert name of the Bidder, which in the case of a joint venture shall be the name of the joint venture (whether legally constituted or prospective) or the names of all members thereof] (hereinafter called “the Applicant”) has submitted or will submit to the Beneficiary its Bid (hereinafter called “the Bid”) for the Design, Manufacture, Supply, Installation, Testing & Commissioning of **Pit Jacks, Mobile Jacks and Turn Tables** for Mumbai Metro Line 3 (Colaba – Bandra – SEEPZ) Project under Loan Agreement No. [ID-P268].

Furthermore, we understand that, according to the Beneficiary’s conditions, Bids must be supported by a Bid guarantee.

At the request of the Applicant, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of [insert amount in words, (insert amount in figures)] upon receipt by us of the Beneficiary’s complying demand, supported by the Beneficiary’s statement, whether in the demand itself or a separate signed document accompanying or identifying the demand, stating that either the Applicant:

- (a) Has withdrawn its Bid during the period of Bid validity set forth in the Applicant’s Letter of Bid (hereinafter called “the Bid Validity Period”), or any extension thereto provided by the Applicant; or
- (b) Having been notified of the acceptance of its Bid by the Beneficiary during the Bid Validity Period or any extension thereto provided by the Applicant, (i) fails to execute the Contract Agreement, or (ii) fails to furnish the Performance Security, in accordance with the Instructions to Bidders of the Beneficiary’s Bidding Documents.

This guarantee will expire on _____ (Expiry Date) and shall be returned to the Applicant:

- (a) if the Applicant is the successful Bidder, upon our receipt of copies of the Contract Agreement signed by the Applicant and the Performance Security issued to the Beneficiary in relation to such Contract Agreement; or
- (b) if the Applicant is not the successful Bidder, upon the earlier of (i) our receipt of a copy of the Beneficiary’s notification to the Applicant of the results of the Bidding process; or (ii) twenty-eight (28) days after the end of the Bid Validity Period.

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

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 758.



[Signature]

Below is not the part of BG format

Note for information of the Bidder:

- 1) The terms '**Bidder**' and '**Applicant**' have been used interchangeably in the above **Form of Bid Security (Bank Guarantee)** meaning the same as the '**Bidder**' as stated in ITB 4. The term '**Applicant**' shall not be construed as the **applicant** who has approached the Bank for issuing the Bank Guarantee(s).
- 2) The Bidder shall be careful while getting the Bank Guarantee(s) prepared from their Bankers as any default in the correctness of BG as per the BG requirements shall lead to rejection.

----- End -----



BIDDING DOCUMENTS



MUMBAI METRO LINE 3 (COLABA-BANDRA-SEEPZ)

CONTRACT MM3-CBS-DEQ-9-05

Design, Manufacture, Supply, Installation, Testing & Commissioning of

- A) Synchronized Under Floor Lifting System
- B) Synchronized Mobile Lifting Jacks, and
- C) Bogie Turn Tables

for Project "Mumbai Metro Line-3"

Part 1

Bidding Procedures

Section IV-B

Pricing Document

August - 2019

Mumbai Metro Rail Corporation Ltd

MMRCL Line 3 Transit Office,

Wing A, Block E,

Bandra-Kurla Complex,

Bandra (East), Mumbai- 400 051, India.



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Bidding Documents

Composition of Documents

Part 1	Bidding Procedures
Section I	Instructions to Bidders
Section II	Bid Data Sheet
Section III	Evaluation and Qualification Criteria
Section IV-A	Bidding Forms
Section IV-B	Pricing Document
Section V	Eligible Source Countries of Japanese ODA Loans
Part 2	Employer's Requirements
Section VI-A	Employer's Requirements – General Specifications
Section VI-B	Employer's Requirements – Technical Specifications
Part 3	Conditions of Contract and Contract Forms
Section VII	General Conditions of Contract (GC)
Section VIII	Particular Conditions of Contract (PC)
Section IX	Contract Forms
Part 4	Drawings
Section X	List of Drawings



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1.1 Preamble

The Pricing Document shall be read in conjunction with Invitation for Bids, Instructions to Bidders and all Bidding Documents, Specifications and Drawings as listed in Sub-Clause 6.1 of Part 1, Section I, ITB and Section II, BDS. This is a Fixed Price Contract. The Pricing Document is divided into Schedules representing one or more groups of inter-related facilities. The detailed Scope of work is given in Part 2, Employer's Requirement – General and Technical Specifications.

The individual item descriptions within each Schedule are indicative only of the Work included in this Contract and shall not be taken as defining the scope of work to be executed either under the Schedule or the Contract.

The item descriptions, if given, are general summaries only. Therefore no omission from, or error in item descriptions within this Pricing Document shall warrant an adjustment of the Contract Price nor entitle the Contractor to seek an extension of time under the Contract.

The activity descriptions for items within Schedule shall be deemed to cover all aspects of the relevant item scope, irrespective of the fact that the Bidder may not have inserted an amount against any item description. The total amount of each Schedule shall be deemed inclusive of all of the Contractor's obligations to execute the part of the Facilities covered by the Schedule and to perform all of his other obligations under the Contract in respect thereof. The Contractor shall not be entitled to receive any further or additional payment in respect of such Schedule.

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.

Prices shall be filled in indelible ink and any alterations necessary due to errors, etc., shall be initialled by the Bidder.

The person authorized to sign on behalf of the Bidder shall sign in full, with company seal and date, at the bottom of all pages of the Pricing Schedule.

1.2 Contract Price

The Contract Price consists of price for Design, Manufacture, Supply, Installation, Testing & Commissioning of the Facilities including supply of O&M manuals and Training of Employer's O&M staff as per the Employer's Requirements-, Section VI-A &VI-B, Part 2.

- 1.2.1** All the prices shown in the Schedules shall include all taxes, duties, levy, cess, etc. which constitute the Contract Price and will be the total amount to be paid to the Contractor for executing the Works and performing all other obligations under the Contract. The prices in different Schedules shall be quoted as per ITB 19.1, Section II, Part 1.



1.2.2 The Schedules and the Contract Prices shall not be subject to adjustment by the Contractor in respect of any error or oversight in the Pricing Document. The Pricing Document represents the full extent of the Contractor's entitlement to receive payment as per the Schedules. Arithmetical errors, if any found in the Contractor's submission, will be corrected by the Employer as indicated in the Instruction to Bidders, Clause No 36.1, Part 1.

1.2.3 The rate for each item detailed in Schedules Nos. 1, 2, 3, 4, 5 & 6 (Grand summary) & 7 (Recommended spare parts) are for finished items of work, 100% complete in all respects, and shall include but not be limited to the preliminary and detailed design, supply of all materials, equipment, landing charges, shipping costs for transport by air, sea or land (or any combination thereof), insurance charges, taxes, duties, levy, cess, etc. unloading, storage, installation, factory testing, testing & commissioning at site including intergrated testing with other designated Contractor, supply of spare parts and special tools, training of employer's O&M staff, provision of as-built drawings, provision of O&M manuals, and all types of clearances/approvals required from government authorities. The rate also includes the Contractor's profit and establishment overhead, all general risks, insurance liabilities, compliance with labour laws as per statutory obligations set out or implied in the Contract, attending to defects list prepared by the Employer prior to handover of works and facilities, and any other Contractual requirements stated in the Employer's requirements.

1.2.4 Deemed Export

The Bidder shall be solely responsible for claiming and availing all deemed export benefits if available during the currency of Contract. However, for availing the said benefits, necessary payment certificate in accordance with the laws of the land and extant policies of the Government of India will be issued by MMRC at the specific request of the Contractor. Contractor shall process for refund for 100% of the paid Custom Duties/Basic custom duty (as applicable) only and full terminal excise duties for items as above after availing the concessional duties such as Project Import Benefits under chapter 98.01 of Customs Tariff Act, etc. from the Statutory Authorities based on submission of documentary evidence by the Contractor. Contractor shall be fully responsible for ensuring that all necessary documentation/information, as may be required, for processing the refund of paid duties from the Statutory Authorities are correctly prepared by them and are timely submitted, so as to claim the refund of paid duties from the Statutory Authorities. The Contractor shall arrange for the remittance of the refund so obtained to the Employer within 15 days. In case of failure by the Contractor to obtain and remit the refund within reasonable time (to be decided by the Project Manager & intimated to Contractor) to the Employer, the same will be recovered by the Employer from the amounts due as payment to the Contractor or as debt due from the Contractor.

1.2.5 Exemption in state taxes

In case of any waiver/ reduction subsequent to the Base Date for GST (CGST, SGST, IGST, UGST etc.) and any other tax, duties, levy, cess, etc, Custom duties in full or part thereof, the Contractor will be required to obtain exemption/refund of such taxes, duties etc., from the concerned authorities. The Contractor shall arrange for the remittance of the refund so obtained to the Employer. In case of failure by the Contractor to obtain and remit the refund within reasonable time (to be decided by the Project Manager & intimated to Contractor) to the Employer, the same will be recovered by the Employer from the amounts due as payment to the Contractor or as debt due from the Contractor If



the Contractor fails to take the required action to obtain refund or exemption, the Employer shall take action in accordance with the Conditions of Contract.

1.2.6 Record of Taxes, Duties etc.

The Bidder shall also give breakdown of his fixed Price clearly giving the Custom Duty, GST (CGST, SGST, IGST, UGST etc.) and any other Tax, levy, Cess, etc. along with the applicable rate in the Form attached as Appendix A of Schedule No. 6 (Grand Summary).

The Contractor shall maintain complete records in respect of payments made by them for taxes, duties, Octroi, and other levies payable to various authorities (except Income Tax or Corporate Tax) and advise the Employer the summary of such payment every quarter in a format advised by the Employer during execution of the Contract.

The detailed records shall however remain open for inspection by the Employer/ Project Manager at any time and copies of the records shall be furnished as required by the Project Manager. Should there be any statutory changes in taxes & duties with respect to the tax structure as on base date, the amount payable/recoverable from the Contractor in accordance with the conditions of the Bid will generally be calculated based on these records. However, Employer at his sole discretion, if not satisfied with the veracity of records or records are incomplete or otherwise, may separately determine the amount payable/recoverable from the Contractor in accordance with the conditions of the Bid, which shall be final and binding.

The Contractor shall also maintain records of the imported components supplied to local manufacturers and actual utilization of the same in the manufacture of complete Equipment. The Contractor shall be fully responsible for any loss or misuse of these components in manufacture of Equipment.

1.2.7 Concessional benefits for Project Import

MML3 Metro Project is eligible for availing concessional duty benefits as per Customs Tariff Act for Project Imports and Bidders shall refer to Project Import Regulation 1986 (PIR), Section 5, read along with Customs Manual chapter 5, Para 3,4 & 5. After award of Contract, at the request of the Contractor, MMRC shall fulfil its obligation towards registration of Contract (Sec 5 of PIR), and approval of the items for import as the Sponsoring Authority (Sec 5 (4) of PIR). However, the responsibility for providing all information, technical details documentations, obtaining of licences as may be required for registration (para 5, Chapter 5 of the Manual) and all logistics and other arrangement in connection with the import of material shall remain with the Contractor as per the Bid conditions. MMRC shall not be the importer of the Equipment or any part of it.

1.3 Description of Pricing Schedules

The Pricing Documents comprise the following Schedules:

Schedule No. 1- Plant, to be supplied from abroad;

Schedule No. 2- Plant, to be supplied within the Employer's country;

Schedule No. 3- Design services.

Schedule No. 4- Installation, Testing & Commissioning, and Other Services.

Schedule No. 5- Deleted

Schedule No. 6- Grand Summary

Schedule No. 7- Recommended Spare parts



Schedule No. 8- Pricing for unqualified withdrawal of conditions, qualifications, nonmaterial nonconformities, etc.

1.3.1 Schedule No. 1

Schedule No. 1 is dedicated to Plant, to be supplied from abroad at MMRC Depot at Aarey, Mumbai as per the requirements and other details given in the Part 2 Section VI-B, Contract Drawings included in Part 4 and other specifications.

This Schedule comprises all those obligations and ongoing activities throughout the Contract not associated directly with any other Schedule.

This includes but is not limited to:

- Completion of manufacture offshore.
- Completion of Inspection, all routine Testing of Equipment and test running in Factory,
- Completion of all Factory Acceptance Tests,
- Completion of despatch from offshore factory, Provision of Marine and Transit Insurance from off-shore Factory inclusive of release of equipment at port in India and inland transportation up to the Metro Depot.
- Delivery and unloading of Plant in MMRC depot in good condition,
- Completion of supply of Mandatory Spares to Metro depot, Aarey, Mumbai and its successful inspection,
- Any other item not listed but is considered necessary to comply with the scope of work

1.3.2 Schedule No. 2

Schedule No. 2 is dedicated to Plant, to be supplied within the Employer's country including manufacture, dispatch, Inland transportation, delivery and receipt of Plant in MMRC Depot at Aarey, Mumbai as per the requirements and other details given in the Technical Specifications, Section VI-B, Part 2 and Drawings, Section X, Part 4.

This Schedule comprises all those obligations and ongoing activities throughout the Contract not associated directly with any other Schedule.

This includes but is not limited to:

- Completion of manufacture in Employer's country.
- Completion of Inspection, all routine Testing of Equipment and test running in Factory,
- Completion of all Factory Acceptance Tests,
- Completion of despatch from Factory with Provision of Transit Insurance to MMRC depot, Aarey, Mumbai inclusive of inland transportation up to the Metro Depot.
- Delivery and unloading of Plant in MMRC depot in good condition,
- Completion of supply of Mandatory Spares to MMRC depot in Mumbai and its successful inspection,
- Any other item not listed but is considered necessary to comply with the scope of work.

1.3.3 Schedule No. 3

Schedule No. 3 is dedicated to the activities relating to Design Services as per the requirements and other details given in the Technical Specifications, Section VI-B, Part 2, and other Specifications.

This Schedule comprises all those obligations and ongoing activities throughout the Contract not associated directly with any other Schedule.

This includes but is not limited to the submission of:



- Work program
- Quality Plan
- Safety Plan
- RAMS Plan
- Inspection & Testing Plan
- Preliminary Design and the Final Design
- Any other item considered necessary to comply with the Scope of Contract.
- Submission of 3-D BIM model

1.3.4 Schedule No. 4

Schedule No. 4 is dedicated to the Facilities related to Installation, Testing & Commissioning and all other allied activities as per the Employer's Requirements stated in Part 2, Sections VI-A & VI-B, Drawings and other Specifications and detailed below..

This Schedule comprises all those obligations and ongoing activities throughout the Contract not associated directly with any other Schedule.

This includes but is not limited to:

- Installation, Testing & Commissioning (including Guarantee Testing) of Plant,
- Submission of technical details if called for for obtaining sanction of statutory authorities.
- Provision of staff essential for Testing & Commissioning and service trials of Plant.
- Training of Operating & Maintenance personnel of Employer at Metro Depot by deputing Instructors.
- Submission of "As-Built drawings"
- Submission of Training Manuals
- Submission of Operating and Maintenance Manuals
- Provision of Spare parts Catalogue
- Any other item considered necessary by the Contractor to comply with the Scope of Works,

1.3.5 Schedule No. 5: (Provisional Sums)

DELETED

1.3.6 Schedule No. 6

Schedule No. 6 is dedicated to the Grand Summary of Prices quoted against Schedule Nos. 1, 2, 3, 4 and 5. Total of Schedule – Grand Summary to be carried forward to Bid Form.

The Bidder shall also give breakdown of his fixed Lump Sum Price clearly giving the Custom Duty, GST (CGST, SGST, IGST, UGST etc.) and any other Tax, levy, Cess, etc. along with the applicable rate in the Form attached as Appendix A to this Schedule No.6.

1.3.7 Schedule No. 7

This schedule pertains to spares parts, consumables and special tools recommended by the Bidder. The prices quoted under this Schedule shall remain fixed till the acceptance of the Facilities (issue of Operational Acceptance Certificate) and thereafter shall be adjusted in accordance with Appendix 2, Contract Forms, Section IX, Part 3.

1.3.8 Price / Cost Breakdown

- a) The total of Schedule Nos. 1, 2, 3, and 4 is shown in Schedule No. 6 (Grand Summary) of this Pricing Document shall be deemed to include all costs associated with the supply, manufacture and delivery to Site of such item by the Contractor (including, without



limitation, the cost of design, manufacture, packing, supply and delivery to Site, testing & commissioning, labour cost, preliminaries and other general requirements, overheads and profit, taxes, duties, royalty etc.) irrespective of the quantity of the items to be supplied.

- b) Variations will only be considered if there is any additional work required beyond the scope as mentioned in Part 2 Section VI-A & VI-B - Employer's Requirements and as mentioned in this section elsewhere or the Project Manager instructs any changes to the existing scope.
- c) Payments to the Contractor will be made in accordance with Terms and Procedure for Payment as mentioned in Appendix 1 to Contract Forms in Part 3, Section IX.
- d) No payment will be made against any item in the Contractor's Pricing Document which has a value entered against in the Amount column as indicating '0', 'NIL' or left blank.

1.4 Payment Concept

Payment will be calculated as per Appendix 1, Section IX, Contract Forms, subject to the Project Manager/Employer being satisfied that the Facilities for each item are 100% complete. Payment will be based on the Contractor's submission of a stage-wise statement in the case of supply portion of the Contract and quarterly statement in the case of Maintenance Service as per Appendix 1, Contract Forms, Section IX, Part 3.

a) Apportionment of Lump Sum Price to Schedules & Milestones under Each Schedule

1. The whole of Facilities is divided into Schedules. Each of these Schedules represents a major item associated with the Facilities. Schedules are named according to their general scope of Work.
2. The Lump Sum price for the whole of Facilities shall be apportioned by the Bidder among the various Schedules.
3. In case of a Joint Venture/Consortium, Payment will be made in the name of Joint Venture/Consortium only. However, on combined request by all members of JV/Consortium, payments can be made to Individual JV/Consortium members with approval of the Employer.
4. The sums of amounts shown in a Schedule Nos. 1, 2, 3, 4 & 5 are the amounts that are to be carried forward to the Grand Summary at Schedule No. 6. For Schedules that involve payment in foreign currency, the division of the respective Schedule amounts between INR, JPY, USD and Euro shall be shown in the said Summary.
5. The scope and extent of the Facilities are to be ascertained by reference to the Contract documents as a whole and shall not be limited in any manner whatsoever by the descriptions of the Schedules.
6. The maximum/ minimum amount or percentage of the total price that can be apportioned to Schedule Nos. 3 and 4 is indicated in the respective schedules.

b) Custom Clearance

The Contractor shall be solely responsible for Custom clearances (including any other related activities) of all items that may be directly or indirectly required for execution of this Contract.



Schedules of Rates and Prices

Schedule No. 1: Pit Jacks, Mobile Jacks, Turn Tables, to be supplied from abroad (on DDP basis)

Item	Description	Equipment	Unit	Quantity	INR		JPY		EURO		USD	
					Unit Rate	Amount	Unit Rate	Amount	Unit Rate	Amount	Unit Rate	Amount
1	Obtain the "Notice of No Objection" or "Notice of No Objection Subject to --" from the Project Manager as per Employer's Requirement (detailed in Part 2) after completion of all the following: <ul style="list-style-type: none"> • Issue of Inspection Certificate on satisfactory completion of all Factory Acceptance Tests; • Marine Insurance; • Documents for shipment to Indian Port; • Dispatch of Equipment from offshore factory and shipping port; 	A: Pit Jacks	Set	01								
		B: Mobile Jacks	Set	01								



	<ul style="list-style-type: none"> • Transit insurance from Port in India to Depot Site in Mumbai; and • Completion of shipping to port in India, custom clearance at port in India, Inland transportation in India, delivery of Plant and its unloading at MMRC Depot site, Mumbai in good condition; 	C:Turn Tables	Nos	04								
2	Mandatory Spares - (Details to be given as per Appendix- A1)	A: Pit Jacks										
	Total (to be carried to Schedule No. 6 Grand Summary)	B: Mobile Jacks C:Turn Tables										

Note:



- Only items to be supplied from abroad are to be quoted in this statement. If an item is to be supplied from within the country, its to be quoted in Schedule No.2.

Country of Origin Declaration Form

Item	Description	Code	Country



Schedule No. 2: Pit Jacks, Mobile Jacks & Turn Tables to be supplied within the Employer's country (on FOR basis).

Item	Description	Equipment	Unit	Quantity	INR	
					Unit Rate	Amount
1	Obtain the "Notice of No Objection" or "Notice of No Objection Subject to ---" from the Project Manager as per Employer's Requirement (detailed in Part 2) after completion of all the following: <ul style="list-style-type: none"> • Issue of Inspection Certificate on satisfactory completion of all Factory Acceptance Tests ; • Transit Insurance; • Despatch Documents; • Despatch of Plant from onshore factory; • Inland transportation in India, delivery of Plant and its unloading at MMRC Depot site, Mumbai in good condition; 	A: Pit Jacks	Set	01		
		B: Mobile Jacks	Set	01		
		C: Turn Tables	Nos	04		
2	Mandatory Spares -- (Details to be given as per Appendix- A1)	A: Pit Jacks				
		B: Mobile Jacks				
		C: Turn Tables				
Total (to be carried to Schedule No. 6 Grand Summary)						
Name of the Bidder						
Signature of the Bidder						

Note:

- Only items to be supplied from within the country are to be quoted in this Schedule no. 2 . If an item is to be supplied from abroad, its to be quoted in Schedule No.1.



Schedule No 3: Design Services: Pit Jacks, Mobile Jacks & Turn Tables

Item	Description	Equipment	Amount			
			INR	JPY	EURO	USD
1	Obtain the "Notice of No Objection" or "Notice of No objection Subject to ---" from the Project Manager as per Employer's Requirement (detailed in Part 2) for: This includes but is not limited to the submission of : <ul style="list-style-type: none"> • Work Programme; • Quality Plan • Safety Plan • RAMS Plan • Inspection & Testing Plan • Preliminary design and Final Design drawings; • 3-D Revit model (BIM model) • Liaison with other Designated Contractors during design. 	A: Pit Jacks				
		B: Mobile Jacks				
		C: Turn Tables				
	Total (to be carried to Schedule No. 6 Grand Summary)					
		Name of the Bidder				
		Signature of the Bidder				

Notes:

- Quantities listed above are tentative based on the conceptual design. This Contract is a lump sum design-build Contract and the final quantities will be submitted by the Contractor based on his detailed design subject to the approval of the Project Manager/Employer. No variation, whether positive or negative, will be considered in the lump sum price unless the scope of work stated in the Employer's Requirements is changed by the Employer.
- The total amount quoted in Schedule No. 3 shall be $\leq 10\%$ of the Grand Summary (sum of prices quoted in Schedule Nos. 1 to 4) of the respective equipment.



Schedule No. 4: Installation, Testing & Commissioning, and Other Services - Pit Jacks, Mobile Jacks & Turn Tables

Item	Description	Equipment	Unit	Quantity	INR Amount	JPY Amount	USD Amount	EURO Amount
1	<p>Obtain the "Notice of No Objection" or "Notice of No Objection Subject to ---" from the Project Manager as per Employer's Requirement (detailed in Part 2) for:</p> <p>This includes but is not limited to:</p> <ul style="list-style-type: none"> • Installation of Plant, obtaining certificate of satisfactory completion of functional tests and running of Plant in the Depot. • Completion of Commissioning including Guarantee Testing in the Depot; • Instrumentation Tests, trials; • Obtaining of Sanction of Statutory Authorities (if applicable). • Submission of "as built drawings" • Submission of Training Manual and O&M Manuals, • Completion of Training of Employer's O&M Staff at Site. • Submission of Spare Parts catalogue. • Supply of special tools, fixtures, gauges and Maintenance tool box equipped with all repair & maintenance tools. 	A: Pit Jacks	Set	01				
		B: Mobile Jacks	Set	01				
		C: Turn Tables	Nos	04				
	Total (to be carried to Schedule No. 6 Grand Summary)							
		Name of the Bidder						
		Signature of the Bidder						

NOTE:

- The total amount quoted in Schedule No. 4 shall not be less than 10% of the Total quoted price (sum of prices quoted in Schedule Nos. 1 to 4) for Pit Jacks.
- 5% of the Total quoted price (sum of prices quoted in Schedule Nos. 1 to 4) for Mobile Jacks.
- 5% of the Total quoted price (sum of prices quoted in Schedule Nos. 1 to 4) for Turn Tables.



Schedule No. 5: Provisional Sums -

DELETED

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MUMBAI METRO RAIL CORPORATION LTD. ★
MUMBAI

Schedule No. 6: Grand Summary- Pit Jacks, Mobile Jacks & Turn Tables

Schedule	Description	Amount INR	Amount JPY	Amount USD	Amount EURO
1	Plant and Mandatory Spares to be supplied from abroad				
2	Plant and Mandatory Spares to be supplied from within the Employer's country				
3	Design Services				
4	Installation, Testing & Commissioning and Other Services.				
5	Provisional Sums	-	-	-	-
	BID TOTAL				
	EQUIVALENT BID TOTAL (IN USD)				

EQUIVALENT BID TOTAL (In words): USD _____

	Name of the Bidder
Signature of the Bidder	



Notes:

- Payments for this Contract will be made in Indian Rupees, Japanese JPY and/or maximum two other international currencies (USD or EURO), if the Contractor so desires, or in a combination of all four currencies.
- The Bidder shall complete the equivalent Bid Total in USD in words above.
- For the conversion to USD/Euro/JPY for INR equivalent the date of exchange rate will be Base Date as mentioned in ITB 37.1. The rate for conversion shall be as published by Reserve Bank of India and if the rate is not published, the as per the website of www.xe.com
- Deviations are to be indicated in the Statement of Deviations, Section IV-A, Bidding Form 3. The price for unqualified withdrawal of the deviations shall be entered in Schedule No. 8 of the Price Schedule and the Employer shall add this price to the quoted price for the purpose of comparison of Bids to ascertain the lowest Bidder.



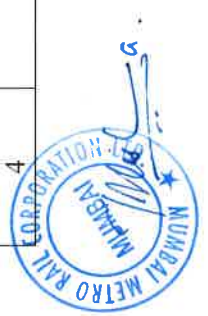
Appendix A

Details of Taxes/Duties/Levies, etc. included in The Bid Price

Sr. No.	Taxable Amount	Custom Duty		CGST		SGST		IGST		UGST		Any Other Tax/Levy/Cess etc		Total Amount of all Taxes/Duties /Levies/Cess etc
		Rate %	Amount	Rate %	Amount	Rate %	Amount	Rate %	Amount	Rate %	Amount	Rate %	Amount	
Schedule No. 1*														
1														
2														
3														
4														
5														
Total														
Schedule No. 2*														
1														
2														
3														
4														
5														
Total														
Schedule No. 3*														
1														
2														
3														



Sr. No.	Taxable Amount	Custom Duty		CGST		SGST		IGST		UGST		Any Other Tax/Levy/Cess etc		Total Amount of all Taxes/Duties /Levies/Cess etc
		Rate %	Amount	Rate %	Amount	Rate %	Amount	Rate %	Amount	Rate %	Amount	Rate %	Amount	
4														
5														
Total														
<u>Schedule No. 4*</u>														
1														
2														
3														
4														
5														
Total														
<u>Schedule No. 5*</u>														
1														
2														
3														
4														
5														
Total														
<u>Schedule No. 7*</u>														
1														
2														
3														
4														



Sr. No.	Taxable Amount	Custom Duty		CGST		SGST		IGST		UGST		Any Other Tax/Levy/Cess etc		Total Amount of all Taxes/Duties /Levies/Cess etc
		Rate %	Amount	Rate %	Amount	Rate %	Amount	Rate %	Amount	Rate %	Amount	Rate %	Amount	
5														
Total														
Schedule No. 8*														
1														
2														
3														
4														
5														
Total														
Grand Total														

*Please mention similar group of goods/services which attract same rate of tax under each schedule. Bidder shall add more rows wherever required.

Refer to Clause 1.2.3 of Section IV-B above and the Notes below for an explanation of the above table.

NOTES:

The Bidder is to give in his Bid offer, a breakdown of his fixed Lump Sum Price clearly detailing the following:

- Custom duty on offshore manufactured Plant/ Equipment, if any along with rate of Custom duty.
- GST (CGST/SGST/IGST/UGST, etc) (after availing relevant Credit) on completely assembled/manufactured Plant/ Equipment, if any along with rate of GST (CGST/SGST/IGST/UGST, etc).
- Custom duty on imported spares, special tools, etc.. along with rate of Custom duty.
- GST (CGST/SGST/IGST /UGST, etc) on Spares, Jigs, Fixtures, Special tools, Testing and Diagnostic Equipment etc. along with rate of



- GST (CGST/SGST/IGST/UGST, etc) on the completely assembled/manufactured Plant/ Equipment along with the rate of GST.
- GST (CGST/SGST/IGST/UGST, etc) on the indigenous finished Spares, Special tools and Testing Equipment etc. along with rate of GST.
- GST (CGST/SGST/IGST/UGST, etc) on works along with applicable rate.
- Any other tax/ levies/ Cess. etc. (If applicable)
- If the rates of taxes mentioned in above table is different from the actual applicable rates, then the actual applicable rates will be considered for variation purpose only, however no change in Bid prices quoted in different schedules shall be considered.

Name of the Bidder	
Signature of the Bidder	



**Schedule No. 7: Recommended Spare Parts-
 (Including Operational Spares, Consumables, Lubricants, Unit Exchange Spares and Special Tools) - Separately for Pit Jacks, Mobile Jacks &
 Turn Tables**

Item	Description	Code	Qty	INR		JPY		USD		EURO	
				Unit Rate	Amount	Unit Rate	Amount	Unit Rate	Amount	Unit Rate	Amount
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
				Name of the Bidder							
				Signature of the Bidder							



date to which it will be allocated. The 'Lump Sum Price' quoted by the Bidder in 'BID TOTAL' in Grand Summary (Schedule No. 6) shall not include the Price for withdrawal of remark, comment, condition, qualifications or deviation, etc. quoted in this Schedule 8. However, the Employer shall adjust the Bid Price by taking into consideration the nonmaterial nonconformities to evaluate the Bid Price (for comparison purpose only) of the Technical Bids which are substantially responsive.

- In case price for unqualified withdrawal of any remark, comment, condition, qualification or deviation, etc. indicated in Statement of Nonmaterial Deviations, Section IV-A, Bid Form 3 is not quoted in Schedule No. 8, it shall be considered that the remark, comment, condition, qualification or deviation is unconditionally withdrawn without any financial implication. However, Employer at its sole discretion and option may assess the financial implication of the said remark, comment, condition, qualification or deviation, etc. based on best engineering principles and concepts, which shall be binding on the bidder, and the same may be considered by Employer for financial evaluation.



Appendix A1: Mandatory Spares

A: Pit Jacks

S No.	Description	Unit	Qty.	Unit Rate				Amount					
				INR	JPY	USD	EURO	INR	JPY	USD	EURO		
1	Bogie Hoist motor	Nos	2										
2	Body Hoist motor	Nos	2										
3	Drive gear box	Nos	2										
4	Set of motor protection relay & contactors	Sets	4										
5	Set of limit & proximity switches	Sets	4										
6	PLC module (Programmed) of all types for one control panel.	Sets	4										
7	Set of carrying, supporting & safety nuts	Sets	8										
8	Set of thrust bearings	Sets	8										
9	Inverter (Programmed)	Nos	4										
10	HMI (Human Machine Interface)	No	1										
Total Amount (to be carried forward to Schedule No 1 and/or Schedule No 2)													

Note: "Set" is defined as set of one number complete with all associated components to meet the functional requirement.

- Only items to be supplied from abroad are to be carried forward to in Schedule No.1. If an item is to be supplied from within the country, its to be carried forward to in Schedule No.2.



B: Mobile Jacks

S No.	Description	Unit	Qty.	Unit Rate				Amount					
				INR	JPY	USD	EURO	INR	JPY	USD	EURO		
1	Load nut of cast Bronze	Nos	2										
2	Safety nut of Cast Bronze	Nos	2										
3	PLC module (Programmed) complete set for one control panel	Set	1										
4	Drive motors	Nos	2										
5	Brakes	Sets	2										
6	Main Screw Protection Bellows	Nos	12										
Total Amount (to be carried forward to Schedule No 1 and/or Schedule No 2)													

Note: "Set" is defined as set of one number complete with all associated components to meet the functional requirement.

- Only items to be supplied from abroad are to be carried forward to Schedule No.1. If an item is to be supplied from within the country, its to be carried forward to Schedule No.2.



C: Turn Tables

S No.	Description	Unit	Qty.	Unit Rate				Amount					
				INR	JPY	USD	EURO	INR	JPY	USD	EURO		
1	Castor Rollers	Nos	4										
2	Centre Bearing	No	1										
3	Locking Device	No	1										
4	Operating Lever	No	1										
5	Wheel Stopper	Nos	4										
Total Amount (to be carried forward to Schedule No 1 and/or Schedule No 2)													

Note:

- Only items to be supplied from abroad are to be carried forward to Schedule No.1. If an item is to be supplied from within the country, its to be carried forward to Schedule No.2.



----- End -----

BIDDING DOCUMENTS



MUMBAI METRO LINE 3 (COLABA-BANDRA-SEEPZ)

CONTRACT MM3-CBS-DEQ-9-05

Design, Manufacture, Supply, Installation, Testing & Commissioning of

- A) Synchronized Under Floor Lifting System
 - B) Synchronized Mobile Lifting Jacks, and
 - C) Bogie Turn Tables
- for Project "Mumbai Metro Line-3"

Part 1

Bidding Procedures

Section V

Eligible Source Countries of Japanese ODA Loans

August - 2019

Mumbai Metro Rail Corporation Ltd
MMRCL Line 3 Transit Office,
Wing A, Block E,
Bandra-Kurla Complex,
Bandra (East), Mumbai- 400 051, India.



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Bidding Documents

Composition of Documents

Part 1	Bidding Procedures
Section I	Instructions to Bidders
Section II	Bid Data Sheet
Section III	Evaluation and Qualification Criteria
Section IV-A	Bidding Forms
Section IV-B	Pricing Document
Section V	Eligible Source Countries of Japanese ODA Loans
Part 2	Employer's Requirements
Section VI-A	Employer's Requirements – General Specifications
Section VI-B	Employer's Requirements – Technical Specifications
Part 3	Conditions of Contract and Contract Forms
Section VII	General Conditions of Contract (GC)
Section VIII	Particular Conditions of Contract (PC)
Section IX	Contract Forms
Part 4	Drawings
Section X	List of Drawings



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Section V. Eligible Source Countries of Japanese ODA Loans

[All countries and Areas]

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BIDDING DOCUMENTS



MUMBAI METRO LINE 3 (COLABA-BANDRA-SEEPZ)

CONTRACT MM3-CBS-DEQ-9-05

Design, Manufacture, Supply, Installation, Testing & Commissioning of

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- for Project "Mumbai Metro Line-3"

PART 2 EMPLOYER'S REQUIREMENTS

Section VI-A General Specifications
Section VI-B Technical Specifications

August - 2019

**Mumbai Metro Rail Corporation Ltd
MMRC Line 3 Transit Office,
Wing 'A', 'E' Block,
Bandra-Kurla Complex,
Bandra (East), Mumbai 400 051, India**



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Section X	Drawings



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BIDDING DOCUMENTS



MUMBAI METRO LINE - 3 (COLABA-BANDRA-SEEPZ)

CONTRACT MM3-CBS-DEQ-9-05

Design, Manufacture, Supply, Installation, Testing & Commissioning of

- A) Synchronized Under Floor Lifting System
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- C) Bogie Turn Tables

for Project "Mumbai Metro Line-3"

Part 2

Employer's Requirements

Section VI-A

General Specifications

August – 2019

Mumbai Metro Rail Corporation Ltd

MMRC Line 3 Transit Office,

Wing A, Block E,

Bandra-Kurla Complex,

Bandra (East), Mumbai- 400 051, India.



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CHAPTER 1

1 General Requirements

1.1 General

1.1.1 This Specification covers the general aspects of the Contract viz., description of the Works, Project Planning and Progress Monitoring, Management Plans, Interface Management, Document Submission, etc. amongst some other aspects. This General Specification shall be read in conjunction with Technical Specification, Section VI-B, Part 2 along with drawings and other Contract documents in Part 1 and Part 3.

1.1.2 Application of the General Specification (GS)

The provisions contained in the Technical Specifications and the Employer's Drawings shall prevail over the provisions contained in the General Specifications. These shall be read in conjunction with General Conditions of Contract (GC), Particular Conditions of Contract (PC), Technical Specifications, Instructions to Bidders and other Contract Documents.

1.1.3 Scope of Work:

The Scope of Work under this Contract covers Design, Manufacture, Supply, Installation, Testing & Commissioning of the Equipment as detailed in Bidding Documents with supply of associated accessories for Mumbai Metro Line 3 Depot at Aarey, Mumbai including training of Employer's Personnel for Operation & Maintenance of the Equipment as per the Contract requirements.

1.1.4 Abbreviations & Definitions:

The abbreviations used in this General Specifications are given in Table-1 below. Definitions of terms specifically used in this Section are also given in Appendix 2.

TABLE 1- ABBREVIATIONS

Abbreviation	Description
AMS	Asset Management System
BIM	Building Information Modelling
BS	British Standard
CAD	Computer Aided Design and Drafting
CD	Compact Disc
CNC	Computer Numerical Control
CPM	Critical Path Method
DDC	Details Design Consultants
EDMS	Employer's Data Management System
E&M	Electrical & Mechanical
EMC	Electro Magnetic Compatibility
EMI	Electro Magnetic Interference
ES	European Standard
FAT	Factory Acceptance Test
FOCS	Flexible Overhead Catenary System
GCIM	General Consultant Interface Manager (assigned by the PM)
GPRS	General Packet Radio Service
IMP	Interface Management Plan
IP	Ingress Protection



ITP	Inspection and Test Plans
IT	Information Technology
LAN	Local Area Network
LED	Light-Emitting Diode
NoNO	Notice of No Objection
OCC	Operational Control Center
OCS	Overhead Catenary System
OEM	Original Equipment Manufacturer
OHS&E	Operational Health, Safety & Environment
O&M	Operation and Maintenance
OS	Operation Software
OSR	Operational Safety Report
OSR-S	Operational Safety Report (Software)
PDM	Precedence Diagramming Method
PM	Project Manager
PSD	Platform Screen Door
QA	Quality Assurance
RE	Resident Engineer
RS	Rolling Stock
ROCS	Rigid Overhead Catenary System
SAT	Site Acceptance Test
SECP	Software Engineering Change Proposal
SI	International System (of Measurement)
STPT	Signaling, Train Control, PSD and Telecommunication

1.1.5 Submission for Notice of No Objection

Documents, drawings, specifications and any other matters which have been given Notice of No Objection by the Project Manager shall not be changed without further submission and review by the Project Manager.

1.2 Power Supply

Traction: 25 kV, AC, 50 Hz single-phase traction power supply shall consist of Flexible Overhead Catenary System (FOCS) in the in the Depot yard, at the ramp to the tunnel and at Aarey Station. Rigid Overhead Catenary System (ROCS) shall be provided in the complete underground portion of 32.5 kms from Seepz to Cuffe Parade of Mumbai Metro Line 3 project.

Non-traction: 415 V, AC, 50 Hz, 3 phase, 3 core connection power supply shall be available for non-traction purposes in the Depot for operations of the Equipment. The Contractor shall design the Equipment such that it is capable of giving guaranteed performance within $\pm 10\%$ of voltage fluctuations. The Equipment installed shall not cause unbalance to the supply.

1.3 Climatic Conditions

The equipment shall generally be required to work under the following climatic conditions:

Temperature

- a) Maximum temperature during summer : 45 degrees C
- b) Minimum temperature during winter : 8 degrees C
- Mean temperature : 33 degrees C



- d) Average daily range : 10 degrees C
- Rainfall**
- e) Average annual rainfall : 2200 mm
 - f) During monsoon months (Jun-Sept) : 1450 mm
 - g) Maximum rainfall : 900 mm per day
- Humidity**
- h) Maximum Relative humidity : 100 %
 - i) Wind Load : 150 kg/ m²
 - j) Water : Hard with high salt content

The above information shall be read as reference only. The Contractor shall check the prevailing climatic conditions from the websites (<http://www.wunderground.com>. or the Regional Meteorological Centre of Mumbai) and design the Equipment on the most severe conditions with allowance for further extreme conditions.

As per the experience in India, high level of IP protection is required in order to ensure equipment reliability under the dusty climatic conditions prevalent in Mumbai area. The Contractor shall also take into consideration the conditions in which the Facilities may be required to operate, for example, with restricted ventilation in the tunnel that may lead to higher local ambient temperatures, and any other factors that may affect the operating environment in any way.

1.4 Electromagnetic Compatibility (EMC)

Some equipment is expected to work in close proximity of other systems like OCS, Signaling and Telecommunications, etc. The equipment shall not generate electromagnetic disturbances above levels that are appropriate for their intended place of use. In addition, the equipment shall have an adequate level of immunity to electromagnetic disturbances so that it can operate correctly in its intended environment. The equipment shall comply to IEC 61000 standard for EMC.

1.5 Environmental Protection

1.5.1 The Contractor shall conform and comply with the various Indian Environmental Laws and codes as applicable relating to Environment Protection, Air Pollution, Water Pollution, Noise Pollution, Hazardous Waste Disposal, etc. These include, but not limited to, the latest version of the following:

- a) Environment Protection Act, 1986
- b) Air (Prevention and Control of Pollution) Act, 1981
- c) Water (Prevention and Control of Pollution) Act, 1974
- d) The Noise Pollution (Regulation & Control) Rules, 2000
- e) The Hazardous Waste (Management & Handling) Rules, 1989

1.6 Standards and Codes

1.6.1 Unless otherwise stated in the Contract, reference in this Section to International Standards, European Standards, British Standards, British Standard Codes of Practice, Indian Standards and similar standards shall mean the latest edition of the document stated in the Technical Specifications, Section VI-B.

1.6.2 Plant & Equipment, related equipment and software shall be in accordance with the requirements of the standards and codes specified in the Employer's Requirements - Technical Specification. The Contractor may propose an alternative equivalent international



- standard or deviation from the specified standards during the design stage. The Contractor shall, in such a case, apply for a 'Notice of No Objection' or 'Notice of No Objection subject to ...' from the Project Manager. The Contractor shall state the exact nature of the change, the reason for making the change and relevant specifications of the materials and equipment.
- 1.6.3 Where no standard is identifiable, the Contractor shall make a proposal, based on the best International practice, which shall be subject to review by the Project Manager.
- 1.6.4 During the preliminary design phase, the Contractor shall submit a consolidated list of all the standards that he intends to use for the design, manufacturing and testing and other phases of the Contract, for review of the Project Manager.
- 1.7 Units**
All drawings and design calculations submitted with the Bid, or in accordance with the requirements of the Contract, shall use SI units.

----- End of Chapter 1 -----



CHAPTER 2

2 Planning, Program and Progress Monitoring

2.1 Planning

- 2.1.1** The Contractor shall develop and provide programme which shall reflect the detailed planning undertaken and which shall be realistic and achievable.
- 2.1.2** Key dates (as defined in Appendix 1) and Milestones shall be an integral part of the programme.
- 2.1.3** The Contractor shall monitor his own and his sub-Contractors' performance to ensure compliance with his obligations under the Contract.
- 2.1.4** The submissions of the plans shall comply with the requirements as given in Appendix 7- list of deliverables by the Contractor.
- 2.1.5** All programme submissions shall, unless otherwise specified, conform to the level of details specified in Appendix 3.

2.2 Works Programme

- 2.2.1** The Contractor shall prepare and submit his Works Programme within 28 days of the Effective Date giving information on the sequence and duration of activities that shall be adopted to achieve Key Dates of the Contract. The Works Programme shall include all activities for all stages of the Works.
- 2.2.2** The Works Programme shall be divided into Sub-Programmes as follows:
- a) Design Submission Programme
 - b) Manufacturing and Testing Programme
 - c) Installation, Testing & Commissioning Programme
 - d) Training Programme and
 - e) Interface Management Programme
- 2.2.3** All programmes shall be prepared using CPM scheduling software Primavera Project Planner (P6) programme or MS Project of the latest version.
- 2.2.4** 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.
- 2.2.5** A standard Gregorian calendar shall be used for planning and execution of the Works. The programmes shall take in to consideration allowance for Public Holidays and non-work periods. If a Key Date falls on a Public Holiday (as declared by Government of Maharashtra) or a non-work day, it shall be effective the next working day.
- 2.2.6** All terminology, definitions and conventions shall be in accordance with BS 6079-2:2000 Project Management.

2.3 Design Submission Programme

- 2.3.1** The Contractor shall submit a Design Submission Programme to the Project Manager.
- 2.3.2** All submissions made by the Contractor shall be properly co-ordinated taking care of due allowance for the Project Manager's review process to be undertaken, including the time needed for any re-submissions.

2.4 Manufacturing, Testing & Delivery Programme

- 2.4.1** The Contractor shall submit his Manufacturing, Testing & Delivery Programme that shall be consistent with the overall Works Programme. This shall include details of each sub-



activity, viz. procurement of major items, manufacturing, testing, and delivery programme.

2.4.2 The Testing programme shall include Contractor's Quality Management System including details of

- a) First Article Inspection
- b) Quality Hold Points
- c) Quality Control Points
- d) Type Tests
- e) Routine Tests

2.5 Installation, Testing & Commissioning Programme

2.5.1 The Installation, Testing & Commissioning Programme shall be submitted and shall include details of each sub-activity, viz, Installation, Testing & Commissioning etc.

2.5.2 The Program shall include all tests for which a certificate shall be issued and shall include activities for preparation, submittal and review of test procedures.

2.6 Training Programme

2.6.1 The Contractor shall submit a Training Programme covering all proposed formal training courses and delivery of the training equipment.

2.7 Interface Management Program

2.7.1 An Interface Management Programme shall be developed in accordance with the interface requirements of the Contract.

2.8 IT Requirement of Employer

2.8.1 Employer is in the process of implementing an Enterprise wide cloud-based IT project titled "Integrated Project Management Platform". The IT project envisages following application stack:

- a) Planning, Progress, Performance reporting and Scheduling services using Primavera Project Planner (P6) program or MS Project convertible to .MPX or .XML of the latest version
- b) Collaborative Document Control and Management Services (using Proliance and Bentley Project Wise)
- c) 3D Modelling through Revit and clash detection through Navis Works (BIM solution)
- d) Enterprise wide ERP implementation

2.8.2 The effective use of such IT platform requires availability of web-based system at the Contractor's location with certain definite user's rights. Data uploading by Contractor's trained staff is key to effective implementation of the IT system. The Bidders are required to consider in their proposal the cost of IT staff for data uploading.

2.8.3 In view of the above, the Contractor shall be required to:

- a) Upload of drawings / designs created by the Contractor as per the classification and on the PMIS.
- b) Key Contract related communication and progress related data as per processes defined on PMIS.
- c) Provide 3D modeling in Revit (Compatible with BIM system) of the Facilities after finalization of the design for incorporation in the Depot BIM model. 3D model shall include foundation, trenches, cable ducts etc. associated with the Equipment. The Contractor shall obtain Project Manager's NoNO of the 3D Model.

2.8.4 Employer, his IT Project Team and IT Implementation Agency shall render necessary assistance to the Contractor, to comply the software system requirement.



2.9 Quarterly Progress Report

The Contractor shall prepare Progress reports, as detailed in Appendix 4, and shall regularly submit to the Project Manager, on a Quarterly basis.

2.10 Meetings

2.10.1 The Contractor or his representative shall participate in meetings as indicated below:

2.10.2 Initial Contract Meeting:

This meeting shall take place within fourteen (21) days of the issue of Letter of Acceptance. The agenda of the meeting shall include:

- a) Submission of guarantees, undertakings, insurance policies and certificates, etc.
- b) Planned activities for the first 30 and 60 days after Effective Date.
- c) Nominate the Point of contact for all short of coordination.

2.10.3 Interim meetings during the execution of the Contract:

The Project Manager shall convene interim meetings, as and when required and considered necessary by either the Project Manager or the Contractor, to sort out issues relating to progress, interface and any outstanding issues.

The Project Manager shall record minutes of all meetings and distribute them within seven (7) days of the meeting. The Meetings will be chaired by the Project Manager.

2.11 Review Periods for Contractor's Submissions

2.11.1 The Project Manager shall review those Contractor's program submissions which require his acceptance and shall signify his acceptance or otherwise within 14 days. The Contractor shall, when required by the Project Manager, re-submit its programs within 14 days of receipt of the Project Manager's comments.

2.11.2 The Project Manager will endeavour to review and respond to the Contractor on the adequacy and acceptability of the Contractor's submissions and re-submissions as soon as reasonably possible but the Contractor should always allow for a 14-day review period.

2.12 Failure to make Submissions

Failure of the Contractor to submit any program, or any required revisions thereto within the time limits stated shall be sufficient reason for certification that the Contractor is not performing the work required in a timely manner.

2.13 Project Calendar

2.13.1 Project Days shall be deemed to commence at 0001 hours on the morning of the day in question. Where reference is made to the completion of an activity or Milestone by a particular day, this shall mean by midnight of the day.

2.13.2 For Project purposes, the presentation shall be in "Day" units.

2.13.3 Quarterly periods shall be of 3 months duration and commencing from 1st January, 1st April, 1st July, and so on.

----- End of Chapter 2 -----



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CHAPTER 3

3.0 Management Plans

3.1 General

3.1.1 List of Plans: In order to ensure satisfactory execution of the Contract, completion of works within specified targets, and quality in design, manufacturing and execution of work, following Management Plans shall be developed during execution of the Contract. These Plans shall be developed and submitted by the Contractor for Project Manager's review and issue of Notice of No Objection by the PM:

- a) Project Management Plan
- b) Phase 1 plans shall cover 'Interface Management Plan', 'Design Plan' 'Quality Plan', 'RAM Plan' and 'Site Safety Plan', and
- c) Phase 2 plans shall cover 'Manufacturing, Testing & Delivery Plan', 'Installation, Testing & Commissioning Plan', 'Training Plan' 'O&M Plan', and 'Defects Liability Plan'.

The plans shall collectively define and describe the Contractor's proposed methods and procedures to meet the requirements of the Technical Specification. The submissions of the plans shall comply with the requirements as given in Appendix 7- list of deliverables by the Contractor.

3.2 Project Management Plan

3.2.1 The Contractor shall submit a Project Management Plan which shall provide the following information:

- a) The names, qualifications, experience and positions of key personnel as described in Section III, Clause 1.1.1.
- b) The Contractor shall nominate a suitably qualified and experienced English-speaking Project Manager from his staff to be the Contractor's Equipment Project Manager. The nominee shall be subject to acceptance of the Project Manager.
- c) To fulfil the Contractor's obligations during the Installation, Testing & Commissioning period, the Contractor shall nominate experienced Site Engineer and organize deployment before undertaking Installation, Testing & Commissioning in the Depot.
- d) The Equipment Project Manager shall nominate a suitable experienced Maintenance Engineer for all maintenance work of the Equipment during DLP. The Maintenance Engineer shall coordinate with the Employer's nominated representative and provide guidance as may be required to carry out the scheduled and un-scheduled maintenance activities from time to time.

3.3 Interface Management Plan

3.3.1 The Contractor shall nominate a suitably qualified and experienced Engineer to be the Contractor's Interfacing Manager. He shall develop the Interface Management plan in accordance with the requirements of Chapter 4 of the Employer's Requirements-General Specification. He shall carry out the interfacing work with system wide Contractors and Depot Civil Contractor.

3.4 Design Plan

The Contractor shall submit the Equipment Design report including the following details



and in accordance with the quality requirement stated in Chapter 6.

- Design criteria;
- Functions of each system, sub-system, equipment or other element within the overall design,
- Incorporate the Project Manager's suggestions and changes based on the Technical Specification and/or operational requirements.

3.4.2 The Contractor shall develop Preliminary design and later Final Design of the equipment and its related foundation (wherever applicable) with following details

- a) calculations and analyses are complete;
- b) all main and other significant elements are delineated;
- c) Interfaces with those of Interfacing Contractors of the Employer shall be incorporated at this stage
- d) Software design and development if applicable shall also be carried out at this stage
- e) all other work, including studies, investigations and reports are complete.
- f) Manufacturing of the Equipment will be allowed to commence production only after receiving 'Notice of No Objection' from the Project Manager.

3.2 **Installation Design:** Installation details shall be given in this stage. Installation work on Site will only be allowed to commence after receiving Notice of No Objection from the Project Manager.

3.5 Quality Plan

3.5.1 The Contractor shall submit a Quality Plan in accordance with the requirements of Chapter 6. It shall contain sufficient information to demonstrate clearly the proposed method of achieving the Contractor's Quality objectives in compliance to the requirements the Contract.

3.5.2 The Plan shall be based on acceptable International Standards (such as ISO 9001/2015 "Model for Quality Assurance in Design Development, Production, Installation and Servicing" or other relevant standards). The Quality Plan shall embrace all activities of Contractors and sub-Contractors including its suppliers and shall include design, manufacturing, sub-Contracting, tests and inspection, installation, commissioning and maintenance activities as also the Quality Audits. The Quality Plan shall indicate the following:

- a) all quality assurance and quality control procedures proposed by the Contractor for its use in the execution of the Works;
- b) a list of all the Codes of Practice, Standards and Specifications that the Contractor proposes to apply to its work;
- c) a statement detailing the records that the Contractor proposes to keep, the time during which they will be prepared and the subsequent period and manner in which they will be stored;
- d) The plans shall identify the level of inspection required, Quality Control Points and Quality Hold Points.

3.6 RAMS Plan

3.6.1 The Contractor shall implement a RAMS Plan in accordance with the Employer's Requirements, General Specifications, Part 2, Section VI-A, Technical Specifications, Section VI-B, and EN 50126.

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



3.7 Site Safety Plan

3.7.1 The Contractor shall submit a Site Safety Plan which shall be prepared as per the requirements of Clause 15.4, Chapter 15, Section VI-A.

3.8 Manufacturing, Testing and Delivery Plan:

3.8.1 The Contractor shall prepare Manufacturing, Testing and Delivery Plan in accordance with the Key Dates of the Contract. This shall identify

- a) The interfacing or co-ordination required with the Contractor's other related plans,
- b) The purchasing of components/ sub-assemblies ensuring that they comply with the requirements of the Specifications.
- c) Inspection and Testing plan of incoming materials
- d) Review of non-conforming material
- e) The handling, storage, packaging, preservation and delivery of manufactured products.
- f) Manufacturing Testing Plan to manage and control any test and inspection activities prior to Factory Acceptance Test.
- g) Factory Acceptance Test Plan: The Contractor shall submit a comprehensive plan for the Factory Acceptance tests. This shall describe as to how the Contractor will plan, perform and document all inspections and tests that will be conducted to verify and validate the Works prior to the delivery at Site. This shall also include details of Type tests, Routine Tests and any other tests constituting the Factory Acceptance Tests. This shall also include details of Type tests, Routine Tests and any other tests constituting the Factory Acceptance Tests.

3.8.2 Once the Factory Acceptance Test is completed to the satisfaction of the Project Manager/Employer, a Notice of No Objection shall be given for shipment/ delivery to the Site.

3.9 Software Quality Assurance Plan

3.9.1 Where software is a design deliverable, the Contractor shall submit a Software Quality Assurance Plan in accordance with the requirements of Chapter 7. This Plan shall address all elements of the design and development of software required as part of the Works.

3.10 Installation, Testing & Commissioning Plan:

3.10.1 The Contractor shall submit the Installation, Testing & Commissioning Plan in accordance with the requirements of Chapter 9.

3.10.2 This plan shall also include details on

- a) Guarantee Testing & Commissioning Plan.
- b) Service trial, Blank operation and performance checking is a part of Testing & Commissioning Plan.

3.11 Training Plan:

3.11.1 The Contractor shall prepare Training Plan in accordance with the requirements of Chapter 11.

3.12 Operation and Maintenance Plan:

3.12.1 The Contractor shall develop an Operation and Maintenance Plan to ensure timely commissioning of the Works and for timely preparation of Contractor's Operation and Maintenance Manuals and the 'As-Built' drawings. The plan shall be updated during the maintenance period, as needed.



3.13 Defects Liability Plan:

- 3.13.1 The Contractor shall submit a Defects Liability Plan which shall describe Contractor's methodologies to demonstrate management of effective working of the Equipment during Defect Liability Period including management of spares required during this period.

----- **End of Chapter 3** -----



CHAPTER 4

4. Interface Management

4.1 General

4.1.1 The Contractor shall interface the Design, Manufacture, Supply, Installation and Commissioning, covering with that of other Contractors, principally the Contractors for the Interfacing Contracts. The Contractor shall keep the Project Manager fully informed in respect of such interfaces, such information being given to the Project Manager in a timely manner ensuring that the work of the Contractor, Interfacing Contractor and other Contractors is carried out as per the Key Dates.

4.1.2 The Equipment Project Manager will nominate a suitable person as Interface Manager who shall assume the primary role as Contractual focal-point between the various Interfacing Contractors and the Project Manager. The Interface Manager and other Interfacing Contractors shall advise the Project Manager, in advance, the dates for which it needs design interface information, manufacture interface information, supply of equipment, testing and commissioning from the other Interfacing Contractor's so that work is not delayed.

4.1.3 Major Interfacing Contractors for Equipment Contractor are (wherever applicable):

- a) Depot Civil Contractor
- b) Power Supply Contractor
- c) Depot E&M Contractor
- d) Rolling Stock Contractor
- e) Track Contractor
- f) OCS Contractor
- g) STPT Contractor

4.1.4 Other Contractors

Besides above there are several other Contractors who may need the information regarding the design features and other parameters of the Equipment(s). Their Contracts shall have the provisions to interface directly with Equipment Contractor for the exchange of information. Equipment Contractor shall do the required interface with them as and when required.

4.1.5 The Contractor shall at all times use his best endeavors to resolve all interfaces applicable to the Contract and shall be proactive in seeking out interface issues and their solutions.

4.2 Contractor's Co-ordination Responsibilities

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

4.2.2 The Master Interface Matrix (MIM), enclosed in Appendix 5, assigns the Contractor which has been designated as the Lead Party(s) for each interfacing Contractor. PM may update the MIM at any time to include additional Interfacing Contractors, and the Contractor's lump sum price shall be deemed to include any such additional works related to interfacing.

4.2.3 The lead Interfacing Contractor shall be responsible for administering, monitoring, managing, supervising and resolving all interface issues between all Interfacing Contractors.

4.2.4 In a situation where either the Lead Contract or the Interfacing Contract is yet to be awarded, the required co-ordination with the awarded Contract shall be done by the PM, with the express understanding that there may be changes as and when the other Contracts are

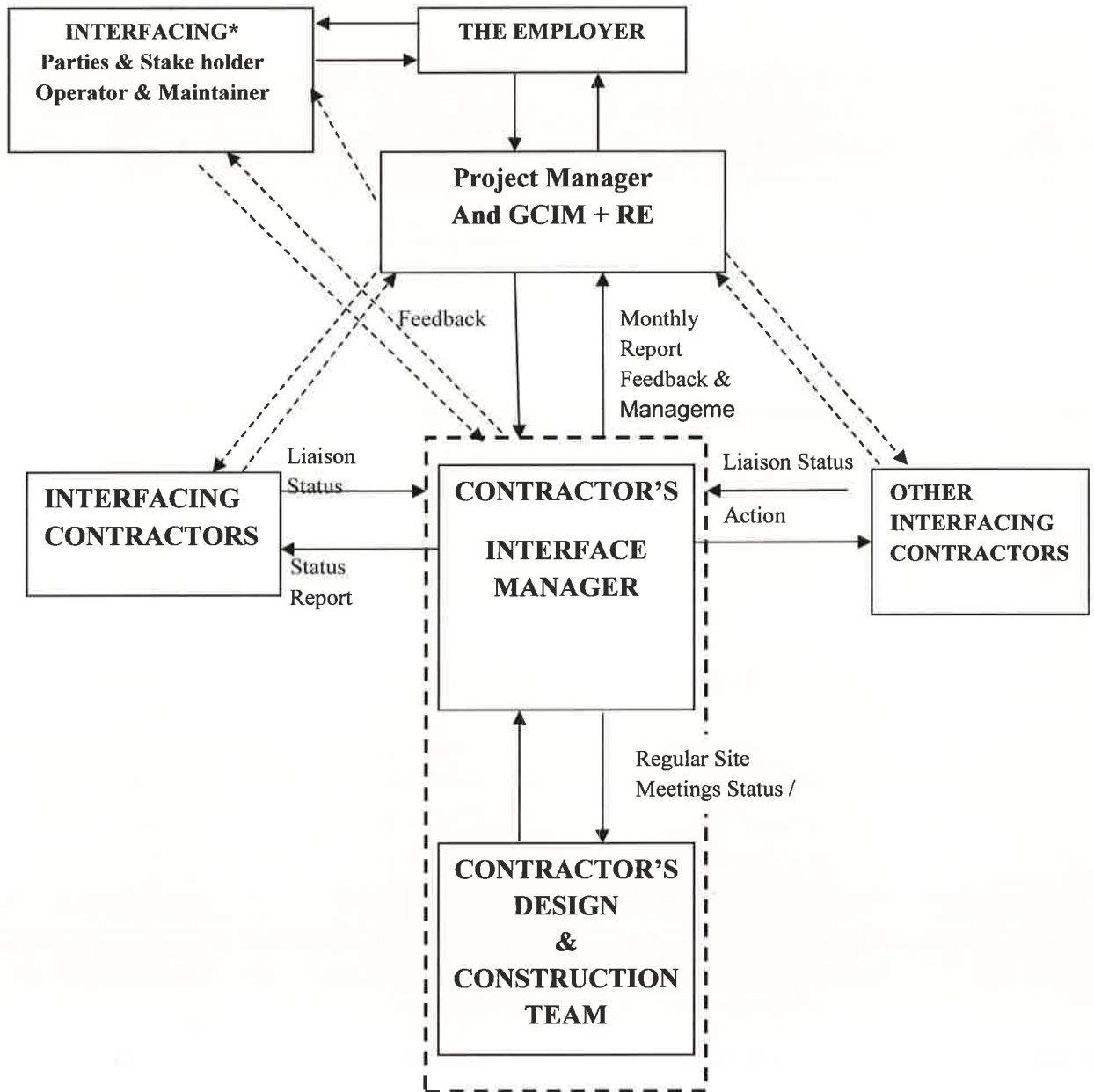


awarded.

4.2.5 The Contractor shall ensure that all the Interface requirements are included in his Interface Management Plan. Figure 1 gives a schematic presentation of the Interface Communication and Co-ordination processes between the various role-players in the Project.

Contractor's Organisation

Figure 1 – Interface Communication and Co-ordination Model



4.3 Interface Responsibilities

- 4.3.1 The interface responsibilities for Design, Manufacture, Supply, Installation, Testing & Commissioning including the Integrated Testing and Commissioning are tabulated, interface Contractor-wise, in Appendix 5.
- 4.3.2 This Appendix shall be read in conjunction with the relevant clauses of the Employer's Requirements including General Specifications and Technical Specifications. The Equipment Contractor shall be responsible for ensuring that all requirements of the specifications pertaining to interfaces are satisfied.
- 4.3.3 The requirements specified herein are by no means exhaustive and it remains the Contractor's responsibility to develop and execute jointly an Interface Plan after the commencement of the works and throughout the execution of works, to ensure that:
- all interfacing issues between the two Contractors are satisfactorily resolved;
 - supply, installation and testing of equipment and software are fully coordinated; and
 - that all equipment supplied under the Contracts are fully compatible with each other, whilst meeting the requirements of the respective Specifications.
- 4.3.4 The Interface Management Plan (IMP) shall be submitted to Project Manager for review and comments. Project Manager will play a lead role in ensuring that the Interfacing Contractors perform in a timely and cooperative manner.
- 4.3.5 The IMP shall be updated by the Contractor, as and when needed, and submitted to the Project Manager. Should it appear to Project Manager that the progress of the Works does not conform with the IMP, the Contractor shall be required to revise all such programs and plans such that they do reflect that the progress of the Works is mutually consistent and conforms to other provisions of the Contract.
- 4.3.6 The Contractor shall review the details of interface works and notify the Project Manager of any amendments to the interface sheets required in the process of its works. Unless such requests are reviewed without objection by the Project Manager, the Equipment Contractor shall design and construct the works in accordance with the provisions outlined in this the attached interface sheets.

4.4 Interfacing Functions

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

- Preparing the Interface Management Plan and subsequent procedures;
- Preparing their Interface Co-ordination Sheets (ICS) and Interface Specifications and issuing same to the relevant Interface Contractors and PM;
- Co-ordinating with the relevant Interface Contractors to establish coordinated Combined Services Drawings (CSD) & Structural, Electrical and Mechanical (SEM) Drawings;
- Updating their ICS from time to time and submit the same to the PM for review.

4.5 Scope of Work of Interface Management Plan

- 4.5.1 The information and scope of works to be provided by the Equipment Contractor include but may not necessarily be limited to those outlined in the attached interface sheets.
- 4.5.2 The Interfacing Contractors shall liaison with the Equipment Contractor in the Design, Installation, Commissioning, Testing and Acceptance of the Equipment Works.
- 4.5.3 The Contractor shall provide all access and attendance necessary in accordance with the Contract requirements to enable the Interfacing Contractors to complete those activities



defined under the interface sheets attached to this interface specification in a timely manner.

- 4.5.4 Where Equipment Contractor works are identified as failing to meet the requirements of the Contract and which will impact the Interfacing Contractor's works, the Equipment Contractor shall submit the proposed remedial measures to the Project Manager for review and shall copy the same to the Interfacing Contractors.

4.6 Interface with Asset Management System (AMS) Contractor

- 4.6.1 The Employer has plans to implement state-of-the-art IT-based Asset Management System (AMS), which shall enable it to manage and optimize various processes (viz. maintenance management, engineering management, O&M relationship management, supply chain management, reporting, etc.)

- 4.6.2 The Equipment Contractor shall be required to coordinate and interface with AMS Contractor for successful integration of Assets into the Asset Management System.

- 4.6.3 The Equipment to the required levels of breakdown shall be entered into the AMS.

- 4.6.4 The Equipment data shall be fed into the AMS broadly in three forms:

- (a) Predetermined set of active failure rules shall be transmitted to OCC. AMS shall be able to take in this data for processing.
- (b) Data shall be downloaded from Control Console of the Equipment through GPRS or WLAN at predetermined intervals or locations. AMS shall be capable of interfacing with the concerned database and take in filtered data as per design.
- (c) Other data will be fed manually in the AMS.

- 4.6.5 Preventive and corrective maintenance data generated by the Control Console of each Equipment to be captured to raise the work request /work orders, and to update the equipment data.

- 4.6.6 The point of interface to the AMS will be the AMS depot (or other location) rack via Ethernet LAN connectivity.

4.7 Interface with Depot Detailed Design Consultants and Construction Contractor(s)

- 4.7.1 The Project Manager with experience and help of Detail Design Consultants (DDC) will design the facilities in depots and workshops. This interface is to improve it further to meet the requirements.

- 4.7.2 In order to perform the work, the Contractor will be required to communicate directly with Project Manager. The Project Manager will record the details of all these meetings, and provide a copy to Project Manager. The Contractor will also give the notice for meetings with sufficient time to enable Project Manager to attend these meetings.

- 4.7.3 Project Manager will provide the Contractor with authorization; assistance and the support of its own personnel should the Contractor request Project Manager to intervene on its behalf with such meetings.

4.8 Interface between Equipment Contractor and Other Contractors:

- 4.8.1 Besides above there are several Interfacing Contractors who would need the information regarding the design features and other parameters of the Equipment.

- 4.8.2 Their Contracts shall have the provisions to interface directly with the Equipment Contractor for the exchange of information.

- 4.8.3 The details of these Contracts and Contractors will be made available during the execution of the Contract.

----- End of Chapter 4 -----



CHAPTER 5

5. Document Submission

5.1 General

5.1.1 Copies of correspondence relevant to the execution of the Works and not of a confidential nature received from or dispatched to Government departments, utility undertakings and Project Contractors employed by the Employer shall be submitted to the PM for information as soon as possible and in any case not later than 3 days after issuing date of the document.

The Contractor shall supply for the PM's information, comment and notice of no objection all documentation required for the procurement, design, manufacture, certification, testing, installation, training, maintenance and operation of the Works.

5.1.2 All submissions shall be made to the PM in a format which has Notice of No Objection by the PM and in accordance with the requirements in:

- a) the Contract;
- b) the Drafting and CAD Standards -Appendix 6, Drafting and CAD Standards and
- c) Unless otherwise stated herein all documents shall, as a minimum, be produced in accordance with the following requirements:
 - i) All documentation shall be submitted in the English language using SI Units
 - ii) All documentation presented as print material shall use paper of suitable quality for a retention time under conditions of normal usage and storage for a minimum period of 10 years without deterioration or fading.
 - iii) Documentation provided on DVD, electronic media shall allow archiving, storage, retrieval, amendment and printing out.
 - iv) All documentation shall be produced with a suitable indexing and document numbering system to be agreed with the Employer and compatible with Employer's Data Management System (EDMS).

5.1.3 All designs specifically produced for this Contract shall become the property of the Employer and shall be clearly identified as such on all documents.

5.1.4 Drawing Practice and Symbols:

- a) Except as otherwise agreed with the Employer, documentation shall be produced by the Contractor in the following sizes in accordance with BS /EN / ISO 5457:
 - i) Drawings sizes shall generally be A1, A2 or A3. All drawings shall be capable of being photo reduced in a legible form to A3 size, sketches may be submitted in A4 size.
 - ii) Other documents shall be A3 or A4 size with associated drawings within the document provided as A3 sized documents, for A4 sized documents associated drawings shall be A4 or A3 folded to A4.
- b) Graphical symbols shall follow established international conventions and standards such as IEC 60417 and ISO 7000.
- c) Documentation shall conform to standards such as BS8888, 'Technical Product Specification', and current version.
- d) Drawings shall be fully labelled with cross-referencing data between drawing sheets, where necessary, to permit ease of use.



5.1.5 Document format:

- a) The Contractor shall use suitable, compatible, industry standard software packages in the preparation of documentation for submission to the PM.
- b) The following software which shall be compatible with the Employer's Requirement and also with Intel-Windows based computers shall be used, unless otherwise stated, for the various electronic submissions required:
 - Text Documents MS Word
 - Spread Sheets MS Excel
 - Data Base Files MS Access
 - Presentation Files MS Power Point
 - Programs Primavera P6 or MS Project
 - Drawings Auto CAD
 - Photographic Files Adobe Photo Shop
 - Project Management MS Project

5.1.6 The objective of the design submission process is to ensure that the proposed resulting works comply with the specifications, are capable of being produced consistently to exacting quality standards and can be operated safely to the satisfaction of the Project Manager.

5.1.7 The design submissions include Design Calculations, Design Reports and Design Drawings.

5.1.8 In the event that a statutory body (e.g. Government of India Ministry of Railways, Research, Design, Standards Organization (RDSO), Commissioner of Railway Safety, etc.) requires design information in a particular format, it shall be incumbent upon the Contractor to provide the same, as directed by the Project Manager.

5.2 Review of Data

5.2.1 As soon as practicable after the Award of the Contract, the Contractor shall review all applicable data, criteria, standards, directives and information provided to him as the basis for design. Any apparent inconsistencies or erroneous information shall be brought to the attention of the Project Manager. Such information shall not alleviate the Contractor from its responsibilities under the Contract.

5.3 Format of Deliverables

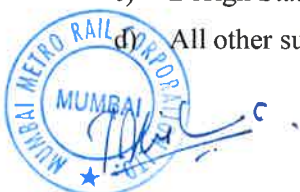
5.3.1 Drawings and CAD data shall comply with the requirements of Appendix 6 of this General Specification: Drawing and CAD Standards. Reports, calculations, specifications, technical data and similar documents shall be provided in A4 format, and one of the copies shall be ring bound to facilitate photocopying. A3 size drawings included in documents shall be folded to A4 size.

5.4 Number of Copies

The following quantities of drawings and other documents shall be submitted to the Project Manager, including preliminary, pre-final, and final design submissions, the final Contract document, and all other submissions. These drawings and documents are in addition to those required for the exchange of information between Interfacing Contractors and other submissions to statutory, governmental and local authorities.

- a) Full size Paper drawings (folded and collated)- 4 sets
- b) Design documents and calculations- 3 sets.
- c) Design Status Report and Design Statement- 3 sets.

d) All other submissions- 3 sets.



- e) Each of the above in electronic format.

5.5 Document Notification Codes

5.5.1 Each document submitted by the Contractor shall use Document Submission Cover sheet or have an Acceptance Block with a minimum size of 100 mm x 75 mm which shall be located as detailed below:

- a) For Documents in the center of the front page
- b) For Drawings in the lower right-hand side of the front sheet
- c) With a space for the Notice of No Objection Signature of the PM together with his Name and Date of signature.

5.6 Project Manager's Review

The PM will respond to the Contractor by issuing a Document Submission Report (DSR) indicating notification in one of the following three ways:

DRAWING/DOCUMENT SUBMISSION REPORT			
CODE	STATUS		COMMENT
'A'	Objection		Complete re-submission required
'B'	No Objection with comments		Incorporate All Comments - & re-submit Documents
'C'	No Objection		Notice of No Objection
Signature:		Print Name:	Date:

- a) Issue of a Notice of "No Objection", status code 'C', entitles the Contractor to proceed to the next stage of the programme of work. Receipt of such notice of no objection does not in any way remove any responsibility from the Contractor for complying with the Contract.
- b) If the PM discovers minor non-compliance, discrepancies, omissions, etc. that, in his opinion, are not of a fundamental nature, he will return the completed Document Submission Report (DSR) – Status Sheet with the status code 'B' checked as 'No Objection with comments' with a Document Submission Report (DSR) – Comment Sheet containing a listing of the Employer's Requirements Comments and area of deficiency which are required to be amended, included or improved to comply with the Contract. Issue of a 'No Objection with comments' entitles the Contractor to proceed to the next stage of the programme of work, subject to the required amendments of documents where by the PM's comments are taken into account fully and implemented exactly.
- c) If the PM discovers major non-compliance, discrepancies, omissions, etc. that, in his opinion, are of a fundamental nature, he may return the Document Submission Report (DSR) – Status Sheet with the status code 'A' checked 'Objection. A complete resubmission is required' with a Document Submission Report (DSR) – Comment Sheet containing a listing of the PM Comments and area of deficiency which are required to be amended, included or improved to comply with requirements of the Contract. The issuance of an 'Objection. A complete resubmission is required' does not entitle the Contractor to proceed to the next stage of the programme of work until it is entirely resubmitted in a proper way and all of the PM's comments are fully taken into account and a satisfactory re-submission has been made (i.e. one which results in a code 'B' 'No Objection with comments' or code 'C' 'Notice of no objection').

The Project Manager will complete his review of the submission within 14 calendar days, after which the review comments in writing or on marked up drawings and specifications



will be furnished to the Contractor. Within two weeks of the receipt of the Project Manager's comments, the Contractor shall submit its proposals for implementation in the next submission. Where the comments are minor, such proposals may be clarified by calculations, part prints, etc. acceptable to the Project Manager and included in the Contractor's next submission. Should the Project Manager deem the submission to be unacceptable, the Contractor shall revise and resubmit the entire submission within two weeks, unless otherwise agreed with the Project Manager.

- 5.6.2 After Project Manager's review of the design submissions, the Contractor shall update the documentation incorporating Project Manager's observations and also other design requirements. For all subsequent submissions, the Contractor shall demonstrate that all the previous comments by Project Manager has been incorporated. The comments previously issued by Project Manager shall also become part of the submission.

5.7 As-Built Drawings and Documents

- 5.7.1 As-built drawings are intended to show the works exactly as constructed. These are prepared by amending the manufacturing drawings to take into consideration changes necessitated by manufacturing methodology. These drawings shall be completed and submitted to the Project Manager before completion of Installation, Testing & Commissioning.
- 5.7.2 At least 1 month prior to the anticipated date of delivery of the Equipment, the Contractor shall compile and submit to the Project Manager for recording purposes all those documents and drawings which in the opinion of the Contractor, constitute the complete record of the design and manufacture of the Works.
- 5.7.3 The updated compilation of the complete record of the design and manufacture of the Works shall be submitted before Operational Acceptance of the Equipment.
- 5.7.4 **Manufacturing Drawings** Detailed manufacturing drawings will not normally be required for acceptance but shall be submitted for comment if the Project Manager so requires.
- 5.7.5 For requesting any change to the accepted design, the Contractor shall submit the relevant design details for review of Project Manager. The Contractor shall not implement any change without receiving "No Objection" from the Project Manager.

5.8 Document Identification and Numbering

- 5.8.1 The Contractor shall follow the project-wide Document Identification and Numbering Procedure of the Employer.
- 5.8.2 This Procedure is applicable for all documents, including but not limited to the following:
- Correspondences and Letters.
 - Documents- Internal and external.
 - Reports.
 - Method Statements.
 - Drawings.
 - Manuals.
 - Procedures.
- 5.8.3 The Contractor shall co-ordinate with the Document Controller of the Project Manager and shall take from him the details of the Numbering System to be followed with the Project Manager.

5.9 Structure of Handover Documentation

- The Contractor shall provide the following documentation on handover of the system to the PM:



- a. As-Built Drawings and Documents
- b. Full Asset Register (Including Installation Verification Record)
- c. Licenses and Warranties
- d. Material Certification File
- e. Operations & maintenance Manual
- f. Operator's Handbook
- g. Training Manual
- h. Spares Parts List (Including Illustrated Parts Catalogue)

----- **End of Chapter 5** -----



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CHAPTER 6

6 Quality Management

6.1 Quality System Definitions:

The following Quality Management System terms are used in these requirements. The definitions given are derived from ISO 9000: 2005, clause 3.

Audit,	Systematic independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which audit criteria are fulfilled
Conformity	Fulfilment of a requirement
Design and Development	Set of processes that transforms requirements into specified characteristics or into the specification of a product, process or system. These are prepared to support the Quality Plan for a particular element of the Works
Hold Point (H)	A point in time when a notice of permission, consent or Notice of no objection by the Contractor Quality Assurance Team (or that the PM may elect to witness), is required before the Contractor can proceed with an activity
Inspection and Test Plan	Plans specifying the activities required to establish whether conformity is achieved. They identify the responsibilities for executing the activities, the documents controlling them and details requirements for the production of records
Observation Point (O)	A stage identified on an Inspection and Test Plan where the PM or authorised third parties may observe activities and any associated verification
Quality Management System	Management system to direct and control an organization with regard to quality as formally expressed by top management
Quality Plan	Document specifying the procedures and associated resources shall be applied by whom and when to a specific project, product, process or contract Quality Plan shall specify the quality management system of an organization

6.2 Introduction

- 6.2.2 The Contractor shall maintain and implement a Quality Management System, based on International Standard ISO 9001: 2015, that shall remain in effect from the instance of manufacturing through commissioning/ handing over and shall submit it for PM's Notice of



No Objection (NoNO) as specified in this Section.

- 6.2.3 The Contractor shall be required to provide appropriate training to all personnel in the operation of the Quality Management System and maintain records to demonstrate competence in its application.
- 6.2.4 Company manufacturing the Plant & Equipment is required to be certified to ISO 9001 by a registered Certifier that is acceptable by Project Manager (PM). Company's Sub-Contractors of all major equipment shall also be covered by the Contractor's Quality Management System ISO 9001:2015.
- 6.2.5 Contractor's Quality Management System shall be capable of ensuring that all aspects of the Works, including but not limited to, design, procurement, fabrication, installation, inspection, construction and modifications will comply with the requirements of the Contract.
- 6.2.6 The Contractor's Quality Management System shall ensure that all goods and materials, whether on-shore in India or off-shore before shipping, workmanship, plant and equipment procured and supplied, inspecting, handling, assembling, testing, storing, fabrication, suppliers and vendors comply with the Contract requirements.
- 6.2.7 The Contractor shall, for the PM/ Employer's Inspection, Verification and /or Test and Commissioning, provide:
- a) Right to inspect;
 - b) Facilities to carry-out the inspection of their work; and
 - c) Assistance in travel and accommodation arrangements

6.3 Quality Management System (QMS)

- 6.3.2 Contractor's QMS shall be capable of demonstrating by self-certification that all relevant standards, regulations, testing requirements and all requirements of the Contract are being met.
- 6.3.3 The Contractor shall designate an approved Quality Manager who shall be responsible for overseeing the implementation of all quality checks of the Contractor.
- 6.3.4 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 of his Quality Management System Documentation which have been given Notice of no objection by the PM. Such activities shall include, without limitation, the inspections and/or tests implied or expressly required by the Contract.
- 6.3.5 The PM shall designate, if necessary, Quality 'Hold Points' into the Contractor's Inspection Testing and commission Plans for the Contractor's Quality Department to adhere to, or for the PM to attend, on a case-by-case basis at his discretion
- 6.3.6 The Contractor shall coordinate the Inspection and Testing necessary to demonstrate that all specified requirements have been met. All non-conformances are to be documented and resolved, before final acceptance of the Works or any section of it.
- 6.3.7 The Contractor, his consultant, and Major item suppliers thereof shall make available for audit all records necessary to demonstrate that the Works have been executed in accordance with the Contract. They shall also provide the PM with documents that demonstrate that the Works are progressing in accordance with the specified requirements. These shall be provided in a timely manner to enable non-conformities to be rectified satisfactorily.



6.4 QMS documentation

Contractor shall submit the following documents as fulfilment of his QMS requirement for seeking PM's NoNO as specified in this Section, before start of his Work.

6.3.1 Quality Plan

Quality Plan, identifying its Quality Procedures, Audits, O-chart, their Key personnel/ Management Structure, Organization Documentations, Process Flowchart, Documents related to Control Process, Non-conformity, Corrective and Preventive Actions, Risks Mitigation Strategy, etc. covering the entire scope of his Works in the Contract. Such Plan shall include but not limited to the schedule of internal, consultant/ sub-Contractor/ supplier Audits, Reports of which shall be promptly submitted to PM for information and record.

6.3.2 Design, Manufacturing, Installation, Testing and Commissioning Plan

This can be submitted as one document or split into different plans for Design, Manufacturing, Installation, Testing and Commissioning.

Design Plan shall include all pertinent details to manage and control Design which shall not be limited to:

- a) The procedures for the control of design and/or its changes if any, shall be defined in order that such activities are reviewed, verified, validated and approved before enactment.
- b) All design documents (drawings, plans, specifications, calculations and reports) produced by the Contractor's organization shall be checked and certified by the Designer before seeking NoNO from PM.
- c) The Contractor shall maintain records showing design calculation and data supporting design review activities.
- d) The Plan shall laydown bearing of a detailed approved Method Statement before undertaking any work
- e) PM reserves the right to inspect and audit these documents at any time for verification

Manufacturing Plan shall include all pertinent details to manage and control manufacture which shall not be limited to:

- a) Manufacturing Process, QA/QC ensuring compliance with design, drawings and specifications
- b) Checklist for Design, Manufacturing, Installation, Testing and Commissioning
- c) Clear identification and traceability of material and manufactured parts
- d) Detailed narration on disposition of non-conforming material or product so as to avoid unintended use/installation shall find a plan in this Plan
- e) The Plan shall include process and system of purchasing of materials/ equipment including approved bought-out items ensuring they comply with the requirements of the specification
- f) Purchasing documentation and specific verification arrangements prior to release for use/installation
- g) Compliance with vendor approval of the Equipment from PM

Installation Plan shall include all pertinent details to manage and control installation work which shall not be limited to:



- a) Resource Planning incorporating Plant and Labour
- b) Harmonizing with relevant Drawings and Works Specifications
- c) Hazard, Safety and Environmental provisions that need to be taken to eliminate and/or mitigate shall be identified and separately submitted
- d) Plan shall overarch on chapters covering DLP and O&M

Inspection and Test Plans shall include all pertinent details to manage and control any test and inspection activities which shall not be limited to:

- a) The procedure and instructions for the inspection and/or testing
- b) The test method or a reference to the relevant standard of testing
- c) Details of Inspections, Tests and Trials, its level and frequencies of each aspect of the Works of all incoming materials, in process and final product
- d) The inspection and/or testing required for the completion of an activity

6.5 Quality System Requirements

6.5.2 All testing in India is to be carried out by laboratories accredited by NABL (National Accreditation Board of Testing and Calibration Laboratories) or internationally by accredited laboratory complaint to ISO 17025: 2005.

6.5.3 All testing of systems, software, plant and materials must be carried-out by persons qualified to meet the requirements and Standards.

6.5.4 The Contractor shall promptly supply the PM with three (3) controlled copies of his Quality Plan, details of all Inspections and Tests, Factory Acceptance Tests, related procedures / instructions/ forms for NoNO from the PM. The Contractor shall maintain such controlled documentation throughout the duration of the Contract. For any amendment to the quality system documentation, the Contractor shall as soon as practicable prepare and submit the proposed amendment to the Project Manager for NoNO

6.5.5 The Contractor shall maintain and make available for inspection by the PM at its site, a complete, up-to-date, organized file of all submittals (plans, procedures, Method Statements etc.), including an index and locator system which identifies the status of each submittal.

6.5.6 Pursuant to clause 6.5.4, a 'controlled copy' means a document prepared and issued in accordance with the provisions regarding document control contained in the relevant ISO standard and the Contractor's Quality Plan.

6.6 Reports

6.6.2 The Contractor shall compile and submit reports of final inspection of the equipment and major Items of Supply from the Sub Contractors. 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.

6.6.3 Each report of inspection and/or test shall be signed by a representative of the Contractor who has been allocated the requisite authority under the relevant Inspection Test Plan (ITP) and signed by the Contractor's Quality Engineer.

6.6.4 The Contractor shall ensure that a signed copy of report each-in-situ and each off-site inspection/test is filed in his Records within 3 (three) working days and within seven (7) working days of the date of completion of the test process respectively.

6.6.5 The Project Manager reserves the right to inspect and audit these documents anytime.



----- End of Chapter 6 -----

CHAPTER 7

7 Software Quality Assurance Plan

7.2 Perspective Framework

7.1.1 All software to be developed or modified (re-engineered software), shall follow the requirements of EN 50128 (Railway Applications: Software of Railway Control and Protection Systems). The Contractor shall define within the Software Quality Assurance Plan what techniques and measures are to be applied for software development.

7.1.2 The Plan shall require the Contractor to provide all changes, bug fixes, up-dates, modifications, amendments and new versions of the programs, as required by the Project Manager. The Project Manager may also direct to provide the copy of previous version of software till such time the new version of software is proven.

7.1.3 The Contractor shall provide all tools, Laptop computers or any special device to upload / download the software, Control data, equipment, manuals and training necessary for the Employer and Project Manager to maintain and re-configure all software provided under this Contract. The documentation of software may be supplied after the expiry of the warranty period, under terms and conditions to be mutually agreed at Contract pre-award stage.

7.1.4 When a fault is discovered in delivered software, or an error in the associated documentation, the Contractor shall take the necessary steps to rectify such faults and errors at the earliest opportunity. The Contractor shall supply to the Project Manager, full details, in writing, as to the nature of the corrective action proposed or taken. These changes shall be documented in the form of Software Engineering Change Proposal (SECP), which shall be got approved from Project Manager. The documentation of software may be supplied after the expiry of the warranty period, under terms and conditions to be mutually agreed at Contract pre-award stage.

7.3 Software Management Control

7.3.2 The Contractor shall take full responsibility for software development, if software development or modification are required under the Contract.

7.4 Software Audit

7.4.2 The Project Manager may carry out an audit of the Software. Further external independent audits may also be arranged.

7.5 Software Acceptance

7.5.2 The Contractor also shall submit an Operational Safety Report (Software) for software acceptance by the Project Manager. All the documents for the design, development, testing, verification and validation as defined in CENELEC standards including EN 50128 shall be submitted.

7.5.3 The Operational Safety Report (Software) shall include, as a minimum:

a) OSR(S) – Introduction: Shall describe the nature of software sufficiently to ensure that the Project Manager is given a comprehensive overview of primary characteristics such as structure, functions, criticality, volume and language.

b) OSR(S) - Evidence of Quality Management: Shall provide evidence to demonstrate that the software development has been subject to acceptable quality assurance.

c) OSR(S) - Evidence of Safety Management: Shall provide evidence to demonstrate that the



software development has been subject to acceptable safety management.

- d) OSR(S) - Technical Report: Shall describe how software integrity has been achieved.
- e) OSR(S) - Operation and Maintenance Report: Shall describe the Software operation and maintenance characteristics.
- f) OSR(S) - Restrictions for Use: Shall define what restrictions are applied to the use of the software.

7.6 Application Software and Development Tools

7.6.2 The staff of the Employer/ Project Manager shall be given the required training by the Contractor and made conversant with the software and other related issues as found necessary during the Contract execution.

7.6.3 After loading, and the satisfactory functioning of the software, the Contractor shall supply two back-up copies of the software, including any new versions adopted. The documentation of software shall be supplied before the expiry of the DLP.

7.6.4 All software(s), irrespective of Contractor's own software or of sub-suppliers, shall be compatible with latest version of Windows Operating software and shall also have upward compatibility. In case, the compatibility of installed software(s) with latest version of Windows is not available, the Contractor shall replace the installed software(s) that are compatible with latest version of Windows OS without downgrading the Equipment performance. Contractor shall commit to support and supply free of cost any special hardware / software required for ensuring compatibility with new version of Windows for at least a period of 5 years beyond DLP of the Equipment.

7.6.5 Beyond the above period of 5 years, in case of obsolescence, suitable alternatives solutions shall be implemented (at mutually agreed terms and conditions) and full support shall be provided by the Contractor so as to ensure that Equipment performance is not affected adversely.

7.6.6 Diagnostic tools to be provided shall include all hardware / software required for the purpose of:

- a) Uploading / downloading of all software used in the Equipment / system / sub-systems.
- b) Downloading of faults and any other information required for trouble shooting and diagnostic purpose.
- c) Data analysis and investigation tools of real-time downloads on central computer.

7.7 Software Support

7.7.1 The Contractor shall provide all tools, equipment, manuals and training as necessary for the Employer / PM to use, maintain and re-configure all of the software provided under the Contract,

7.7.2 The Contractor shall submit all new versions to the PM for a Notice at least 2 weeks prior to their installation. New Versions of any program shall not result in any non-conformance with the Specification or degrade the operation of the System. The Contractor shall:

- a) ensure that all new versions are fully tested and validated on the simulation and development system prior to installation.
- b) ensure that all new versions are fully tested and commissioned once installed on the Site.
- c) deliver to the Employer and the PM any new version, together with the updated Operation and Maintenance Manuals



- 7.7.3 The PM is not be obliged to use any new version and the Contractor is not relieved of any of his obligations. Any effect upon the performance or operation of the computer-controlled system that may be caused by a new version shall be brought to the PM's attention including updating the files to suit the new version
- 7.7.4 Within 14 days of the installation of any software into the Permanent Works by the Contractor, the Contractor shall submit to the PM for retention by the Employer and the PM, two backup copies of the software, which shall include, without limitation:
- a) All licenses in favour of the Employer for their use.
 - b) all source and executable codes;
 - c) all design documentation relating to the software; and any specified development tools required for maintenance of the software, including, but not limited to, editors, compilers and linkers

----- End of Chapter 7 -----



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CHAPTER 8

8 Packaging, Storage, Shipping and Delivery

8.1 General

8.1.1 The Contractor shall be fully responsible for the provision and maintenance of acceptable storage facilities for the Plant and any materials or equipment he intends to use for the carrying out of the Works.

8.2 Storage

8.2.1 The Contractor shall prepare, protect and store, in a manner to be accepted by the Project Manager, all 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.

8.2.2 Secure and covered storage shall be provided for all equipment and materials other than those accepted by the Project Manager as suitable for open storage.

8.3 Packing, Crating & Markings

8.3.1 The Contractor shall provide all packing, crating and markings.

8.3.2 Each case, crate or package shall be waterproof, rot-proof and insect/rodent proof and of robust construction.

8.3.3 Each case, crate or package shall be legibly and indelibly marked in large letters with the Site address, Contract number, "right way up", opening points and other markings as necessary to permit materials to be readily identified and handled during transit.

8.3.4 All packing procedures shall be subject to acceptance by the Project Manager.

8.3.5 Spare parts shall be tropicalized in their packing for prolonged storage in accordance with BS 1133 or equivalent and shall be suitably labelled to indicate:

- Ownership (MMRC)
- Shelf life
- Type of storage
- Description of item and relevant part number
- Serial number, if applicable
- Inspection Certificate number and batch number, that is, the number allocated by the Contractor's Inspector at the time of manufacture or packing

8.3.6 Protection requirements shall include but not be limited to:

- Electrical and other delicate items or equipment shall be properly protected to the Project Manager's acceptance.
- Tube ends, cable ends, cable entry points into equipment and other similar terminations and openings shall be blanked off to prevent ingress of dirt, moisture, vermin or insects and to provide protection against damage.
- Flanged ends shall be protected by adhesive tape or jointing material covered by a properly secured wooden blank not smaller than the flange itself. Plain tube ends shall be closed off with bungs or plugs or suitable materials firmly fixed in position.
- Particular care shall be taken to prevent damage to or corrosion of shafts and journals where they rest on timber or other supports, which may contain moisture. At such points, wrappings impregnated with anti-rusting composition shall be used. Wrapping shall be of sufficient strength to resist chafing under the pressures and movements likely to occur in transit.



- Spare ball and roller bearings and similarly protected items shall not be removed from the manufacturer's wrappings or packing.
- 8.3.7 Each case, crate or package shall contain a comprehensive packing list showing the number, mark, size weight and contents together with any relevant drawings. A second copy of the packing list shall be enclosed in a watertight enclosure on the outside of each case.
- 8.3.8 All items heavier than 100 kg shall be marked on the outside of the case to show the gross and net weights, the points for slinging, and where the weight is bearing.
- 8.3.9 Care shall be taken to prevent movement of equipment within cases, crates or packages by the provision of bracings, straps and securing bolts as necessary. Bags of loose items shall be packed in cases and shall be clearly identified by well-secured labels on which the quantity and name of the part and its index or catalogue number have been stamped.
- 8.3.10 If sea transportation of Machinery and Plants from manufacturer's works to site at Mumbai is required, seaworthy packing/ treatment of Machinery and Plants shall be carried out for the safe transportation of Machinery and Plants. It shall apply to sea transportation of spares and other materials.

8.4 Shipping

- 8.4.1 The Contractor shall notify the Project Manager seven (7) 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.
- 8.4.2 Without prejudice to any other provisions of the Contract, the Contractor shall be responsible for all legal requirements, dues, taxes and other such requirements including all expenses in connection with this.

8.5 Delivery

- 8.5.1 The Contractor shall deliver the Works and all items to be supplied under the Contract to the Site. The Contractor shall be responsible for transporting safely all equipment from the unloading point to the delivery point at Site through the streets of Mumbai, complying with all traffic rules and regulations. Obtaining necessary permission from the Traffic Police in this regard shall be the responsibility of the Contractor.
- 8.5.2 The Contractor shall unload the Works and all items to be supplied under the Contract at the designated delivery point and positioning or storing them.
- 8.5.3 Any part of the Works or any item to be supplied under the Contract that is damaged in transit shall not be considered as delivered until repairs or replacements have been made and all necessary spare parts or items have been delivered to the Site.
- 8.5.4 All documents, manuals, drawings and other deliverables shall be delivered to an address in Mumbai to be designated by the PM in writing.
- 8.5.5 The Contractor shall store and secure the Works, equipment, spare parts and other items until the same have been inspected and are considered delivered at the designated point by the PM.
- 8.5.6 The Contractor shall remove temporary fittings required for shipment and re-assembly of equipment and shall complete this prior to the equipment or parts thereof being inspected and before they are considered delivered.
- 8.5.7 An item shall be considered delivered when all damage have been repaired and all documentation including post-delivery preparation have been completed to the satisfaction of the PM.

---- End of Chapter 8 ----



CHAPTER 9

9 Inspection, Installation, Testing & Commissioning

9.1 General

9.1.1 The Inspection, Testing & Commissioning Plan shall contain, but not limited to, the following topics:

- a) the Contractor's methodology for inspection, testing & commissioning;
- b) all Inspections and Quality Hold Points;
- c) the interdependency and inter-relationship with Interfacing Contractors and their commissioning program;
- d) the objectives of each test and criteria for successful tests;
- e) documentation for conducting tests and submission of Testing & Commissioning procedures.

9.1.2 The Project Manager will then check the Plan to see whether it meets the requirements. The Project Manager shall inform the Contractor in writing within 14 days period after receipt of the above information:

- a) that the Contractor's proposed methods of inspection, testing & commissioning (including Integrated Testing and Commissioning) have the consent of the Project Manager; or
- b) in what respects, in the opinion of the Project Manager, the Contractor's proposed methods, etc. fail to comply with the Employer's Requirements and/or the Final Design Document, and
- c) would be detrimental to the Works and/or to the other works comprising the Project; and
- d) do not comply with the other requirements of the Contract; or

9.1.3 In the event that the Project Manager does not give his consent, the Contractor shall take such steps or make such changes in the said methods or supply such further documents or information as may be necessary to meet the Project Manager's requirements and to obtain his consent. The Contractor shall not change the methods of inspection, testing & commissioning which have received the Project Manager's consent without further review and consent in writing of the Project Manager.

9.1.4 Notwithstanding the foregoing provisions of this Clause, or that certain of the Contractor's proposed methods of inspection, etc. may be the subject of the consent of the Project Manager, the Contractor shall not be relieved of any liability or obligation under the Contract.

9.2 Sequence of Tests

9.2.1 The sequence of tests shall be:

- a) Stage Inspection at Manufacturing Stage.
- b) Factory Acceptance Tests (FAT) prior to dispatch.
- c) Open Package inspection on receipt of Equipment at Site
- d) Installation, Testing & Commissioning in Depot.
- e) Final Site Acceptance Tests (SAT).

9.2.2 All the facilities required for carrying out the FAT, should be available at the Manufacturer's premises and will have be extended to the Inspection team during Factory Inspection.

9.2.3 All additional facilities required for carrying out the SAT, except Rolling Stock or Rolling Stock Components, should be arranged by the Contractor, at his own costs.

----- End of Chapter 9 -----



CHAPTER 10

10 Materials and Equipment

10.1 Materials and Equipment Provided by the Employer

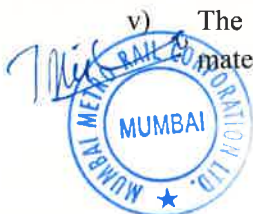
The Employer will not provide any equipment or materials for this project.

The list of items, (material or equipment) if any, will be provided in Appendix 6 of the Contract Agreement under Part 3, Section IX.

10.2 Materials

10.2.1 General

- a) Materials for inclusion into the Works shall be new unless otherwise stated in the Contract or having been given a Notice of No Objection by the Project Manager.
- b) Certificates of tests by manufacturers, which are submitted to the Project Manager, 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.
- c) 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 proposes to use or employ in or for the Works. Such samples, if having been given a notice, shall be retained by the PM and shall not be returned to the Contractor or used in the Works unless allowed by the PM. No components or materials or goods of which samples have been submitted shall be used in the Works unless and until the PM shall have given a notice of no objection.
- d) Materials, or components 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 given a Notice of No Objection by the Project Manager.
- e) If any component or 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 PM may, upon application from the Contractor, give permission to the use of an equivalent component or material in imperial specifications as a substitute, provided that:
 - i) no statutory specification shall be altered except in accordance with relevant legal provision, if any;
 - ii) the PM is satisfied that the Contractor has made every reasonable effort to obtain the component or material in metric specifications;
 - iii) in the opinion of the PM, the substitute component or material is suitable for the Works in all respects and any additional costs are the contractor's responsibility;
 - iv) in the opinion of the PM, the substitute component or material complies with all the specifications for the component or 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 component or material; and
 - v) The Contractor shall be responsible for all extra quantities of the component or material required for meeting design and specification requirements of the Facilities



or for any changes or modifications required to accommodate such materials, due to the use of the substitute.

- f) General Requirement for Electrical & Mechanical component/parts is detailed in Appendix 8 & Appendix 9.

10.2.2 Certificates for Manufactured Goods or Materials

The Contractor shall obtain certificates of goods and materials incorporated into the Equipment. 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.

10.3 Equipment

10.3.1 Equipment Protection

All equipment shall be capable of short term continuous operation, without the benefit of air conditioning or forced cooling, at the extremes of environmental conditions likely to be encountered. All equipment shall be capable of continuous operation in its normal environment and achieve its stated service life. The Contractor shall be responsible for ensuring that his equipment and systems are not adversely affected by the modified environmental conditions caused by the localised heat or vapour emissions or moisture of other adjacent equipment whether provided under the Contract or otherwise.

10.4 Electronic Control Racks & Cabinets

10.4.1 Racks & Cabinets

- a) Electronic control equipment shall be housed in suitably enclosed metal cabinets. All metal components such as cabinet and parts shall be manufactured to withstand Mumbai humid and corrosive environment in accordance with appropriate international and local standards BS EN ISO 14713: Current Version or equivalent.
- b) The equipment shall be of modular construction to facilitate easy maintenance, repair and replacement of parts. Standard commercial parts shall be utilized to the maximum extent possible.
- c) 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.
- d) There shall be a minimum walkway of 1000 mm between equipment racks.
- e) The equipment shall be suitable for the environment in which it is to be used and it shall be designed to prevent ingress of all vermin and to minimize the ingress of moisture, dust and dirt.
- f) Outdoor equipment shall be sealed against the ingress of dust, moisture and vermin. A minimum IP rating is essential as detailed in Appendix 8.
- g) No item of equipment which is removable as part of routine maintenance procedures shall be mounted greater than 2.0 m above floor level.
- h) The Contractor shall provide for all cubicles, cabinets and panels, a mean of locking appropriate to the location. All locks shall conform to a system suited to meet the requirements of the PM and interfacing Contractors.



10.4.2 Cables

- a) No joints or splices shall be permitted in cables or wires except at recognised termination points.
- b) All multi-core cables shall allow 25% or 2 cores, whichever is the greater, as spares.
- c) All cable cores shall be terminated including all spare conductors.
- d) Each cable core shall be uniquely numbered and identified with a label giving details of the circuit carried.
- e) 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 10** -----



CHAPTER 11

11 Training

11.1 Training Requirements

- 11.1.1 The Contractor shall provide comprehensive training to the Employer's staff to enable safe and efficient Operation and Maintenance of the Equipment supplied as part of the Contract to achieve maximum reliability and economy of cost.
- 11.1.2 The Training Plan shall include, but not limited to, the following aspects of Equipment operation and maintenance:
- a) Schedule of training courses.
 - b) Objective, syllabus, format, class size and duration of each course and training evaluation methods.
 - c) Training facilities to be provided by the Employer.
 - d) On-Site training during Installation, Testing & Commissioning
 - e) Instructor's qualifications
 - f) Operation and procedures under normal and degraded modes of the Equipment.
- 11.1.3 The Employer's personnel required to undergo training will be qualified engineers, technicians, supervisors or instructors. The training syllabus should therefore concentrate on familiarisation with various systems of the Equipment along with hands-on-training.
- 11.1.4 Training Instructors provided by the Contractor shall be fully qualified and experienced engineers and experts in the relevant field with experience in imparting training to Engineers and Technicians to the level of competency essential for Operation and Maintenance of the Equipment of similar specifications. The Instructors shall be English speaking and preferably having some knowledge of Hindi. The appointment of Instructors shall be confirmed only after its detailed curriculum vitae have been accepted by the Project Manager. In the event that an Instructor is subsequently deemed not to be competent, he shall be replaced forthwith.
- 11.1.5 The Contractor is required to provide at its own cost, all other necessary training aids such as written and printed notes, video programs, models, drawings, e-learning modules, CDs and other training aids. 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.
- 11.1.6 Facilities such as classrooms, LED projectors and video monitors will be made available by the Employer free of cost to the Contractor for imparting training post- DLP.
- 11.1.7 All expenses of trainers, including travel and lodging, shall be borne by the Contractor. The cost of training material to trainees shall also be borne by the Contractor.
- 11.1.8 Any gadget, e.g. laptop, projector etc., needed for the training shall be arranged by the Contractor. Employer shall be providing halls/rooms, complete with furniture, electric points etc., for the classroom trainings free of-cost. Onsite training will be done on the commissioned Equipment.
- 11.1.9 The Contractor shall also provide training materials to the Employer's training instructors to a level of competence to allow the instructors to subsequently train the Employer's staff in maintenance and operation of the equipment.



11.2 Training Objectives: Operations

11.2.1 The operation training shall cover all operation aspects of the Equipment covering –

- a) Full features of operation,
- b) Safety features,
- c) Faults diagnosis and measures to rectify the Equipment.

11.2.2 After classroom training, the operating staff is required to be trained in actual operation of the Equipment to acquire the required confidence in operation in the Metro Depot.

11.3 Training Objectives: Maintenance:

11.3.1 The objective of training of maintenance staff is that the maintainers should be able to maintain the Equipment safely under all operating conditions.

11.3.2 The training shall consist of classroom training and practical hands on training. The Contractor shall depute competent trainers to impart training to a high degree of proficiency with competency certificate issued by OEM. During the Defect Liability Period when the Contractor is responsible for fault finding and repairs, he shall provide practical hands on training to the Employer's maintenance staff.

11.3.3 The training in maintenance of the Equipment shall enable the engineers, inspectors and staff to achieve the following broad objectives:

- a) Full understanding of all aspects of the system design and functions of all the equipment including proprietary and sub-Contractor's equipment, software, etc.
- b) All planned maintenance and overhaul of the systems and equipment supplied, installed or modified under the Contract.
- c) Fault finding and rectification techniques for the systems and equipment supplied (by use of special test equipment, if required), 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.
- d) All practices and procedures necessary for the safe and efficient operation of the systems and equipment, installed or modified under the Contract.
- e) 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.
- f) Modification in the software to extend or modify the control and monitoring functions.
- g) Maintenance Management Information System and documentation.
- h) Stores inventory planning and control.

11.4 Training Methods

11.4.1 As a general guide, Training shall consist of classroom (theory) training, computer based interactive multi-media training, and practical (hands on) training.

- a) The Contractor shall cover all aspects of Operation and Maintenance of the Equipment in the O&M Manual supplied against the Contract.
- b) Contractor shall arrange the experts from the OEMs of the systems to impart the "hands on" training at site during the Contract execution.

Training evaluation shall be carried out at regular intervals, to monitor the progress and



suitability of the training program, and of the trainees.

- d) The Contractor shall issue Competency Certificate to those staff who have acquired adequate knowledge in the Operations and Maintenance of the Equipment.
 - e) The performance of Contractor's Instructors shall also be evaluated by the Project Manager at regular intervals.
- 11.4.2 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.
- 11.4.3 The Contractor shall review the responses to questionnaires and the trainees' test results and forward a summary to the PM.
- 11.4.4 If the PM considers that the course has not achieved the required objectives, he will advise the Contractor who shall then organise and implement appropriate re-training at no cost to the Employer.

11.5 Training Records

- 11.5.1 The Contractor shall, at the completion of each training course:
- a) provide the PM with a consolidated training record listing the training course title, date of training, name of all trainees, training result and other relevant information; and
 - b) issue an appropriate competency certificate to each trainee who has successfully completed the course.
 - c) Staff who do not possess adequate knowledge of Operations and Maintenance of the Equipment after the training shall be retrained by the Contractor at no cost to the Employer.

11.6 Training Manual

- 11.6.1 The Contractor shall provide five (05) coloured copies and one soft copy (.pdf on CD) of the Training Manual for use by the Employer for conducting in-house training. The Manuals shall cover all requirements specified in this chapter.

11.7 Transfer of Training Aids

- 11.7.1 After completion of the training, training aids and materials used shall become the property of Employer to enable further training to take place.

---- End of Chapter 11 ----



CHAPTER 12

12 Operation & Maintenance Manuals

12.1 General

- 12.1.1 The Contractor shall prepare the Operation and Maintenance Manuals and submit to the Project Manager for review. Upon issue of Notice of No Objection from the Project Manager, the Contractor shall provide five (5) copies and one (1) electronic soft copy (.pdf on CD) to the Employer.
- 12.1.2 It is accepted that further amendments may subsequently be required.
- 12.1.3 Each and every manual shall be divided into indexed sections explaining the subject matter in logical steps. Most manuals shall consist of printed sheets bound in stiff-cover wear-resistant binders clearly and uniformly marked with the subject matter and reference number. The binding shall allow for all subsequent changes and additions to be readily effected.
- 12.1.4 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 programs to enable faults to be quickly identified and system modification to be undertaken at any time.
- 12.1.5 The Contractor shall provide clarifications and amendments to the Operation and Maintenance manuals as necessary during training.

12.2 Operation Manuals

- 12.2.1 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.

12.3 Maintenance Manuals

- 12.3.1 The Contractor shall provide maintenance manuals showing details of all the various systems and sub-systems from a maintenance and fault-finding standpoint, with 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 program.
- 12.3.2 The Contractor shall provide documentation for all hardware and software for computer systems and other associated electronic equipment to meet the following requirements. Contractor shall ensure the any hardware(s)/software(s) required for the purpose as covered in the maintenance manuals are supplied free of cost. Such documents shall include but not be limited to:
- a) manufacturers' documentation supplied as standard with the equipment;
 - b) hardware configuration with details of expansion capabilities and options;
 - c) program loading instructions, including runtime environment configuration;
 - d) program listing including comprehensive 'comment statements' in hard copy and soft format for source code, compilers and development tools necessary to modify and recompile software;
 - e) flow charts, data flow diagrams and state diagrams as appropriate;
- description of software modules including purpose, linkage with other modules, error routines and any special considerations;



- g) memory maps for both internal and peripheral memory showing description of all programs, data files, overlay areas, memory available for expansion and the like;
 - h) loading and operating instructions for diagnostic programs and specifically developed debugging tools; and
 - i) programming manuals relevant to operating systems, languages, development tools, etc.
- 12.3.3 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.
- 12.3.4 The maintenance manual shall also include an illustrated parts catalogue of all equipment and components supplied and shall contain sufficient information including Part No, Description, Life expected, General or specific purpose and technical specification to identify and requisition the appropriate part by maintenance staff. The catalogue shall comprise 3 subsections.
- 12.3.5 The catalogue shall also contain 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.
- 12.4 Electronic Manuals**
- 12.4.1 The Contractor shall provide manuals in electronic format. This is in addition to the submission of manuals in hard-copies.
- 12.4.2 The format of the electronic copies shall be proven in at least two other applications and shall allow for links between parts catalogue and maintenance instructions.

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CHAPTER 13

13 Traffic, Road & Transportation to Site

13.1 General

13.1.1 The Contractor shall conform to the applicable requirements of the Motor Vehicle Act 1988. The Contractor shall ensure compliance with the requirements regarding the licensing of drivers and the registration of vehicles. Vehicle size and load limitations shall be in accordance with all statutory requirements.

13.2 Transportation to Site

13.2.1 The Contractor shall make all arrangements and assume full responsibility for transportation to the Depot site of the Equipment, and all related accessories, equipment, materials and supplies needed for the proper execution of the Works. Procedures for access to and from the site shall be co-ordinated with the relevant Authorities.

13.2.2 The Contractor shall use such routes and rights of entry to the Site as may be decided by the Project Manager from time to time. Routes for 'very large' or 'very heavy' loads shall be discussed with the Project Manager in advance and all arrangements thereafter shall be submitted to the Project Manager. 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 Project Manager for possible solutions.

13.2.3 The Contractor shall be responsible for obtaining permission from the Traffic Police and other relevant authorities to move "very large" and "very heavy" loads and for arranging police escorts if required. 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 vehicle or its workmen, scaffolding, plant, materials, equipment, etc. All Workmen working on the road shall wear approved reflective safety vests at all times.

13.2.4 The Contractor shall repair damage caused, if any to existing roads, footpaths, steps, cables, sewers, drains, etc. and shall reinstate the same at its own expense to the satisfaction of the relevant authorities.

13.2.5 All of the Contracted material/ supplies should be transported only through registered common carriers, as per the provisions of carriage by road act, 2007 and carriage by road rules, 2011.

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CHAPTER 14

14 Supply of Spares, Special Tools and Test Equipment

14.1 General

14.1.1 The Contractor shall supply the following items of spares:

- a) Consumables / spares for maintenance of the Equipment during Installation, Testing & Commissioning;
- b) Mandatory spares, as included in the Contract;
- c) Recommended spares, as included in the Contract;

14.1.2 Contractor shall submit purchase and technical specifications of bought out items used in this project. Project Manager's views, if any, shall be suitably incorporated.

14.2 Consumable Spares

14.2.1 The consumable spares shall include lubricants, oils, greases, sealants, filter media, gaskets, lamps, rubber items and wearable parts, etc. and such items, whose declared life is one year or less, considering use of the Equipment for at least 25 days in a month with single shift working.

14.2.2 The consumable spares shall be stored at the depot under the custody of the Depot Rolling Stock Manager/ Stores Manager.

14.2.3 Any consumable item, if required but not included in the Recommended items list by the Bidder, shall be supplied as asked for by the Employer. Employer's decision in determining any particular item as consumable(s) in line with Clause 14.2.1 above will be final and binding.

14.2.4 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 within the quoted cost. No increase in quoted cost shall be made due to any change in the list of consumables arising due to change/modification of design.

14.2.5 Unpriced list of consumable spares shall be furnished in the Technical Package. List of consumable spares shall contain following information as a minimum:

- 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 per year;
- f) Overall dimensions and weight including minimum packing (if any) for shelf space purposes;
- g) Interchangeability or otherwise with similar parts;
- h) Normal manufacturing and shipment lead times; and
- i) Shelf life.

14.2.6 It shall be the responsibility of the Contractor to maintain a certain defined stock of



consumable spares during Comprehensive Maintenance Service period at the depots under the custody of the Depot Rolling Stock Manager. Spares consumed during maintenance in DLP period shall be replenished every quarter as per the Contract conditions.

14.3 Mandatory spares

- 14.3.1 The Contractor shall supply the Mandatory Spares as included in the Contract.
- 14.3.2 No change in quoted cost of any spare will be allowed even when there is change in design of any equipment/sub-system during execution of the Contract.
- 14.3.3 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/ shelf life;
 - g) Interchangeability or otherwise with similar parts;
 - h) Normal manufacturing and shipment lead times;
 - i) Purchase Technical Specification with relevant drawings
- 14.3.4 The information as above shall also be given for all other components / equipment, etc. which may have to be changed / replaced during maintenance based on the proposed maintenance practices of the Contractor.

14.4 Recommended spares

- 14.4.1 The Bidder shall furnish price list of the recommended spares, expected to be required during two years of defect liability period and for ten (10) years after the expiry of defect liability period, along with the bid. The Spares, as included in the Contract or later, shall be supplied in the Depot.
- 14.4.2 Price quoted for the recommended spares shall be subject to Price variation as specified in Appendix 2 to Contract Agreement, Section IX, Part 3.

14.5 Delivery and Warranty

- 14.5.1 The spare parts ordered under the Contract shall be manufactured/ bought out, works tested and inspected in accordance with the relevant quality system, suitably packed and labelled in accordance with Employer's Requirements General Specification "Storage, Packing, Crating and Marking" and delivered by the Contractor to the depot. All spares shall be subject to inspection by the Project Manager.
- 14.5.2 The warranty period of all spares or any other item / equipment delivered shall be 24 months from the date of receipt of material.

14.6 Purchase of Spares from Vendors

- 14.6.1 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 after the Operation



Acceptance of the Equipment. The spares purchased shall be subject to inspection by the Project Manager.

- 14.6.2 Contractor shall obtain an undertaking from vendors, OEMs, etc. at detailed design submission stage that they have no objection to deal directly with Employer for supply of spares, equipment and/or sub-systems.

14.7 Commissioning Spares

- 14.7.1 The Contractor shall submit to the Project Manager for review a list of minimum spare parts that he intends to make available during the installation, testing & commissioning and integration testing period.
- 14.7.2 The Contractor shall keep on Site, under its own custody and at its own cost, throughout the installation, testing & commissioning including Integration testing period, stocks of spare parts, to enable rapid replacement of any item found to be defective or in any way in non-conformance with the Specification.
- 14.7.3 The Contractor shall generally not be entitled to use any of the Employer's spare parts during the installation, testing & commissioning periods.
- 14.7.4 Contractor shall not be permitted to remove any working/healthy equipment / components / sub-systems / systems from the Equipment for any reason whatsoever without specific approval in writing from the Project Manager.
- 14.7.5 Stocks of spares maintained by the Contractor at the Depot will be jointly checked with Employer's Engineer every three months. Certificate by Engineer confirming availability of the Contractor's spares 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 during the last six months period before the expected expiry of the Comprehensive Maintenance Service period.

14.8 List of Spares

- 14.8.1 The Contractor shall ensure availability of spare parts for a period of ten years from the end of DLP. The Employer at its discretion, during a period of ten years from the end of DLP, purchase as many spare parts as required by him.
- 14.8.2 If during the period of ten years, the Contractor intends to discontinue the manufacture of spare or replacement parts for the Machinery and Plants, the Contractor shall immediately give notice, at least six (6) months in advance, 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 shall reasonably require in relation to the anticipated life of the Machinery and Plants.
- 14.8.3 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 its 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).
- 14.8.4 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.

- 14.8.5 The Contractor will so far as it is reasonably able to bind its 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.
- 14.8.6 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.

---- End of Chapter 14 ----



CHAPTER 15

15 Work Site and Site Management

15.1 Access to Site

15.1.1 The Contractor will be given access to the Site in accordance with Clause 10.2 of the General Conditions of Contract.

15.2 Site Facilities

15.2.1 The Contractor will be provided, free of cost, a total space at depot, matching the requirements as decided by the Project Manager, for the setting up of Contractor's site office and for keeping covered stores, and for the staff working for Installation, Testing & Commissioning. These site offices shall be built commensurate with the architecture of the surrounding buildings and after obtaining the approval of Project Manager for its broad design. The structure shall be handed over to Employer after the commissioning of the Equipment.

15.2.2 The Contractor shall arrange its furnishing, security, etc.

15.2.3 Suitable and adequate fire-fighting equipment shall be provided as is considered necessary.

15.2.4 Three Phase and Single-Phase Power (as required) will be made available to Contractor free of charge for Testing & Commissioning. The Contractor shall liaise with Interfacing Contractors for availing of the power and assuring compliance of all safety procedures. The Contractor shall provide his own operators for Testing, Commissioning and Trials.

15.2.5 The Contractor shall provide its own lifting facilities for unloading of Equipment and any heavy item, at the port of arrival, for transshipment, and at the depot. The Contractor shall however, be allowed to use any necessary Depot facilities free of charge for assembly, commissioning, inspection and repairs, subject to availability. The Employer shall, however, not be responsible for adequacy, reliability and safety of the facilities provided to the Contractor.

15.2.6 Reasonably lit access to the areas and to rail sidings, if applicable, will be provided by the Employer. If lighting is not provided in the specific areas allocated to the Contractor, he should make its own arrangements. The Contractor shall be solely responsible for the security and housekeeping of the area, plant and possessions allocated to him. The Contractor shall provide and maintain all facilities required by him in the area allocated for its exclusive use and all other work required to allow the Contractor to fulfil its obligations under the Contract.

15.2.7 The Contractor shall arrange at its own cost all Site services necessary and appropriate for the assembly, testing and commissioning of the Equipment, which shall include, but not necessarily be limited to:

- a) Electricity at site-area (other than traction)
- b) Compressed air;
- c) Water
- d) Instrumentation.

15.2.8 The Contractor shall be responsible for making applications or requests to the concerned Authorities for availing of the above facilities. In the event that electricity or water supplies are arranged by another Interfacing Contractor in the Depot area, the Contractor may avail himself of those supplies from the Interfacing Contractor, directly on agreed terms and



conditions. The Contractor shall comply with all regulations of the utility companies and Government departments concerned.

15.3 Site Management

- 15.3.1 The particular use and for the period to which the Site is put shall be submitted to the Project Manager in the Installation, Testing & Commissioning Plan. The Contractor shall:
- a) confine its use of the areas of the Site to purposes having been reviewed without objection by the Project Manager who reserves the right to extend, amend or restrict the uses to which areas of the Site will be put;
 - b) 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;
 - c) refrain from depositing rubbish or causing nuisance or permitting nuisance to be caused and, except where reviewed without objection by the Project Manager, depositing earth on or removing earth from areas of the Site;
 - d) except where otherwise provided, not permit any person to reside on the Site.
 - e) unless otherwise stated, pay all rates and charges of any nature whatsoever arising out of his use of the Site and all work areas provided therein as provided under the Contract.
 - f) not use any part of the Site or Works for advertising purposes except with the acceptance of the Project Manager.
- 15.3.2 The Site shall be maintained in a clean and tidy condition. Materials, including those required for Temporary Works, shall be stored in an orderly manner. The Contractor shall, throughout the period of the Contract, provide a central collection point on Site, as reviewed without objection by the Project Manager, for collecting all empty cans, drums, packing and other receptacles capable of holding water. The Contractor shall ensure the regular collection and removal of such debris from the Site. After every day of works, all work areas shall be cleaned and made tidy to the satisfaction of the Project Manager.
- 15.3.3 The Contractor shall ensure that gases, fuels, explosives and other dangerous goods are stored and handled in a safe manner and in accordance with the Statutory Regulations pertaining to their storage and handling. The Contractor shall be responsible for obtaining the requisite licences at its own cost.
- 15.3.4 The Contractor shall provide all necessary protective clothing, safety equipment, hand tools, ladders, trestles, power supply, and replacement equipment for the staff engaged on Site maintenance.
- 15.3.5 Because of the multi-disciplinary 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 organization and co-ordination of access and occupation requirements, the Contractor shall maintain a close liaison with other Contractors.
- 15.3.6 As soon as any or all of the Contractor's installations are no longer required for the execution of the Works, the Contractor shall remove those facilities and ensure that the area is left free of debris, excess materials, and obstructions.

15.4 Site Safety

- 15.4.1 The Contractor shall, during installation stage, take care of the Occupational Health, Safety



& Environment aspects (OHS&E) for the health and safety of the workers engaged in the Installation work. The Contractor shall be expected to follow the provisions of different statutory provisions and ensure the Health and Safety of workers and taking care of the Environment. The Contractor as well as his subcontractors shall actively pursue both at the Works and the Installation Site, the achievement of

- a) BS EN OHSAS 18001:2007- OHS Management System
- b) BS EN 18002, OHS Management System- Guidelines
- c) ISO 14001:2004- Environmental Management System

15.4.2 The Contractor shall ensure, where required, availability of a Portable First Aid Box in a fully equipped state and a trained person to give First-aid at Site during the period the Contractor's personnel are on site for Installation, Testing & Commissioning work.

15.4.3 The Contractor shall be fully responsible for the safety of its personnel, its sub- Contractors' personnel, the public, and any persons directly or indirectly associated with the Installation Works, on or in the vicinity of the depot site for any unwanted/ unsafe act on the part of its workers.

15.4.4 The Contractor shall notify and submit a report to the Project Manager immediately after the occurrence of an incidence involving its staff or that of its sub-Contractors, or to any person at the Installation site. Reportable incidents shall include fatal accidents, major injuries (any fracture, loss of limb or part of limb, dislocation of the shoulder, hip, knee or spine, loss of sight whether temporary or permanent, penetrating injury to the eye) and dangerous occurrences (Collapse of foundation, building or lifting appliances, fire, electrical short circuit resulting in damages, any explosion, collision of any moving equipment etc).

15.4.5 The Contractor shall submit the report of the above reportable incidences in standard forms available with the Project Manager. The first report shall be made through SMS to the Co-ordinating Engineer of the Project Manager.

15.4.6 The Contractor shall also carry out his own investigation of the reportable incidences and submit the investigation report to the Project Manager. Follow up action as is considered necessary shall also be taken by the Contractor.

15.4.7 In the case of a reportable incidence, the Contractor shall not disturb the scene of incidence except to make the area safe or to shift the injured persons for treatment.

15.4.8 The Contractor shall deploy his persons at the Site who are competent for the work involving hazardous situations, viz. working close to 25kV Overhead Electrical system, working at height, etc. Each person deployed shall carry a Permit to Work with him issued by the Contractor. Permit to work for Electrical Work and Hot Work shall be issued on standard forms to be collected from the Project Manager.

15.4.9 All persons deployed by the Contractor shall wear suitable and sufficient Personal Protective Equipment, e.g. Safety Helmets, Protective Goggles, Safety Harnesses, Safety Shoes, etc. The Contractor shall follow the colour scheme for helmets as under:

Safety Helmet Colour with Logo	Designation
Violet	Contractor's Engineers & Supervisors
Red	Electricians
Yellow	Other Workers



15.4.10 The Contractor shall submit its Site Safety Plan, as a part of System Safety Assurance Plan.

15.4.11 The Site Engineer shall also act as the Safety Officer during the work at Site and shall be suitably trained in this work.

---- End of Chapter 15 ----



CHAPTER 16

16 Photographs and Public Relations

16.1 Progress Photographs

16.1.1 After completion of manufacturing, the Contractor shall furnish photographs of the manufactured Equipment.

16.1.2 Each photograph shall have forty millimetres by eighty millimetres title block in the lower right- hand corner, which shall show the following information:

MMRC CONTRACT No:

CONTRACT NAME:

CONTRACTOR:

PHOTOGRAPH No (Unique serial number based on agreed drawing numbering system):

DATE of PHOTOGRAPH:

DESCRIPTION:

16.1.3 Detailed photographs (date and time stamped) of each Plant & Equipment on its arrival at the depot and before introducing for regular use shall be archived and copies handed over to the Project Manager. The photographs must include all such items that are incomplete / defective, etc. Complete set (soft copy) shall be submitted to the Project Manager.

16.2 Public Relations:

16.2.1 The Contractor shall, in conjunction with the Project Manager, liaise with Public Relations Officer, MMRC on all press and public relations matters in connection with the Contract.

16.2.2 All press releases, press statements, articles or printed material prepared by the Contractor shall be submitted to MMRC, in consultation with the Project Manager prior to publication or release to the news media.

16.2.3 All press queries relating to the Contract received by the Contractor must be referred to MMRC for clearance, in consultation with the Project Manager.

16.2.4 The Contractor shall not provide any press release, press statement or publish any subject related to the Project without first seeking clearance from MMRC.

16.2.5 Use of the MMRC logo in the Contractor's publications shall be subject to approval of MMRC.

16.2.6 The Contractor shall provide MMRC and the Project Manager with schedules relating to night works, traffic diversions, closure of road, etc. that may cause inconvenience to the public.

16.2.7 The Contractor shall extend to MMRC all the necessary assistance and cooperation with regard to requests for photo-taking, video-taking and visits to the Site by the MMRC official photographer or appointed film-maker, in consultation with the Project Manager.

16.2.8 The Contractor shall include a section on matter concerning Public Relation in its monthly report to the Project Manager.

---- End of Chapter 16 ----



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CHAPTER 17

17 Temporary Electricity Supply

17.1 Electricity Supply for the Contractor by the Depot Civil Contractor

- 17.1.1 The Contractor, during installation of the Equipment, shall use the power supply, where required, provided by the Depot Civil Contractor, if available.
- 17.1.2 The Contractor will be responsible for reimbursement to the Depot Civil Contractor of the utility charges for consumption of electricity. The Depot Civil Contractor will charge the Contractor for consumption of electricity at the same unit rates as paid by the Depot civil Contractor to the electricity authorities for such utilities.

17.2 Work on Site

- 17.2.1 The Site Engineer of the Contractor shall be solely responsible for ensuring the safety of all temporary electrical equipment on Site. All necessary safety precautions shall be taken in to consideration.
- 17.2.2 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 Project Manager for Notice of No Objection.
- 17.2.3 All electrical installation work on Site shall be carried out in accordance with the requirements laid down in BS 7375 and the Specification and should comply with various statutory Rules and Regulations connected with the work. All work shall be supervised or executed by qualified and suitably categorized electricians, who are registered as such under the Electricity Ordinance 1990/Electricity (Registration) Regulations 1990. Copies of the electrician's registration shall be kept on site and the Project Manger shall be allowed to inspect at any time.
- 17.2.4 All cabling shall be run at high level whenever possible and be firmly secured to ensure they do not present a hazard or obstruction to people and equipment.
- 17.2.5 Protection shall be provided for all main and sub-circuits against excess current, residual current and earth faults.
- 17.2.6 Periodic 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 operation of the system.

17.3 Inability to Supply

- 17.3.1 Wherever, the Depot Civil Contractor is not in a position to supply construction power and water supply to the Interfacing Contractor, the Contractor shall arrange for his own separate temporary construction power and water supply all at his own cost.

----- End of Chapter 17 -----



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MUMBAI METRO LINE 3

Part 2

EMPLOYER'S REQUIREMENTS

Section VI-A

GENERAL SPECIFICATIONS AND APPENDICES

LIST OF APPENDICES

**Mumbai Metro Rail Corporation Ltd
MMRC Line 3 Transit Office,
Wing 'A', 'E' Block,
Bandra-Kurla Complex,
Bandra (East) Mumbai 400 051.**



APPENDIX 1- Key Dates

1. KEY DATES

The Contractor shall prepare and submit his detailed Program of Work so as to achieve key dates of various activities on time. The Contractor shall complete the work in a phased manner by fixing priorities to different stretches of work to give access to the other interfacing Contractors as per the requirement of project from time to time and as per the key dates (mile stones) indicated below:

CONTRACT KEYDATES Schedule of Key Dates- Pit Jacks

Key date No.	Key Activity	Days
KD – 1	Submission of Equipment Preliminary Drawing, electric supply details and Equipment Foundation Drawing and obtain the Project Manager's 'Notice of No Objection' to the above.	56
KD – 2	Submission of Equipment detailed design drawings and Documents as required.	84
KD – 3	Dispatch of the Equipment to MML3 Depot Mumbai along with O&M Manual, Project Management Plans and Spare Parts Catalogue	350
KD – 4	Installation, Testing & Commissioning of the Equipment (excluding Guarantee tests) including Training of O&M Personnel of Employer and supply of Training Manuals	483
KD – 5	Completion of all obligations (including Guarantee tests) of the Contractor under the Contract	539

Schedule of Key Dates- Mobile Jacks

Key date No.	Key Activity	Days
KD – 1	Submission of Equipment Preliminary Drawing, electric supply details and Equipment Foundation Drawing and obtain the Project Manager's 'Notice of No Objection' to the above.	56
KD – 2	Submission of Equipment detailed design drawings and Documents as required	84
KD – 3	Dispatch of the Equipment to MML3 Depot Mumbai along with O&M Manual, Project Management Plans and Spare Parts Catalogue	322
KD – 4	Installation, Testing & Commissioning of the Equipment (excluding Guarantee tests) including Training of O&M Personnel of Employer and supply of Training Manuals	405
KD – 5	Completion of all obligations (including Guarantee tests) of the Contractor under the Contract	539



Schedule of Key Dates- Turn Tables

Key date No.	Key Activity	Days
KD – 1	Submission of Equipment Preliminary Drawing, electric supply details and Equipment Foundation Drawing and obtain the Project Manager's 'Notice of No Objection' to the above.	56
KD – 2	Submission of Equipment detailed design drawings and Documents as required	84
KD – 3	Dispatch of the Equipment to MML3 Depot Mumbai along with O&M Manual, Project Management Plans and Spare Parts Catalogue	322
KD – 4	Installation, Testing & Commissioning of the Equipment (excluding Guarantee tests) including Training of O&M Personnel of Employer and supply of Training Manuals	448
KD – 5	Completion of all obligations (including Guarantee tests) of the Contractor under the Contract	539

Notes on Key Dates:

1. The achievement of a Key Date shall be subject to the issuing of a Notice of No Objection from the Project Manager.
2. The achievement of a Key Date shall require completion of all the works specified for achievement of the Key Date.
3. The achievement of Key Dates shall be read in conjunction with the Interface Specifications to establish access requirements for Interfacing Contractors.

Schedule of Access Dates

The table below sets out the access dates when Site Areas will be made available to the Contractor together with the dates by which they must be vacated by the Contractor. These should be taken in to account in implementation schedule.

Equipment: Pit Jacks

Site area: **The area for Installation, Testing and Commissioning of Equipment.**

System	Access days	Vacate days	Reason for vacation
Depot Civil	385 days	483 days	Completion of the assembling, testing & commissioning and training.
E&M	380 days	----	
Track	380 days	----	



Equipment: Mobile Jacks

Site areas: **The area for Testing and Commissioning of Equipment.**

System	Access days	Vacate days	Reason for vacation
Depot Civil	320 days	350 days	Completion of the assembling, testing & commissioning and training.
E&M	380 days	--	
Track	380 days	---	

Equipment: Turn Tables

Site areas: **The area for Testing and Commissioning of Equipment.**

System	Access days	Vacate days	Reason for vacation
Depot Civil	320 days	343 days	Completion of the assembling, testing & commissioning and training.
E&M	380 days	--	
Track	380 days	---	

Applicable rate for liquidated damages

- 1) If the Contractor fails to deliver as per the Key Dates within the period fixed for such delivery in the Contract or as extended from time to time, or at any time repudiates the Contract before the expiry of such period, the Employer may, without prejudice to his other rights, recover from the Contractor as agreed Liquidated Damages as follows:
 - i) For KD- 2: 0.20 % of the Price in Schedule No 3 per each complete week of delay;
 - ii) For KD-3: 0.20 % of the Price in Schedule No 1 and/ or in Schedule No.2 per each complete week of delay;
 - iii) For KD- 4: 0.20 % of the Price in Schedule No 4 per each complete week of delay;
 - iv) For KD- 5: 0.30 % of the Price in Schedule No 4 per each complete week of delay;
- 2) There is no maximum limit in levy of LD for delays in individual Key Dates. However, the aggregate amount of such liquidated damages shall in no event exceed 10% of the Contract price.
- 3) In case the Contractor is able to achieve KD-4 without delay, all the applicable liquidated damages on KD-2 to KD-3 may be waived off and LD amount, if deducted, will be returned (without interest) to the Contractor.



----- End of Appendix 1 -----

APPENDIX 2- Definitions

Definition	Meaning
Access Dates	These are the dates that are to be achieved by the Interfacing Contractors and which are considered to be essential to the successful completion of the Contract to the Original planned schedule.
As-Built Drawings	These are those drawings produced by the Contractor and endorsed by it as true records of construction of the Works and which have been a given a Notice of No Objection by the PM.
Design Checker	Means a suitably qualified person appointed by the Contractor to check the Design of the Works.
Factory Acceptance Tests (FAT)	Means the tests to be performed at the Contractor's Works prior to delivery to the Site to verify compliance with the Specifications.
Installation Tests	Means the tests to be performed to verify the conformity of completion of an installation to the design documents previously issued a Notice of No Objection by the PM prior to the start Installation.
Service Trial	Means the phase after completion of the Integration Testing and Commissioning where the training and operating procedures are validated. Service Trial form part of the Tests and Inspection to be performed under the Contract.
Integrated Testing and Commissioning	Means those tests that demonstrate the integration of the complete system meeting the requirements of the Specification in an operating environment.
Validation	Means the process of confirmation by examination and provision of objective evidence that the application produced achieves the particular requirements specified.
Works	Means the Permanent Works or the Temporary Works, or either of them as appropriate.
Permanent Works	Means the Plant and Equipment to be supplied and installed, as well as all the Installation Services to be carried out by the Contractor under the Contract.
Temporary Works	Means the works that shall not remain on the Site after Employer's taking over of the Works.
Maintenance	Means the maintenance to be carried out in accordance with the Contractor's Maintenance Manual.
Preventive Maintenance	Means the maintenance specified by the Contractor's Maintenance Manuals to be carried out from the period of Taking over of the Contract Works.

----- End of Appendix 2 -----



APPENDIX 3- Programs

3. PROGRAMS

3.1 Time-scaled Network / Bar Chart

3.1.1 All programs shall be developed by computerised Critical Path Method (CPM) using the Precedence Diagramming Method (PDM) and shall be presented in either bar chart or time-scaled network diagram format, suitably coloured to enable easy reading. All duration for the purpose of programming shall be in calendar days. All reference to network shall mean time- scaled network unless otherwise specified.

3.1.2 The coding structure shall be such that the activities can be summarised to the various levels. Each level shall be summarised and collapsed to the next level using the programming software. The Contractor shall propose essential codes and activity codes to be used for review of the Project Manager. The Project Manager may require additional activity codes subject only to restrictions imposed by the programming software. Additional codes where necessary may be created by the Contractor with the approval of the Project Manager. Each activity in the network shall be coded, as a minimum, with the following:

- a) Contract number, activity type, and unique identification numbers.
- b) Activity codes to indicate Unit, Segment, Stage or Phase, for e.g. design, manufacturing, delivery, installation, etc.
- c) The Contractor shall note that breakdown of system into sub-systems is essential and shall be carried out not through further coding but through activity descriptions in a consistent manner such as to allow storing. However, the Project Manager shall have the right to require the Contractor to code sub-systems, using codes approved by him, if necessary.
 - i) Area, location and location details under Activity Code – Unit.
 - ii) Cost and resources
 - iii) Cost and resources codes shall be submitted for the approval of the Project Manager. For Bid purposes, the Bidder shall use its own codes.

3.1.3 All logical and necessary relationships between activities shall be shown.

3.1.4 All key dates indicated in the Contract shall be shown. In addition to the key dates, the Contractor may require certain events that are critical to its work to be reflected in its programs. These shall be reflected as "milestones". Appropriate activity codes shall be used to distinguish "milestones" from the Key Dates.

3.1.5 Activities pertaining to review/acceptance by the Project Manager and local authorities shall be identified. Where duration for review of the Contractor's submissions are specified elsewhere in the Contract, they shall be used. Where they are not specified, a duration of 30 days for review of each submission shall be used.

3.1.6 Activities outside the scope of the Contract that may affect the Contractor's progress shall be shown.

3.1.7 The activity network shall be organised so that major work sections are carefully coordinated with the Civil Contractor and the System-wide Contractors to allow opportunity for all to work with as minimal disruption as possible.

Activity descriptions shall be brief (<48 characters) and shall convey the nature and scope of the work. Uncommon abbreviations shall be explained in the legend. Float time shall be



distinguished from schedule performance.

3.1.9 The CPM Network Diagram shall be developed to permit modification to the schedule and allow for impacts on the schedule to be analysed by introduction of "what if" statements into the input data.

3.2 Time Scaled Network/Bar Chart Details

3.2.1 Design: The Design network/bar chart shall detail the various design, submission and acceptance stages including approval by local authorities and the Project Manager, preparation, submission and approval of drawings, manuals and all other activities related to the design.

3.2.2 Manufacturing: The manufacturing network chart shall indicate the relationship and duration of the activities necessary to procure, fabricate manufacture, assemble equipment/complete tests, ship and delivery of M&Ps in time to support the activities at site. It shall establish milestones for monitoring the progress of the manufacturing process. Major areas of work shall be shown as separate and distinct activities. The network shall also cover activities of Sub-Contractor as appropriate, including testing.

3.2.3 Testing and Commissioning: The Factory and On-Site Testing and Commissioning network/bar chart shall present the relationship and duration of those items relating to Commissioning tests including those related to other Interfacing Contractors. The network/bar chart shall present testing approach to be used, the deployment of resources in accordance with M&P delivery dates.

3.2.4 Integrated Testing: The Integrated Testing network/bar chart shall indicate the activities required to verify the functioning of the Equipment in conjunction with activities of the System-wide and Civil Contractors.

----- End of Appendix 3 -----



APPENDIX 4- Quarterly Progress Report

4 QUARTERLY PROGRESS REPORT

Note: Contractor shall refer to Para 2.8 of General Specifications regarding Employer's IT Requirements. The requirements pursuant to this Appendix shall be effected through the "Integrated Project Management Platform".

4.1 Contract Stages

4.1.1 General

The Contractor shall submit to the Project Manager, a Quarterly Progress Report. This Report shall be submitted by the end of each calendar Quarterly period and shall account for all work actually performed from 26th day of the last Quarter period and up to and including the twenty-fifth (25th) day of the Quarterly period of the submission. It shall be submitted in a format to which the Project Manager shall have given consent and shall contain sections/sub-sections for, but not be limited to, the topics listed in the clauses below.

4.2 Financial Status

4.2.1 A narrative review of all significant financial matters, and actions proposed or taken in respect to any outstanding matters.

4.2.2 A spread sheet indicating the status of all payments due and made.

4.2.3 A report on of the status of any outstanding claims. The report shall in particular provide interim updated accounts of continuing claims.

4.3 Physical Progress

4.3.1 It shall describe the status of work performed, including critical items and problem areas, corrective actions taken or planned and other pertinent activities, and shall, in particular, address interface issues, problems and resolutions.

4.3.2 It shall include a simplified representation of progress achieved compared with planned as derived from the Works Program.

4.4 Program Update

4.4.1 Program updating shall include:

a) The Bi-monthly Program Update which shall be prepared by recording actual activity completion dates and activities completed up to the twenty-fifth (25th) of the Quarterly period together with estimates of remaining duration and expected activity completion based on current progress. The Program Update shall be accompanied by an Activity Report and a Narrative Statement. The Narrative Statement shall explain the basis of the Contractor's submittal:

b) If the Updated Detailed Work Program indicates an actual or potential delay to Contract Completion date or Key Dates, identify causes of delays and provide explanation of Work affected and proposed corrective action to meet Key Dates or mitigate potential delays. Identify deviation from previous Quarterly period's critical path.

c) Discuss Variation Order Work Items, if any.

4.5 Milestones Status

A report on the status of all Milestones due to have been achieved during the Quarterly period and forecasts of achievement of any missed Milestones, and those due in the next



Quarterly period.

4.6 Planning and Co-Ordination

4.6.1 A summary of all planning/co-ordination activities during the Quarterly period and details of outstanding actions.

4.6.2 A schedule of all submissions and consents/approvals obtained/outstanding.

4.7 Areas of Concern & Critical Issues

The Contractor shall submit a review of all areas of concern and critical issues during the Bi-monthly period including appropriate details of such issues for drawing attention of the Project Manager.

----- End of Appendix 4 -----



APPENDIX 5- Interface Sheet

Attachment A - Interface Specification Form

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



Attachment B - Confirmation of Co-ordination Form

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



Attachment N – Indicative Interface Sheets for Contract MM3-CBS-DEQ

SL NO	Description
N1	Indicative Interface Sheet for Depot Equipment (DEQ) and Rolling Stock (RS)
N2	Indicative Interface Sheet for Depot Equipment (DEQ) and for Signalling & Train Control, Platform Screen Doors and Telecommunication Systems (STPT)
N3	Indicative Interface Sheet for Depot Equipment (DEQ) and Track Work (TWK-01)
N4	Indicative Interface Sheet for Depot Equipment and Asset Management System (AMS)
N5	Indicative Interface Sheet for Depot Equipment (DEQ) and Detailed Design Consultant (DDC)
N6	Indicative Interface Sheet for Depot Equipment (DEQ) and Depot Civil Works (DPT)



APPENDIX 5- INTERFACE SHEET

N1. Indicative Interface Sheet for Depot Equipment (DEQ) and Rolling Stock (RS)

Mumbai Metro Interface Sheet	Contract A	DEQ	Contract B	RS	Rev # :	AI
Approved by:	DEQ (Depot Equipment) (Lead Contract)		RS (Rolling Stock) (Participating Contract)		Date:	03/04/17
GC issued by:					First issue:	
Checked by:						
General Interface details between the Rolling Stock (RS) and Depot Equipment (DEQ)						
Contract A (DEQ)	DESIGN STAGE			Contract B (RS)		
DE/RS-01: Shall ask and collect, from Contractor B, all relevant, information and maintenance requirements regarding Rolling Stock characteristics and detailed design to incorporate in Equipment design to suit the maintenance requirement Rolling Stock.	DE/RS-01: Shall give details, at time to Contractor A, like any relevant information and maintenance requirements regarding Rolling Stock characteristics and detailed design.					
Contract A (DEQ)	CONSTRUCTION / INSTALLATION STAGE			Contract B (RS)		
DE/RS-04: Shall ensure conformance to design parameters during manufacturing Depot Equipment.	DE/RS-04: Shall give conformance to Contractor A regarding design parameters					
Contract A (DEQ)	TEST & COMMISSIONING STAGE			Contract B (RS)		
DE/RS-06: Shall conduct joint tests demonstrating that Depot Equipment are adapted and compliant to Rolling Stock characteristics and requirements.	DE/RS-06: Shall attend and provide necessary support to Contractor A during Depot Equipment tests and commissioning.					



Mumbai Metro Interface Sheet	Contract A	DEQ	Contract B	RS	Rev # :	AI
Contract A (DEQ)					Date:	03/04/17
MAINTENANCE STAGE						
Contract A (DEQ)			Contract B (RS)			
<p>DE/RS-7: Shall prepare and provide Maintenance Manual of supplied Depot Equipment.</p>			<p>DE/RS-7: Shall review and comment Operation Manuals to ensure that the operational process of Depot Equipment is compliant with Rolling Stock requirements.</p>			



N2. Indicative Interface Sheet for Depot Equipment (DEQ) and for Signaling & Train Control, Platform Screen Doors and Telecommunication Systems (STPT)

Mumbai Metro Interface Sheet	Contract A	STPT	Contract B	DEQ	Rev #:	A3
Approved by:	STPT		DEQ (Depot Equipment)		Date:	23/09/17
GC issued by:	Lead Contract		Participating Contract		First issue:	
Checked by:						
General Interface details between the Signalling & Train Control, Platform Screen Doors and Telecommunication Systems (STPT) and Depot Equipment (DEQ)						
Contract A (STPT)		DESIGN STAGE		Contract B (DEQ)		
ST/DE-01: Shall design LAN telephone wiring to locations required by DEQ		ST/DE-01: Shall determine and provide to STPT the locations required for LAN service. The locations shall be provided on depot architectural drawings				
Contract A (STPT)		CONSTRUCTION / INSTALLATION STAGE		Contract B (DEQ)		
ST/DE-02: Shall install LAN/telephone wiring to locations required by DE and configure for internet connectivity.		ST/DE-02: Shall confirm LAN wiring for Depot Equipment is in agreed Location.				
Contract A (STPT)		TEST & COMMISSIONING STAGE		Contract B (DEQ)		
ST/DE-03: Shall arrange temporary internet connectivity for LAN wiring locations required by DEQ. Shall show this interface in ST as-built drawings.		ST/DE-03: Shall confirm working internet connection of LAN wiring for Depot Equipment.				
ST/DE-04: Shall demonstrate working telephones at locations required by DEQ. Shall show this interface in TEL O&M Manual		ST/DE-04: Shall demonstrate working telephones at locations required by DE.				



N4- Indicative Interface Sheet for Depot Equipment and Asset Management System (AMS)

Mumbai Metro Interface Sheet	Contract A	AMS	Contract B	DEQ	Rev #	: A
Approved by:	AMS (Asset Management System) Lead Contract		DEQ (Depot Equipment) Participating Contract		Date	08/09/2017
GC issued by:					First issue:	
Checked by:						
Contract A (AMS)		DESIGN STAGE		Contract B (DEQ)		
AMS/DEQ-01: Shall collect all relevant data about the Equipment from Contract B		AMS/DEQ-01: The Contractor shall share the list of all components, sub-components of equipment along with operational data in MS Excel.				
Contract A (AMS)		CONSTRUCTION / INSTALLATION STAGE		Contract B (DEQ)		
AMS/DEQ-02: Shall coordinate and update data inputs on AMS.		AMS/DEQ-02: Shall coordinate with Contract A with any further relevant data required in updating on AMS				



N5. Indicative Interface Sheet for Depot Equipment (DEQ) and Detailed Design Consultant (DDC)

Mumbai Metro Interface Sheet	Contract A	DEQ	Contract B	DDC	Rev #:	A0
Approved by:	Depot Equipment Contractor (Interface Lead)		Detailed Designed Consultant (Interface Follower)		Date:	03/02/2017
GC issued by:					Last changes:	
GC Checked by:						
General Interface details between Depot Contractor and Detailed Designed Consultant						
Contract A (Depot Equipment)		DESIGN STAGE			Contract B (Detailed Design Consultant)	
DE/DDC-01: Mobile lifting Jacks & under floor lifting system (Pit Jack) for 8 cars – Shall give requirements for Pit Size, Floor Surface, foundation details, markings, etc.					DE/DPT-01: Shall prepare the civil construction drawings along with interfaces.	
DE/DDC-02: Bogie Turn Table -Shall define the requirements for mounting foundation, etc. for Bogie Turntables					DE/DDC-02: Shall prepare the civil construction drawings along with interfaces.	



N6. Indicative Interface Sheet for Depot Equipment (DEQ) and Depot Civil Works (DPT)

Mumbai Metro Interface Sheet		Contract A	DEQ	Contract B	DPT	Rev #:	A5
Approved by:		Depot Equipment (DEQ) Lead Contract		Depot Civil Works (DPT) Participating Contract		Date:	15/05/20
GC issued by:						First issue:	
Checked by:							
General Interface details between Depot Equipment (DEQ) and Depot Civil Works (DPT)							
Contract A (DEQ)		CONSTRUCTION / INSTALLATION STAGE				Contract B (DPT)	
DEQ/DPT -01: Shall co-ordinate with Contract 'B' for construction of various Civil requirements (Foundation, pits, RC, Control Panel Buildings, plinth, flooring, structures, cable trenches, etc. if & as applicable in different Depot Equipment) as per the drawings & data submitted.		DEQ/DPT-01: Shall construct the various Civil requirements (Foundation, pits, buildings, plinth, flooring, structures, drainage lines, cable trenches, etc. if & as applicable in different Depot Equipment Contracts) as specified by Contract 'A' for respective DEQ equipment.					
DEQ/DPT -02: Shall jointly check with Contract 'B' the provision of Civil requirements and confirm the correctness of the same as per the drawings & data submitted.		DEQ/DPT-02: Shall coordinate with Contract 'A' for joint checks of the Civil requirements for respective DEQ equipment.					
DEQ/DPT -03: Shall provide installation of plant & equipment with water pipelines from water supply point. Shall co-ordinate with Contract 'B' in the installation & commissioning work.		DEQ/DPT-03: Shall coordinate with Contract 'A' in installation and commissioning of Depot Equipment.					



APPENDIX 6- Drafting and CAD Standards

6. DRAFTING AND CAD STANDARDS

Note: Contractor shall refer to Para 2.8 of General Specifications regarding Employer's IT Requirements. The requirements pursuant to this Appendix shall be effected through the "Integrated Project Management Platform", as applicable.

6.1 Introduction

- 6.1.1 The purpose of this document is to define the minimum Drafting and CAD standard to be achieved by the Contractor for all drawings produced by the Contractor for the purpose of the Works.
- 6.1.2 By defining a common format for the presentations of drawings and CAD files, the exchange of drawn information is improved and will maximise the use of CAD in the co-ordination process.
- 6.1.3 All submissions shall be made to the Employer's Requirement in a format reviewed without objection by the Employer's Requirement and in accordance with the requirements in:
- the Contract;
 - the Document Submittal Instructions to Consultants and Contractors.
- 6.1.4 Paper and drawing sizes shall be "A" series sheets as specified in BS 3429.
- 6.1.5 The documents shall be submitted in the following software unless otherwise stated, for the various electronic submissions required. Any formulae / micros / programs used therein shall not be hidden / masked and must be visible and transparent without any compromise and shall be validated for the submissions. The following software compatible for use with Intel-Windows based computers shall be used, unless otherwise stated, for the various electronic submissions required:

Document Type	Electronic Document Format
Text Documents	MS office Professional (latest version)
Spread Sheets	MS office Professional (latest version)
Data Base Files	MS office Professional (latest version)
Presentation Files	MS office Professional (latest version)
Programs	Primavera enterprise/M S Project (latest version)
AutoCAD Graphics	AutoCAD 2016 OR latest
Photographic	Adobe Photoshop CC (2015.5) OR latest
Desktop Publishing	Adobe Page Maker 7.0 OR latest
CADD Drawings	AutoCAD 2016 OR latest

- 6.1.6 Media for Electronic File Submission: One copy shall be submitted unless otherwise stated in CD-ROM / DVD / USB Stick / Pen Drive.

6.1.7 Internet File Formats/Standards

The following guidelines shall be followed when the Contractor uses the Internet



browser as the communication media to share information with the Employer.

- b) All the data formats or standards must be supported by Microsoft Internet Explorer or other web browser (latest version) running on latest version of Windows.
- c) The following lists the file types and the corresponding data formats to be used on the Internet. The Contractor shall comply with them unless prior consent is obtained from the Employer's Requirement for a different Data format:

File Type	Data Format
Photo Image	Joint Photographic Experts Group (JPEG)
Image other than Photo	GIF or JPEG
Computer Aid Design files (CAD)	Computer Graphics Metafile (CGM)
Video	Window video (.avi)
Sound	Wave file (.wav)

- 6.1.8 The following states the standards to be used on Internet when connecting to database(s). The Contractor shall comply with them unless prior consent is obtained from the Employer's requirement for a different standard:

Function to be Implemented	Standard to be Complied With
Database connectivity	Open Database Connectivity (ODBC)
Publishing hypertext language on the World Wide Web	Hypertext Markup Language (HTML)

The hard copy of all documents shall be the Contractual copy.

6.2 Building Information Modelling (BIM)

The Contractor shall get Civil & Architecture BIM Model of the Depot Building using software REVIT 2017 or latest. The Eqpt Contractor shall incorporate his BIM model of the Equipment in the Civil & Architecture BIM Model using software the same software. Wherever Civil & Architecture Model is not available, the Contractor shall submit the BIM model of the Equipment after finalization of the design.

The BIM Model of the Equipment shall include foundation, trenches, cable ducts and all parts of the Equipment etc. whichever is applicable. Notice of No Objection of REVIT model shall be obtained by the Contractor from Project Manager.

6.3 General Requirements

6.3.1 General

- a) The Contractor shall adopt a title block similar to that used in the Drawings for all drawings prepared under the Contract.
- b) Each drawing shall be uniquely referenced by a drawing number and shall define both the current status and revision of the drawing.
- c) The current status of each drawing shall be clearly defined by the use of a single letter code as follows:



P - Preliminary Design Drawing
F - Final Design Drawing
B- As Built Drawing
M - As Manufactured Drawing

6.3.2 Types of Drawing

- a) "Design drawings" mean Preliminary or Final Design drawings.
- b) "As-built drawings" show the Works exactly as constructed or installed. They are usually prepared by amending the working drawings to take in to account changes necessitated by site conditions and described in Site drawings. These drawings shall be completed on a regular basis as the works progress, and shall not be left until completion of the entire works.
- c) 'As Manufactured Drawing' show the details to which the Equipment is manufactured.

6.4 Computer Aided Design & Draughting (CAD) Standards

6.4.1 Introduction: Data input procedures between the Project Manager and Contractor must be coordinated, and the key parameters used to form CAD data files must be standardized. The production of all CAD data files shall comply with the following requirements.

6.4.2 Objectives: The main objectives of the CAD standards are as follows:

- a) To ensure that the CAD data files produced for Project are coordinated and referenced in a consistent manner
- b) To provide the information and procedures necessary for a CAD user from one discipline or external organization to access (and use as background reference), information from a CAD Data file prepared by another discipline or external organization.
- c) To standardize the information contained within CAD data files which may be common to More than one discipline such as drawing borders, title boxes, grid lines, etc.
- d) To establish procedures for the management of CAD data files.
- e) To ensure all Contractors use "Model space" and "Paper space" in the production of their CAD files.

6.4.3 Terminology & Associated Standards / Guidelines

Any terminology used within this section that is ambiguous to the user shall be clarified with the Employer's Requirement. British Standard BS1192 is used in principle as a guide for drawing practice, convention, CAD data structure and translation.

6.4.4 Paper Drawings

- a) For the Project "Paper" drawings are considered to be the main vehicle for the receipt and transmittal of design and production information, typically plans, elevations and sections.
- b) The Project wide accepted media for the receipt and transmittal of "Paper" drawings will be paper and polyester film of various standards ISO "A" sizes. The composition of this information shall be derived from a CAD "Model".

The CAD derived "Paper" drawing composition will reflect a window of information



contained within a CAD "Model Space" file together with a selection of information contained within the associated CAD "Paper Space" file.

6.4.5 CAD Data Creation, Content & Presentation

A consistent method of CAD data creation, together with content and presentation is essential. The method of CAD "Model Space and Paper Space" creation is as follows:

a) Model Space Files

Typically, CAD "Model Space" files are required for general arrangement and location plans and will consist of a series of other "Model Space" referenced CAD files covering the total design extents at a defined building level (the number of referenced files should be kept to an absolute minimum). Data contained within a CAD "Model Space" files is drawn at full size (1:1) and located at the correct global position and orientation on the Project Grid / or defined reference points.

Each CAD "Model Space" file will relate to an individual discipline. Drawing border / text, match / section lines or detailed notation shall NOT be included within a CAD "Model Space" file. Dimensions shall be included within a CAD "Model Space" but located on a dedicated layer. Elevations, Long Sections and Cross Sections shall also be presented in CAD "Model Space" as defined above, but do not need to be positioned and orientated on the Project Grid.

b) Paper Space CAD Files

"Paper Space" CAD files are utilized to aid the process of plotting "Paper" drawings and are primarily a window of the CAD "Model Space" file. A "Paper Space" CAD file will typically contain drawing borders, text, match or section lines & detailed notation. Once these files are initially set up and positioned, the majority of "Paper Drawing" plots at various approved scales are efficiently and consistently generated by displaying different combinations of element layers and symbology contained within the "Paper Space" file and the referenced "Model Space" files.

The purpose is to ensure that total co-ordination is achieved between the CAD "Model Space" file and the "Paper Drawing" output during the revision cycle of the design and production process. Duplicated data in "Model and Paper Space" files will not be acceptable unless an automatic update link exists between the two data sets. "Paper Space" files are not typically required as part of the CAD Media Receipt from Contractors, unless specifically requested.

6.4.6 CAD Quality Control Checks

Random CAD Quality Control Audits will be carried out by Project Manager on all CAD media received and transmitted.

These checks DO NOT verify the technical content of the CAD data received or transmitted (as this is the responsibility of the originating organization), however compliance with Project CAD and Drafting Standards shall be checked.

In addition, all Contractors who transmit and receive CAD data from the Project shall have CAD quality control procedures in place. A typical quality control procedure shall contain CAD data quality checking routines coupled with standards for CAD data transmittal and archiving.

6.4.7 CAD Data Transfer Media and Format



When CAD data is received & transmittal between Project Manager and the Contractor, the media shall be as follows:

- a) Data Exchange Format - AutoCAD (latest) (.DWG).
- b) Operating System - / Window NT 4 /Windows2007/2010 (latest version)
- c) Data Transfer Media: DVDs / Hard Disc (or other better means)
All media must be labeled on the data shield with:
 - Name of Company
 - Project Title
 - Drawing Filenames (for diskettes only)
 - Diskette No. / Total No. of diskettes or Tape No. / Total No. of Tapes
- d) All media shall be submitted with a completed Form (CAD Disk/Tape Sheet).
- e) The Contractor must ensure the supplied media is free from virus.
- f) Sub-directories on tapes or disks are not permitted. If CAD Data is created using UNIX, archive commands must be uprooted.

6.4.8 CAD Media Receipt & Transmittal

- a) CAD Media Transmittal (from the Contractor to Project Manager) - this will consist of the following:
 - i. CAD Digital Media (disk(s), CD"s) shall typically contain CAD "Model Space" and "Paper Space" files.
 - ii. CAD data sheet
 - iii. CAD issue / revision sheet
 - iv. CAD Quality Checklist confirming compliance.
 - v. Plot of each "Model Space" file issued on an A1 drawing sheet (to best fit).
- b) The above CAD media will be collectively known as "CAD Media Transmittal Set". The CAD data file transmittal format required by Employer' Representative from all Contractors shall be in AutoCAD version as stated in Clause 6.1.5 above.
- c) All CAD media received from Contractors will be retained by Project Manager except for SCSI disk (if used) as an audit trail / archive of a specific Contractor's design evolution.
- d) CAD Media Receipt (from Project Manager to the Contractor)
CAD media should normally be obtained from the respective Interfacing Contractor(s), but should Project Manager issue CAD media it will consist of the following:
 - i. CAD Digital Media (disk (s) or tape (s)) typically contain only CAD "Model Space" files.
 - ii. CAD data sheet
 - iii. CAD issue / revision sheet
- e) The above CAD media will be collectively known as the "CAD Media Receipt Set". The CAD Data file transmittal format used by Project Manager to all Contractors will be in AutoCAD version as stated in Clause 6.1.5above.
- f) Each CAD transmittal disk / tape will be labeled with proper disk label as approved by the Project Manager. Any CAD data transmitted without this label is assumed to be provisional information not to have been quality checked and therefore not formally



issued.

6.5 Revisions

- 6.5.1** All „Revisions“, “In Abeyance“ and “Deletions“ shall be located on a common layer. This layer can be turned on or off for plotting purposes.
- 6.5.2** The following example text indicates the current CAD file revision, i.e. “Revision [A]”. This shall be allocated to a defined layer on all CAD “Model Space” files, in text of a size that will be readable when the CAD “Model Space” file is fitted to the screen, with all levels on.

6.6 Block Libraries, Blocks, & Block Names

- 6.6.1** All Construction Industry symbols produced as CAD Cells shall typically conform to British Standard BS1192 - part 3.
- 6.6.2** All Blocks created shall be Primitive (i.e. NOT Complex) and shall be placed Absolute (i.e. NOT Relative).
- 6.6.3** The Contractor's specific block libraries shall be transmitted to Project Manager together with an associated block library list containing the filename (max. 6 characters) and block description. The Contractor shall ensure that the library is regularly updated and circulated to all other users, together with the associated library listing.
- 6.6.4** All Blocks of a common type, symbols or details should initially be created within a CAD “Model Space File” specifically utilized for that purpose. These files will be made available on request by Project Manager.
- 6.6.5** All Blocks created will typically be 2D unless 3D is specifically requested. In both instances, they shall have an origin at a logical point located within the extents of each Block’s masked area or volume.

6.7 CAD Dimensioning

Automatic CAD Dimensioning will be used at all times. Any dimensional change must involve the necessary revision to the model space file. If the CAD Quality Control Checks find that the revisions have not been correctly carried out, the rejection of the entire CAD submission will result.

6.8 CAD Layering

All CAD elements shall be placed on the layers allocated for each different discipline. The layer naming convention to be adopted by the Contractor shall be submitted for acceptance and inclusion within these standards.

6.9 Global origin, Location & Orientation on the Alignment Drawing

- a) Location or Plan information in “Model Space” files shall coincide with the correct location and orientation on the Project grid for each specific Contract.
- b) Location plans shall have at least three setting out points shown on each CAD “Model Space” file. Each setting out point shall be indicated by a simple cross hair together with related Easting and Northing’s co-ordinates. The Civil Contractor(s) will establish the three setting out co-ordinates for their respective works, which will then be used by all other Contractors including the Contractor.

6.10 Line Thickness and Colour

To assist plotting by other users, the following colour codes will be assigned to the following line thickness / pen sizes:



Colour	Code No.	Line Thickness
Red	10	0.18
White	7	0.25
Yellow	2	0.35
Brown	34	0.5
Blue	130	0.7
Orange	30	1.0
Green	3	1.4
Grey	253	2.0

6.11 CAD Utilization of 2D & 3D Files

Although the project standard is 2D CAD files, certain disciplines and Contractors may use 3D CAD files for specific applications or where the isolated use of 3D aids the design and visualization process (i.e. Architecture, Survey and Utilities). In these specific instances 3D CAD data will only be transmitted if all other users can use this data. If this is not the case, 3D to 2D translation shall be processed by the creator prior to issue.

6.11.1 CAD File Naming Convention – General

CAD “Model Space” files shall be named in accordance with general drawing conventions.

----- End of Appendix 6 -----



APPENDIX 7- List of Deliverables by the Contractor

7.0 Schedule of Items to be submitted by Contractor:

This Appendix- of Part 2, Section VI-A compiles the principal items to be submitted by the Contractor to the Project Manager. 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.

Sr No.	Article	Reference Clause in Respective Chapter	To be Submitted
1	Works Program (includes Design, Manufacturing, Manufacturing Testing, Delivery, Installation, Testing & Commissioning Program)	2.2	Within 35 days of the Effective Date
2	Quarterly Progress Report	2.9	Every Quarter
3	Quality Plan	3.5	Within 56 days of the Effective Date
4	RAMS Plan	3.6	Within 56 days of the Effective Date
5	Safety Plan	3.7	Within 56 days of the Effective Date
6	Manufacturing Testing and Delivery Plan	3.8	Within 56 days of the Effective Date
7	Preliminary Design & Drawings including foundation drawing and Report if any	3.4.1 & 3.4.2	Within 56 days of the Effective Date
8	Final Design & Drawings including calculation and Report if any	3.4.1 & 3.4.2	Within 84 days of the Effective Date
9	3- D BIM model of Equipment	6.2 of Appendix 6	Within 84 days of the Effective Date
10	Submission of technical details if required for Obtaining sanction of statutory authorities.	As required by PM	Within 434 days of the Effective Date
11	As Built/ Manufactured Drawings	5.9	Within 434 days of the Effective Date
12	Details of Spare parts including Catalogue	14.8	Within 434 days of the Effective Date
13	Installation, Testing & Commissioning Plan	3.10	Within 84 days of the Effective Date
14	Training Plan & Training Content	3.11	Within 84 days of the Effective Date
15	Operation and Maintenance Manual	5.9, 12.2,12.3 & 12.4	Within 434 days of the Effective Date
16	Maintenance Plan	3.12	Within 434 days of the Effective Date

----- End of Appendix 7 -----



APPENDIX 8- General Electrical Requirements

8 General Electrical Requirement

8.1 Motors:

- 8.1.1 All equipment shall withstand the local climatic and environmental conditions (temperature, humidity, dust, etc.) defined in Clause 1.3 above.
- 8.1.2 The motors shall be dust and water splash proof and shall be suitable to work on 415V AC, 50Hz, three phase, 4 wires supply.
- 8.1.3 The protection level of the motors shall be at least IP 55 for internal and IP 65 for external motors unless mentioned otherwise in PS.
- 8.1.4 These shall be ventilated and specially designed for duty ratio and start-ups per hour as per equipment group and shall be fitted with a built-in under voltage electric brake, wherever required.
- 8.1.5 The Contractor shall specify but not limited to the following details:
- the brand,
 - the type,
 - the insulation class: H
 - the power,
 - the nominal rotation speed,
 - the current input at start-up,
 - the current input under nominal load,
 - the construction of the rotor, stator winding
 - the brand of brake,
 - the type of brake,
 - the mode of action of the brake,
 - the nominal braking torque.
- 8.1.6 The motors shall be sized such as to withstand the start-up forces and sudden braking and accidental blocking forces without damage. They shall be protected on all three phases. The Contractor may also propose a variable power supply wherever felt advantageous.
- 8.1.7 The control gear for AC/DC motors shall incorporate the following protection devices as concomitant accessories.
- No Voltage Protection** - No voltage protection shall be provided so that Plant will not start up again by itself when, following an interruption the supply is restored.
 - Short Circuit Protection** - To protect against short circuits due to insulation failure of faulty connections HRC fuses shall be provided for each motor. The rating of the fuse shall be such as to take care of the over current due to motor starting.
 - Over Load Protection** - To prevent motors from overloading, overload protection shall be provided separately for each motor. Three phase motors shall be protected by overload tripping devices on each phase.
 - Single Phasing Protection** - A separate current sensitive delayed action single phasing preventer shall be provided for each motor separately. Overload protection shall not be treated as single phasing preventer.

8.2

Electrical cabinet:

Material for electrical cabinet shall be stainless steel grade -316L. Cubicles shall be



symmetrically arranged as far as possible

- b) 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.
- c) Where a number of different items are in close proximity, the enclosure shall be grouped to form a single suite or a composite enclosure shall be provided.
- d) Each suite of panels or cubicles shall be fitted with a designation label giving 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.
- e) All electrical and electronic equipment/components used in the plant shall be designed for use in outdoor application in very rough environmental conditions (as specified) of Mumbai (power, control, regulation, etc.) & shall be contained in a dust and water splash tight cabinet and shall be at least IP 56.
- f) An approved method of construction shall be employed and the use of externally visible assembly bolts and screws will not be accepted.
- g) The design of cubicles shall be such as to ensure adequate ventilation and air circulation without permitting the entry of vermin. Dust penetration shall be kept to a minimum by the fitting of recessed rubber seals around doors and removable panels.
- h) 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.
- i) Control wiring within the cubicles shall be neatly looped or contained in purposely designed trunking unless every cable is insulated for the highest voltage present in accordance with the requirements of BS 7671.
- j) The front door of all cubicles shall only be opened when the functional unit is shut off.
- k) Live panel wiring terminations shall have a protective cover and warning labels. Where the voltage exceeds 110V dc or ac, danger signage 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 Employer's Representative.

8.3 Electrical cabinet equipment:

- a) 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.
- b) 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. The arrangement shall be got approved first by the Employer.
- c) 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.
- d) 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.



- e) Where inter-panel wiring passes through panel side sheets the access hole shall be fitted with a suitable rubber grommet.
- f) Identification ferrules shall be fitted on all wires at both ends; numbers and letters used shall correspond with the appropriate wiring diagram and shall be read from the terminal's 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.
- g) The wires shall not be jointed or broken in between terminal points.
- h) Wiring for all known future equipment shall be provided and all wires shall be terminated.
- i) Wires of different voltages, AC or DC shall be completely separated.
- j) All equipment and terminals associated with voltages in excess of 110V shall be fully shrouded.
- k) Isolators, clearly labelled, shall be provided in such positions and connections so that maintenance can be carried out with maximum safety.
- l) All power supply terminals and cables shall be marked in accordance with the electrical schematic diagrams.
- m) The functions of the main components shall be identified on engraved labels whose content is identical to that given on the electrical schematic diagrams. 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.
- n) If the cubicle contains items of equipment which may retain electrical charges after they have been switched off, a warning label shall be provided.
- o) All labels shall be of Formica engraving laminate or similar approved, of ample size and engraved in English characters. A permanent mechanical means of fixing these labels shall be provided, other than by adhesives.
- p) All equipment and apparatus, both inside and outside the switchboard, including instruments, meters, and relays, which is not clearly identified by integral labelling, shall be adequately labelled by means of an engraved label bearing, in black letters on a white background.
- q) 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 latest state of the art overload & short-circuit protections. 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 10 kA, and that for MCCB shall not be less than 25kA. In case of Residual Current Circuit Breakers with Integral Overload Protection, manually operated ON/OFF facilities shall be provided.
- r) Auxiliary switches supplied for indication, protection, metering, control interlocking and supervisory purposes shall be readily accessible and enclosed in a transparent dust-proof cover. Terminal blocks at different voltages shall be segregated into voltage groups and terminal board layouts shall correspond with the wiring diagrams.
- s) Fuses and links shall be provided to enable any circuit to be isolated as for maintenance and test purposes without isolating the whole panel.
Push Buttons shall be coloured as follows:



- (i) "Start" - Green;
 - (ii) "Stop" Red;
- All other push buttons shall be black.
- u) Emergency stop push buttons shall be provided and positioned in the immediate vicinity of the associated motor drive
 - v) 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 stay put on push type 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.
 - w) All control circuit supplies for contactor starting shall be obtained from a 110V internal control transformer contained in the cubicle.
 - x) Main drive motor starters shall be suitable for their required frequency duty in line with this Particular 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. Protective, control, interlock and alarm relays shall be placed in positions readily accessible during operation of the plant.
 - y) All the equipment shall be designed to operate in electrified railway environment. It shall in particular be protected against the following effects: i) the numerous disturbing phenomena due to the proximity of high amperage current liable to be working in switching mode, ii) the proximity of equipment generating high frequencies (converters, etc.,) various parasitic disturbances, and against power supply anomalies such as: high ripple ratio, high over-voltage, slow voltage or frequency variations, etc.
 - z) All components, and in particular the relays, shall be of the high endurance type whose high degree of reliability shall allow normal operation of the Equipment over a period of 10,000 (ten thousand) hours necessary.

----- End of Appendix 8 -----



APPENDIX 9- General Mechanical Requirements

9 General Mechanical Requirement

9.1 Materials - General:

- a) 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.
- b) All material used shall be of current production and well-proven application for the design and intended usage.
- c) 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.

9.2 Workmanship - General:

- a) Workmanship and general finishes shall be of best quality and in accordance with best workshop practice.
- b) 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.
- c) 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.
- d) 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.
- e) All equipment shall operate without excessive vibration and with a minimum of noise.

9.3 Materials and Ancillaries:

9.3.1 Structural Steel Sections:

- a) Hot rolled structural steel section shall comply with BS 4: Part 1.
- b) Corrosion protection shall be by hot dip galvanization with minimum thickness of coating of 85 micron or heavy protective finish as specified in the Specification.

9.3.2 Mild Steel:

- a) Mild steel for general purposes shall conform to the requirement of BS: 4360.
- b) Steel parts shall be galvanized as appropriate to approved standards and as specified above. Uncoated or non-corrosion resistant steel parts shall not be used unless otherwise approved by the Employer's Representative.

9.3.3 Steel Castings and Forgings:

- a) All steel castings shall conform to the requirements of BS: 3100. Forgings shall conform to BS: 29.
- b) No repair shall be undertaken without prior Approval by the Employer's Representative. 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.

9.3.4 Corrosion Resistant Steel:

- a) Unless otherwise specified or approved by the Employer's Representative, 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 8. Stainless and heat-resisting steel plates, sheet and strip shall comply with BS 1449: Part 2, grade 304 unless otherwise specified.

- b) 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 marks on the exterior surface. All stainless steels shall be subject to Approval by the Employer's Representative.

9.3.5 Bronze:

Bronze castings for bearings, packing boxes, and similar applications shall be of the phosphor bronze type to BS 1400.

9.3.6 Copper:

- a) Copper tubing shall be of the seamless type to BS 2871.
b) Copper for electrical purposes shall conform to the requirements of BS1432-4 and BS 1977 as appropriate for the duty.

9.3.7 Brass:

Brass tubing shall be of the heavy gauge seamless type and shall comprise 70%, copper, 29% zinc and 1% tin.

9.4 **Welding and Fabrication:**

These Clauses on welding refer to fabrications in mild steel. If the Contractor supplies any equipment welded from other metals, he shall propose the relevant welding standards and procedures for the acceptance of the Client's Representative.

9.4.1 **Distortion and assembly:**

- a) Metal arc welding shall comply with the provisions of BS EN 499 and BS 5135 or equivalent. The temperature of steel shall be more than 10°C when welding is commenced. Finished members shall be true to line and free from twists, bends and open joints.
- b) During the fabrication of a welded assembly, the procedure and sequence shall be such as to minimize distortion and shrinkage. All welds shall be deposited in a sequence that will balance the applied heat as welding progresses.
- c) Members to be joined by welding shall be accurately cut to size to ensure that the finished dimensions are met and, where required, shall be rolled or pressed to proper curvature in accordance with the approved drawings. Edges of members shall be suitably machined for the required type of welding and to permit thorough penetration.
- d) The design of welded joints and connections, and the fabrication of welded steel parts shall conform to the requirements of an acceptable British Standard or equivalent for structural steelwork and shall also be stress relieved to an acceptable British Standard



or equivalent if required. If stress relieving is used, then the Contractor shall ensure that no distortion arises as a result of the process and that the finished size of the equipment is within the required tolerances.

- e) Any welding of steel castings to the framework shall conform to BS 4570 or equivalent.

9.4.2 Equipment:

- a) Electrodes, fluxes and equipment shall be used in accordance with the manufacturer's instructions. The use of welding processes, other than those covered by BS 5135 or equivalent will be subject to be reviewed and acceptance by the Client's Representative. Welding electrodes for manual electric arc welding shall be of the heavily coated type, suitable for all positions of welding.
- b) All welding shall be performed by a process, which will exclude the atmosphere from the molten metal and, wherever possible, be under procedure control using automatic machines. Electric arc welding is preferred.

9.4.3 Quality assurance:

- a) Procedures in line with ISO 9000 or equivalent shall be followed as part of the Quality Plan for all welding procedures and welder certification. These procedures and certifications shall be in line with BS EN 287 and BS EN 288 or equivalent.
- b) All critical welds, as identified by the Contractor, shall be traceable. The Contractor shall submit weld maps and a sample of weld traceability records. These critical welds shall also be subject to a non-destructive test to be proposed by the Contractor for the review and acceptance of the Client's Representative.
- c) Welding shall be carried out by qualified welders only. Welding procedures and welder certificates in accordance with BS EN 288 and BS EN 287 or equivalents shall be followed by the Contractor

9.4.4 Preparation and cleaning:

- a) 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 25 mm back from weld edges. The Contractor shall indicate on his drawings material grade to be used for all fabrications.
- b) Particular care shall be exercised in aligning and separating edges of members to be joined by butt-welding in order to ensure complete penetration and fusion at the bottom of the joint. Each fully penetrated butt joint shall be finished with a sealing run.
- c) All galvanized surfaces to be welded shall have all zinc coating thoroughly removed by means of angle grinding until bare parent metal is revealed. Care must be exercised not to remove more parent metal than absolutely necessary so as not to weaken the strength of the structure.
- d) After deposition, welds shall be cleaned of slag and shall show uniform sections, smoothness of weld metal, feather edges without overlay and freedom from porosity, inclusions and undercut. As a minimum, visual inspection at the edges and ends of welds shall indicate sound fusion with the parent metal. The Contractor shall propose for the



acceptance by the Purchaser's Representative the standards and criteria to be used for weld acceptance. In the case of pressure-tight components, all slag shall be removed by shot-blasting.

9.5 Gearboxes and Gearing:

- a) All gears shall be heat treated for maximum wear and fracture resistance. High speed gears shall be of helical teeth configuration. Each geared shaft assembly shall be supported on ball or roller bearings.
- b) Gearboxes shall be designed such that the gears will be automatically lubricated at all operating speeds. The box shall prevent escape or contamination of the lubricant. Breathing shall be provided. Where oil replacement is necessary, facilities for filling, drainage and means of indicating clearly the correct oil level shall be provided.
- c) Lifting lug(s) shall be provided for gearboxes wherever deemed necessary. Gearing shall comply with BS 436, BS 545 and BS 721 or equivalent.

9.6 General Hydraulic Requirements:

9.6.1 General:

- a) Hydraulic power transmission systems, if provided, shall be constructed in accordance with BS: 4575 or equivalent. All cylinders, piston rods, pipes, hoses, valves and fittings shall be designed to withstand a static pressure of at least 3 (three) times the maximum operating pressure without plastic deformation.
- b) The power unit shall be of integral and compact design consisting of all components necessary for the system to function efficiently and safely as intended. It shall be constructed as a self-contained removable module with all components systematically mounted on a structural steel frame for easy maintenance.
- c) The hydraulic system shall be equipped with the following protection devices:
 - i) Overheating
 - ii) Overpressure
 - iii) Low oil level
 - iv) Surge protection if required
- d) The hydraulic oil proposed shall have characteristics suitable for the intended duties and be compatible with all the components and elastomers used in the system. The oil shall be of appropriate viscosity, correct specific gravity and have good oxidation resistance and good anti-foaming properties. The oil shall not be classified as dangerous goods. The oil shall be readily available in India.
- e) The system shall be designed to ensure that any tripping or transient operation does not result in surge pressures that could cause damage to the system.
- f) The Contractor shall advise Indian equivalent of lubricant & hydraulics oil used in the Equipment.

9.6.2 Hydraulic Cylinders and Rams:

All hydraulic cylinders and rams shall be designed to sustain axial forces resulting from a pressure equal to 2.5 times the full load pressure. A ram shall not be subject to bending



stress or eccentric loading. The rams shall be provided with over centre valves locally fitted at the inlet and outlet ports to prevent creeping of the cylinder when pressure is not applied.

- b) The piston rod shall be constructed of austenitic stainless steel, which is chrome plated and polished.
- c) Cylinders shall be provided with solid metal stops at the end of the stroke, or with other equally effective means to prevent the rod from travelling beyond the limits of the cylinder at maximum speed and maximum operating pressure.
- d) Adjustable cushions shall be provided at the limits of the cylinder stroke. Cushions shall be designed to decelerate the ram from the maximum speed to stop without impact.
- e) All hydraulic cylinders shall be provided with self-aligning clevises at both ends for connection to the system structure.
- f) Rod wipers shall be replaceable without the need to remove the clevis and cylinder from its installed position. The rod bearing and seal of a cylinder shall be mounted in an external cartridge and be replaceable without the need to remove piston.
- g) All cylinders shall be factory tested to 200 (two hundred) percent of full load pressure for a duration of 5 minutes without evidence of any pressure drop or leakage. This shall be identified in the Factory Acceptance Test and a suitable test certificate provided.

9.6.3 Hydraulic oil storage tanks:

- a) Oil storage tanks shall have sufficient capacity to provide an adequate oil reserve to prevent the entrance of air or other gas into the system. They shall be of rigid construction so as to prevent distortion due to the weight of oil and shall be so designed and constructed that when completely filled, a factor of safety of at least 4, based on the maximum normal pressure in the tank can be sustained without plastic deformation. The return lines shall terminate below the minimum fluid level of the tank.
- b) The tank shall be designed to adequately dissipate heat from the oil under all normal working conditions and provide a slow recirculation of heavy contaminants. The oil returning from the pump intake points shall be separated by baffles or other means; such baffles shall not hinder the cleaning of the tank.
- c) A transparent indicator of approved design shall be provided for checking the oil level and it shall be accessible without the need to remove any cover or other parts of the equipment.
- d) A breather or other suitable venting arrangement shall be provided at a position to facilitate the venting of air from the tank.
- e) A manually sealable drain valve shall be provided at a position to facilitate the complete draining of oil from the tank.

9.6.4 Hydraulic pipe work and fitting:

- a) All pipe work shall be provided in stainless steel. Pipe work shall be so supported that undue stresses are eliminated at joints, bends and fittings, particularly at any section of



the system, which is subjected to vibration. Cross-sectional areas of pipe work shall be sufficient to prevent cavitation and starvation.

- b) Hydraulic hoses shall be of adequate strength and be suitable for the type of oil used. Hose connections shall be of the type recommended by the hose manufacturer. The installation of hoses shall be such as to avoid the use of sharp bends and chafing or trapping by moving parts of the Equipment.
- c) The relief valve shall be located between the pump and the check valve and shall be of such a type and so installed in a by-pass connection, which the valve cannot be shut off from the hydraulic pump. The return from the valve shall be passed directly to the tank and not to the suction side of the pump.
- d) The relief valve pressure setting shall be as low as practical, commensurate with the operating requirements and shall not be greater than 125 (one hundred twenty-five) percent of the working pressure of the pump, in order to avoid damage to the motor and hydraulic system. The size of the relief valve and bypass shall be sufficient to by-pass the maximum rated capacity of the pumps, without raising the pressure more than 20 (twenty) percent above that at which the valves open. Relief valves having exposed pressure adjustments shall have their means of adjustment sealed.
- e) Control valve spindles or plungers shall be positively restrained against being forced from the valve casing. Design and installation shall be such that they are fail-safe. Solenoids shall be capable of operating without malfunction within 10% of the nominal control voltage and be protected against the entry of splashed oil and dirt.
- f) The system shall incorporate continuous full flow removable oil filters. All filters shall have integral bypass valves and provisions for visual and electrical indication of blockages. The filters shall be durable, with a low resistance to flow, high direct retention rate, high permissible temperature range, high permissible pressure differential and cleanable. The degree of filtration and level of cleanliness shall be consistent with the requirements for the components and environmental conditions.
- g) All filters shall be installed where they are readily accessible and adequate space shall be allowed for element changing. Where suction filters or strainers are used, they shall be accessible for maintenance without draining the oil tank. Suction filters or strainers shall be selected and installed so that the inlet conditions at the pump are within the pump manufacturer's specification.

9.6.5 Screws, Springs and Pivots:

- a) The use of iron and steel for screws, springs and pivots in the Equipment shall be avoided as far as possible. All fixing screws shall be of stainless steel.
- b) 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.

9.6.6 Bolts, Studs, Nuts and Washers:

- a) All bolts, studs and nuts shall be to an Approved Standard and to metric dimensions and shall generally be of stainless steel. Those subject to vibration, high temperature or pressure shall be of high tensile material to the Approval of the Employer's



Representative. The use of black grade bolts shall be permitted only at approved locations of minor importance.

- b) Bolts, studs, nuts and washers shall be made of free machining quality stainless steel. 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 and studs shall protrude by at least one thread pitch beyond the outside face of nuts.
- c) Jacking and connection screws shall all be of high tensile steel with fine threads of an approved form.
- d) Nuts, bolts, tap-bolts, set pins and any other item subject to vibration shall be secured with Approved locking devices

9.6.7 Bedplates, Alignment and Levelling:

- a) All bedplates of fabricated construction shall, prior to final machining, be fully stress-relieved.
- b) To facilitate the alignment and levelling 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.

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BIDDING DOCUMENTS



MUMBAI METRO LINE 3 (COLABA-BANDRA-SEEPZ)

CONTRACT MM3-CBS-DEQ-9-05

Design, Manufacture, Supply, Installation, Testing & Commissioning of

- A) Synchronized Under Floor Lifting System
 - B) Synchronized Mobile Lifting Jacks, and
 - C) Bogie Turn Tables
- for Project "Mumbai Metro Line-3"

Part 2

Employer's Requirements

Section VI B

Technical Specifications

August - 2019

**Mumbai Metro Rail Corporation Ltd
MMRCL Line 3 Transit Office,
Wing A, Block E,
Bandra-Kurla Complex,**

Bandra (East), Mumbai- 400 051, India.



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Bidding Documents

Composition of Documents

Part 1	Bidding Procedures
Section I	Instructions to Bidders
Section II	Bid Data Sheet
Section III	Evaluation and Qualification Criteria
Section IV-A	Bidding Form
Section IV-B	Pricing Document
Section V	Eligible Source Countries of Japanese ODA Loans
Part 2	Employer's Requirements
Section VI-A	Employer's Requirements – General Specifications
Section VI-B	Employer's Requirements – Technical Specifications
Part 3	Conditions of Contract and Contract Forms
Section VII	General Conditions of Contract (GC)
Section VIII	Particular conditions of contract (PC)
Section IX	Contract Forms
Part 4	Drawings
Section X	Drawings



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1. General Description of the Works

1.1 The Works shall comprise, but not limited to, the Design, Manufacture, Supply, Installation, Testing & Commissioning of

- A) Synchronized Underfloor Lifting System for 8-car train (01 set),
- B) Synchronized Mobile Lifting Jacks, one (01) set for 8-car train,
- C) Bogie Turn Table, 10 Tons Capacity (04 numbers)

These will be located at Aarey Metro depot of Mumbai Metro Line 3 Project. The detailed Technical Specifications of the above Equipment are given in this Section in Clause No 3, 4 and 5 respectively.

1.2 The supply shall include all equipment and accessories even if not particularly mentioned but are considered necessary for Installation, Testing & Commissioning and to meet with the specified operating requirements.

2. Project and Permanent Works

The Mumbai Metro line 3 comprises of 33.6 Km long underground metro rail with 26 underground and one at-grade stations. The traction system will be 25 KV single phase, 50Hz, AC overhead traction system. The track will be standard gauge (1435 mm).

There will be one depot at Aarey Colony to stable, maintain and despatch the trains. Line 3 will be provided with communication-based Signalling and Train Control. Initially trains will be operated with train operator on board, but system shall be designed so that later it can be upgraded to GoA4 level Unattended Train Operation (UTO) with ultimate design headway of 90 seconds.

The Rolling Stock will be of 3.2-metre-wide air-conditioned cars. The trains, of 8-car configuration (DT+M+M+M+M+M+M+DT), shall be capable of sustaining a maximum service speed of 85 KMPH with a permissible speed of 95 KMPH. The trains shall generally remain coupled for maintenance purposes.

The Permanent works under this Contract shall comprise of Depot Plant and Equipment as given in Clause No 1.1

2.1 Location and Boundaries

The location plan together with the indicative works and Site area boundaries are shown on the Drawing 1, Section X, Part IV in the Tender Document. The Interfacing Depot Civil Contractor shall set out the Works and Site area boundaries of the Contract.

2.2 Design Responsibility

The Contractor shall be responsible for the design of the permanent Works, which shall include but not be limited to the following-

- 2.2.1 The development of the design shall be carried out in conjunction with the information contained in the Drawings and shall be in accordance with the Technical Specifications set out in the Contract. The Contractor shall obtain design approval from the Project Manager before starting the manufacturing of the Equipment to be supplied under the Contract.
- 2.2.2 The Contractor will be responsible for the development and completion of the design of any other items of the Works as stated in the Contract, including, without limitation, the updating and amendment of the Drawings from time to time.



- 2.2.3 The Contractor, co-ordinating with the Project Manager and Interfacing Contractors on all matters relating to design and documentation, shall retain full responsibility for managing such design and for the maintenance of all documentation associated with the design process.
- 2.2.4 The Contractor shall determine and verify as appropriate the materials, site measurements and installation criteria before adopting in the design of the equipment.
- 2.2.5 The Contractor shall ensure that the information contained in the submissions has been co-ordinated with the overall requirements of the Works and the works of the Interfacing Contractors.
- 2.2.6 The information that is extracted from the Drawings and adopted by the Contractor in his design shall become the Contractor's design for which neither the Employer nor the Project Manager shall be responsible.
- 2.2.7 The Contractor's designs, whether for Temporary Works or Permanent Works are required to be submitted to Project Manager for Notice of No Objection (NoNO). The Contractor shall make all due allowances for the requirements of the Project Manager's consent process in the Works Programme and in the timing of the Works.
- 2.2.8 Responsibility for the Contractor's design proposals submitted to the Project Manager shall remain with the Contractor who must provide sufficient resources to deal with subsequent questions, alterations etc. requested by the Employer. All communications with the Employer whether written or oral, must be copied/ recorded to the Project Manager.
- 2.2.9 The Contractor may engage local agency for installation related works at site subject to NoNO by the Project Manager. The Contractor shall solely be responsible for design, quality of its installation and shall issue quality certificate for the same.
- 2.2.10 All steel used by the Contractor shall be established to have adequate corrosion resistance.

2.3 General Design Requirements:

The following general requirements on equipment design shall apply to all equipment:

- 2.3.1 The Equipment shall be designed to suit the Rolling Stock and Track to be provided in the Project. The relevant parameters of Rolling Stock and Track are given below for reference purpose only. The Contractor shall reconfirm the required parameters from the Interfacing Contractors before finalization of the design of the Equipment.

TENTATIVE ROLLING STOCK and TRACK PARAMETERS

Rolling Stock Parameters:

- | | |
|-----------------------------------|-------------------------------|
| a) Width of Car | : 3200 mm |
| b) Length of Car (MC/TC) | : 22240 mm |
| c) Length of Car (DTC/DMC) | : 22600 mm |
| d) New Wheel Diameter | : 860mm |
| e) Fully worn Wheel Diameter | : 780mm |
| f) Height of coupler | : 740- 815 mm |
| g) Bogie wheel base | : 2600mm(max) / 2200mm(min) |
| h) Distance between bogie centres | : 15100mm(max) / 14400mm(min) |
| i) Weight of Car | : 42 tons |



Track Parameters:

- a) Gauge : 1435 mm
 - b) Max Axle load : 17 tons
 - c) Minimum Curve radius (in depot): 100 mts
- 2.3.2 Deleted.
- 2.3.3 Work related to the production of the equipment shall comply with the relevant European Standards, Codes of Practice and latest Statutory Requirements of India, as given in Table 1 below:

Table 1- List of Standards & Codes of Practice

Sr No	Standard	Description
1	BS EN ISO 4413:2010	Hydraulic fluid power. General rules and safety requirements for systems
2	IS 8623/1977	Factory built assembly switch gear and control gear
3	IS 4460/1967	Specifications for gears
4	IS 3028	Sound Level
5	ISO 1217	Displacement compressors - Acceptance tests-09/1996.
6	ISO 1711	Assembly tools for screws and nuts - Technical Specification - Hand operated wrenches and sockets
7	BS 5378	Safety colours and safety signs
8	BS EN 287	Approval testing of welders for fusion welding
9	BSEN 288	Specification and approval of welding procedures for metallic materials
10	BS 5304	Code of practice for safety of machinery
11	BS 5395	Stairs, ladders and walkways
12	BS 5950	Structural use of steelwork in building
13	BSEN 60073	Specification for coding of indicating devices and actuators by colours and supplementary means
14	EN 60204	Electrical equipment
15	BSEN 60529	Specification for degrees of protection provided by enclosures (IP code)
15	EN 954-1	Safety for Control System
16	IS 325	Electric Motor
17	ISO 9001-3:1991	Guideline for the Application of ISO9001 to the Development, Supply and Maintenance of Software

- 2.3.4 The Equipment shall be designed and/or selected to allow operation without over stressing, damaging or interfering in any way whatsoever with other equipment in the Depot.



- 2.3.5 The Contractor shall, to the extent that he is responsible for the design or for the selection of particular components of equipment items, recognise and implement all safety requirements and ensure that the design and performance of the equipment are compatible with the appropriate international safety standards and ambient conditions specified.
- 2.3.6 Responsibility for the Contractor's design proposals submitted to the Project Manager shall remain with the Contractor who must provide adequate resources to deal with subsequent questions, alterations etc. requested by the Project Manager and the Employer. All communications with the Employer, whether written or oral, must be copied/recorded to the Project Manager.
- 2.3.7 The electrical components control panel and Switch Boards if applicable shall have IP 65 or above protection level.
- 2.3.8 The information that is extracted from the Drawings and adopted by the Contractor in his design shall become the Contractor's design for which neither the Employer nor the Project Manager shall be responsible.
- 2.3.9 Equipment shall be "fail-safe" and "overload protected". The equipment shall incorporate all necessary safety devices to protect the equipment, operators, and all other people and things in the vicinity of the equipment. No failure of the equipment shall cause or give rise to any damage or catastrophe of any nature whatsoever.
- 2.3.10 Equipment design shall take into account considerations of fire protection, elimination of dust and dirt by means of suitable traps or the like, minimum maintenance requirements and ease of access for cleaning, routine maintenance and general disassembly.
- 2.3.11 Moving parts of the equipment shall be efficiently lubricated to ensure quiet operation as well as durable and reliable life. Lubrication points shall be clearly identified for easy replenishment with minimum removal of other equipment components. The lubrication system shall be designed to last for 30 years of operation.
- 2.3.12 The equipment shall be suitable for use in tunnel as well as on viaducts, at grade Station and inside depot premises. It shall be suitable to operate both on ballasted and ballast-less track.
- 2.3.13 The design of the Equipment shall incorporate predictive maintenance systems so as to reduce dependence on manual inspection, checking and intervention.
- 2.3.14 All software(s), irrespective of Contractor's own software or of sub-suppliers, shall be compatible with latest version of Windows Operating software and shall also have upward compatibility. Contactor shall commit to support and supply free of cost any special hardware/software required for ensuring compatibility with new version of Windows for at least a period of 5 years beyond DLP of the Equipment.

2.4 Safety of Equipment

The Contractor shall identify all safety aspects related to the use, operation, maintenance and stabling of the Equipment including, but not limited to, the following aspects (as applicable):

- a) Requirements for personal protective equipment;
- b) Safety instructions and control measures for hazardous situations;
- c) Uncontrolled machine functions;
- d) Fire hazard elimination and containment;
- e) Failure of hydraulic or pneumatic systems;



- f) Failure of power supply;
- g) Electrical earthing issues;
- h) Electrocution;
- i) Working in confined spaces, etc. whichever is applicable.

2.5 Use of drawings and data

- 2.5.1 All data in concern with the rolling stock and other systems written in this specification is for information only.
- 2.5.2 The compatibility of the Equipment with the rolling stock characteristics and other systems is the responsibility of the Contractor and he shall obtain the required data/ documents from the Interfacing Contractors.
- 2.5.3 The drawings shown on the plans define the operating conditions and are provided for indicative purpose only. These may be adapted by the Contractor in consultation with the Project Manager.

2.6 Finish and Painting

2.6.1 Surface Treatment:

- The surface treatment of the Equipment shall be suitable for the working environment under the climatic conditions of Mumbai.
- External surfaces shall be subjected to brushing, degreasing and sand/shot/grit blasting. Thereafter a coat of anti-corrosion paint shall be applied. The thickness of this coat after drying shall not be less than 60 microns.
- Hollow parts shall be treated prior to assembly.

2.6.2 Painting:

- External and related parts shall be, after the surface treatment, given two coats of polyurethane lacquer with a dry unit thickness of at least 60 microns. The second coat shall be applied over the first coat when it is approximately half dry.
- The Contractor shall touch up at site any paint as may be necessary.
- The paint colour scheme shall be submitted to the Project Manager for his notice of No Objection.
- All rubbing parts or those to remain polished shall be covered with a coating designed to protect them from oxidation until such time as the Equipment enters the service.

2.6.3 Identification:

- A plate indicating the following shall be fixed on the Equipment at a suitable location
 - Name of manufacturer
 - Important technical particulars
 - Year of Manufacture
 - Serial Number
- A logo of MMRC shall be affixed at suitable location (s) on the Equipment.
- Suitable Number Plate as per RTO Maharashtra Regulations- India shall be fixed in both front and rear side of the vehicle.
- The Contractor shall submit the proposed scheme of identification to the Project Manager for his Notice of No Objection



2.7 Training

- 2.7.1 The Contractor shall provide comprehensive training on Operation & Maintenance of the Equipment to the Employer's staff to enable safe and efficient operation of the Equipment.
- 2.7.2 The Contractor shall provide hands on training to a batch of 4 to 6 staff of the Employer for minimum 40 hours (@ 8 hours per day) for Equipment at Mumbai Metro Line 3 Depot.

2.8 Noise Level:

The noise level of the Equipment during its operation shall not exceed 75 dB when measured at a distance of one meter from the machine. Minor variation to above limits is acceptable on the discretion of Employer.

2.9 Equipment Maintenance during DLP:

- a) The maintenance service during DLP shall last up to the completion of twenty-four (24) months from the date of Operational Acceptance of the Equipment. This period shall get extended by no of days, the Equipment remains defective and unable to perform its functions for the faults attributable to the Contractor during the above period.
- b) The Contractor will be responsible for Maintenance (Electronic- Control & Drives, Pneumatic, Hydraulic, Electrical, Mechanical and all other peripherals) of the Equipment.
- c) The Contractor shall be responsible for all co-ordination with the sub-Contractors, if any, for repairs to the maintenance of the Equipment.
- d) The Contractor shall plan periodic visits, at least once every quarter, for servicing/ maintenance as required for proper upkeep and smooth functioning of the Equipment. Any intermediate visit required for attending to the unscheduled maintenance requirement shall be the obligation of the Contractor.
- e) The Contractor shall be in regular contact with the Depot officials for smooth running of the machine and its associated accessories, etc.
- f) However, the Employer will provide the services of operator for operating the Equipment during the visit of Service Engineers of the Contractor, if so required.
- g) Electricity, compressed air and water, required for the maintenance of the Facilities will be provided free-of-cost by the Employer. Any material handling facility if available and spare in the depot shall be provided free of cost by the Employer.
- h) The equipment entrusted to Contractor for repair at their workshop shall be at the risk and cost of the Contractor. If any deduction is required to compensate any loss in this account, the same shall be adjusted from balance payments or by means of forfeiting the performance bank guarantee.
- i) The Contractor shall attend to the machine for every quarterly schedule and annual schedule within ± 7 days from the schedule date for servicing/maintenance.
- j) The Contractor shall carry out Preventive maintenance of the Equipment and plan it in consultation with the Project Manager/ Employer.
- k) During maintenance, the Contractor shall follow all statutory acts, regulation and code practices in force like IE rules and Acts etc.



2.9.1 Breakdown Failure:

- a) When a failure is reported by Employer's representative, a qualified service engineer must visit the site within the Response time (Response time is the time required to get to the site of breakdown and shall be taken as 12 hours. In case where the Response time ends between 2000 hrs to 0800 hrs next day, the same shall be treated to have been extended up to 0800 hrs next day). This Response time shall be treated as grace period, which will not count towards plant down time for up to three (03) failures per year.
- b) Failure reporting shall be done by the Employer's Representative on phone, fax, e-mail, SMS or per bearer or posted at the Contractor's address given for the purpose. The responsibility to keep the failure reporting address details current will rest with the Contractor.
- c) In case, preventive maintenance is carried out along with breakdown maintenance, preventive maintenance time will be deducted from the total down time of the machine.

2.9.2 Damage to Equipment due to External Factors:

In case of damage to the machine on account of any external factor, viz., floods, earthquake, fire, arson or sabotage, entire cost of spare parts and material necessary for repair of the plant shall be borne by the consignee.

2.9.3 Software Up gradation in the Machine:

Any software up gradation in the machine which is required to be done during DLP shall be executed by the Contractor and the cost for the same shall be included in the basic cost of the machine.

2.9.4 Maintenance Records:

Contractor's staff will have to maintain proper records of Maintenance of the Equipment as per the directions of Employer. Some of the records to be maintained are as follows:

- a) Details of Preventive Maintenance carried out, time taken and deployment of manpower for these schedules.
- b) Details of each breakdown, time taken and deployment of manpower for breakdown calls.
- c) Spares availability & their Quarterly utilization.
- d) Quarterly summary of work carried out as per schedule of work.

The above records shall become the property of the Employer. The Contractor will use all reasonable endeavours to ensure that the records will be protected from loss, damage, theft or other detrimental effects. All entries will be legible and in pen.

2.9.5 Maintenance Spares:

- a) The Contractor shall keep stock, duly accounted, of all spares, including consumables and lubricants etc. though not specifically listed but are necessary for proper functioning of the Equipment, at site in possession of the Employer.
- b) Spares having low shelf life shall be kept for a period maximum up to the expected life of the Spare.
- c) For all such materials stocked at the Depot and left unconsumed after the completion of DLP, the Employer shall have the discretion to retain these materials at the cost agreed to between the Contractor and the Employer.



- d) If any spares or consumables owned by the Employer are available, the Contractor shall make use of the same, if so called for by the Employer. The stock of such items utilised by the Contractor shall be replenished in new condition by the Contractor in every quarter along with quarterly replenishments of the consumed materials
- e) Where the Contractor replaces parts or components of the Facilities, the replacement parts or components shall become the property of the Employer after replacement. The replaced parts or components shall remain the property of Employer.
- f) The Contractor shall provide the details of such part or component replaced to the Project Manager.
- g) If at any time in carrying out repairs, the Contractor permanently replaces any part or component of Equipment, it will do so with a replacement that is new or equivalent to new in performance when used as part of the Equipment.

2.10 Major Items of Supply from Sub-Contractors/Manufacturers:

The following are the major items of supply or services in the Equipment:

- a) Lifting Motor
- b) Gear Box.
- c) Lifting Spindle/Screw

The Contractor shall, in respect of these items propose the sub-contractors/ manufacturers of these items during design stage who satisfy the experience condition specified in Clause No 2.6, Section III, Part 1 for Notice of No Objection.

2.11 Functional Guarantees- Reliability, Availability, Maintainability

2.11.1 General

- a) The Contractor shall submit the Reliability, Availability and Maintainability figures in terms of MTBF, % Availability and MTTR respectively for the offered Equipment.
- b) The collection of data with respect to functional guarantees shall commence from the time of issuance of Operational Acceptance Certificate.

2.11.2 Reliability

- a) **Equipment Failures:** The Equipment shall not have more than 2 Failures or 8 faults in a year.
- b) A **Failure** is defined as an event leading to the Equipment being unable to perform its intended service on account of Design/ Manufacturing/ Material Defects/ Installation Defects/ flawed maintenance attributable to the Contractor and for which the maintenance requirement is more than 24 hours from the time of handing over of the Equipment for maintenance to the Contractor's nominated agency for repairs.
- c) A **Fault** is defined as an event leading to the Equipment being unable to perform its intended service on account of Design/ Manufacturing/ Material Defects/ Installation Defects/ flawed maintenance attributable to the Contractor and for which the maintenance requirement is more than one but less than 24 hours from the time of handing over of the Equipment for maintenance to the Contractor's nominated agency for repairs, this will be termed as a Fault. Four Faults shall be counted as one Failure.
- d) Details of all failures and faults including more than one-hour duration shall be recorded and analysed every quarterly.



- e) The Equipment shall have a Mean Time between Failures (MTBF) of 180 days taking every four faults as one Failure.
- f) Figures of MTBF shall be calculated at the end of every year on aggregate basis from the time of Operational Acceptance.
- g) MTBF shall be calculated as $(\text{Total Time} - \text{Total Down Time}) / \text{No of Failures during the period}$.

2.11.3 Availability

- a) The availability of each equipment shall be at least 96%.
- b) This figure takes into consideration the time when the equipment is not available due to breakdown on account of Design/ Manufacturing/ Material Defects/ Installation Defects attributable to the Contractor from the time of intimation to the Contractor's nominated agency for repairs.
- c) This does not include the time for routine and planned maintenance as these will be programmed when the equipment is not in use.
- d) The figures of availability shall be calculated as $(\text{Total Time} - \text{Total Down Time due to Planned Maintenance} - \text{Total Down Time due to Failures and Faults beyond one hour}) / \text{Total Time} - \text{Total Down Time due to Planned Maintenance}$
- e) Figures of Availability shall be calculated at the end of every year on aggregate basis from the time of Operational Acceptance.

2.11.4 Maintainability

- a) The Mean Time to Repair (MTTR) is the time taken to repair the Equipment after handing over to the Contractor's nominated agency for repairs.
 - b) The equipment shall have an MTTR of 24 hours.
 - c) Figures of MTTR shall be calculated at the end of every year on aggregate basis from the time of Operational Acceptance.
-



3. Technical Particulars- Synchronized Under Floor Lifting System

3.1 General:

The Contractor shall undertake to comply with the requirements of "Design, Manufacture, Supply, Installation, Testing & Commissioning" of one (01) set of Pit Jacks capable to lift and support an 8-car unit simultaneously or any number of cars from one to seven in the 8-car train for Mumbai Metro Line 3. Unbalancing of weights within the wheels shall be as per international standards.

3.2 Detailed Scope of Works

The scope of Works, in addition to those specified in the General Specifications and Clause No 1.3, includes the following:

- a) Design, Manufacture, Supply, Installation, Testing & Commissioning of one (01) set of Pit Jacks for 8-car train at Aarey Metro Depot of Mumbai Metro Line 3 and shall comprise a total of 16 Bogie Hoists and 32 Body Supports along with a Master Control Console. The supply shall include all equipment and accessories required to make the Pit Jacks fully functional when connected to a power source. The Pit Jacks shall comply with the configurations of Rolling Stock and Track profile.
- b) Maintenance during DLP.
- c) Electrical cables for connecting Power point to Master Control Console shall be supplied by the Contractor as per the requirement.
- d) The foundation for installation of Pit Jacks shall be designed by the Contractor to match with the continuous pit being constructed by the Interfacing Depot Civil Contractor as per the drawing in Section X. The Contractor shall interface with the Depot Civil Contractor for further design and construction verification. Any special material required for grouting /foundation or inter connection (excluding pipe conduits for cables laying & sump drain connection, which shall be the scope of civil Contractor) shall be supplied by Contractor along with the instructions to use.
- e) The Equipment foundation design shall have provision of continuous passage (tunnel) for easy movement of maintenance staff along with maintenance tools and spares from first lifting jack to the last lifting jack and carrying out the maintenance work with ease. The entrance facility to the pits shall be provided through staircases at the two ends of continuous pit. In addition, provision of ladders shall be provided at 2 suitable locations along the length of long pit. Adequate lighting needs to be provided by the Contractor in the pits and also in the passages between the pits. Conduit/ cable Tray inside the Pits and passages shall be provided by the Contractor as per the requirements.

3.3 Under-Floor Lifting System Configuration

- 3.3.1 The Under-Floor Lifting System for each car shall consist of two bogie hoists for lifting and lowering the rail car units and four body supports for supporting a rail car.
- 3.3.2 Each bogie hoist shall be raised or lowered by 4 lifting columns. Each Lifting column shall consist of a spindle-lifting element, a lifting beam, guiding box, one automatic following gap cover and associated electrical equipment.
- 3.3.3 Each bogie hoist shall have a bogie-lifting platform sized for bogies. Each pair of bogie hoists, i.e. for 2 bogies shall be capable of lifting a railcar of maximum 45 Tons. The lifting platform



shall be of cantilever type that provides a clear passage for transport of bogie and bogie tractor underneath the raised railcars. Lighting (LED) shall be provided by the Contractor on the face of cantilever lifting head for the adequate illumination of complete under frame of the railcars. Adequate lighting arrangement shall also be made inside the pits by the Contractor for smooth maintenance of the installation.

- 3.3.4** Each body support shall have a supporting pad for lifting railcar body at its jacking points. Each pair of body support shall consist of two lifting spindle elements, which may be operated together or individually. The arrangement shall provide a clear passage for transport of bogie and bogie tractor underneath the raised railcars. Two pairs of body supports shall be capable of supporting a 45 T railcar. The exact locations of jacking pockets on the Metro car shall be determined by interfacing with the Rolling Stock Contractor.
- 3.3.5** The Equipment shall be installed inside in suitably sized pits. No part of the Equipment shall project out of the Chequered plate covering the pits.
- 3.3.6** Electrical motors, gear box and other peripheral equipment inside the pit shall be installed at a height of more than 2.0 meters from the base level of pit to avoid damage to these equipment in case of water logging inside the pits. A maintenance platform shall be install at suitable height along with Ladder inside each pit for ease in maintenance of equipment inside the pit.
- 3.3.7** Auxiliary rails/ split rails shall be provided to allow for towing of bogies with a rail bound bogie tractor beneath the lifting platforms while the bogie lifting platforms are raised. The rails on & above all Pits shall be in the scope of supply of the Pit Jacks Supplier and shall not be welded to the shop floor rails. Any material required for holding the Auxiliary Rails/Split Rails (i.e. pre-cast bridges, steel supports etc.) shall be in the scope of the Contractor.
- 3.3.8** Bidders shall provide the scheme of their design of the Pit Jacks in the offer. General Arrangement (GA) drawing shall be provided supporting the scheme. Minor deviation on the specified parameters will be permitted to suit the Standard Equipment available. The deviations should be clearly specified in the offer.
- 3.3.9** All basic elements of Synchronized Pit Jacks shall be fully interchangeable.

3.4 Operating principle

- 3.4.1** The Lifting System shall be electrically linked together to allow various combinations of synchronized lifting/lowering services, viz. One car lifting and any combination from 2 to 8 car lifting.
- 3.4.2** The lifting operations of single car or coupled cars, which are categorized as group control, shall be commanded at the master control console.
- 3.4.3** The lifting operations of individual bogie hoists and body stands, which are categorized as local control, shall be commanded at a local control pendant of the corresponding pit.
- 3.4.4** Key parameters

The equipment shall comply with the following requirements on dimensions and tolerances:

- | | |
|------------------------------------------------------|-------------|
| a) Bogie hoist lift | ≥ 1.8 m |
| b) Body support rise | ≥ 2.7 m |
| c) Bogie hoist lifting speed | ≥ 0.4 m/min |
| d) Body support raising speed | ≥ 0.8 m/min |
| e) Auxiliary track capacity with bogie hoists raised | 120 kN/axle |



f)	Gap between platform rails and shop rail	≤ 5 mm
g)	Bogie hoist level tolerance within individual bogie	± 3 mm
h)	Bogie hoist level tolerance within adjacent bogies	± 5 mm
i)	Bogie hoist level tolerance within two cars	± 10 mm
j)	Body stand level tolerance within a pair	± 3 mm
k)	Body stand level tolerance within adjacent pairs	± 5 mm
l)	Body stand level tolerance within two cars	± 10 mm

Note: The body stand lift should match the Rolling Stock needs to hold the car body when maximum hoisting is done at bogie lift.

3.4.5 Jack

- a) The structural design of the equipment shall withstand the weights, and other forces from movement of rail car.
- b) While the Jacks are at the lowered positions, the shop area, where the pit Jacks are located, shall provide a safe and clear passage for railcars of weight maximum 48 tons.
- c) The pit areas shall be covered with jack structures or galvanized Steel Chequered plates which should support workshop road vehicles of max weight 16 tons with axle load of max 8 tons. The maximum deflection of chequered plates shall not exceed 1/750 of the cover spans.
- d) While the Jacks are at the raised positions, the floor openings that result from the displacement of lifting elements shall be covered automatically by steel covers (following gap covers). It should also facilitate the movement of the bogie tractors pulling / pushing the bogies below the lifted cars. General clearances between structural elements at the floor level, except wheel flange grooves, shall not exceed 10 mm under all operation conditions.
- e) The structure of the equipment shall be fabricated by welding of steel connections.
- f) All floor covers shall be solid steel plates with a minimum thickness of 8 mm set flush with floor level. The surface of these cover plates shall be non-skid with diamond pattern.
- g) The static structural calculation of lifting elements shall be made to verify that the stresses permissible according to European Standards EN 1493 or equivalent for the chosen material are not exceeded under a static factor of 1.5 times and a dynamic factor of 1.15 times of the nominal load.
- h) The equipment to be installed at the pits shall adopt an approved corrosion prevention coating system to cope up with the possibility of water logging for long hours.
- i) The spindle shall be a robust, vertical, self-locking screw shaft driving a spindle load-lifting nut, which shall be manufactured from cast bronze. A safety nut shall follow the lifting nut of cast bronze. The load screw shall be of class 3A as per IS 2004/78 having threads in accordance with IS 4696 or equivalent international / European / British standard. Screw must be irreversible under 1.5 times of nominal load. Load screw shall be covered with protection boots.
- j) The spindles shall be fitted with flexible bellows for protection. The bellows shall be grease, acid, water and steam resistant. The fastening of the bellows shall be designed to facilitate quick disassembly for inspection of the spindles.



3.4.6 Hoisting Mechanism

- a) Each Lifting spindle element shall be of screw type (absolute self-locking through an angle of inclination related to the exterior diameter of the screw and driven by geared electric brake motor.
- b) Magnetic brakes shall be used to precisely control the stopping of the lifting elements but shall not be used for locking. Automatic brakes shall be applied in the event of power failure.
- c) The synchronization of lifting spindle motors shall be monitored and controlled by suitable variable frequency drive (VFD) and PLC control system.
- d) In case of failure of any one motor/control during hoisting operation, suitable mechanism shall be available to safely lower the rail car to floor level, preferably under power, for clearing the track.

3.4.7 Control and Interlock Provision

- a) The master control console shall be provided at the central area of the Under Floor Lifting System for mode selection and group controls. The console shall only be accessible by a unique key, which shall be latched into the console during operation. A lockable cover on operating panel shall be provided for the safety of HMI and other controls when system is not in use.
- b) A local control pendant shall be provided at each pit, which accommodates one bogie hoist and one pair of body stands. The pendants shall be linked by 3-metre long cables and easily retrieved from the pits by opening hinged steel covers, which shall be set flush with the shop floor.
- c) Operation of the bogie hoists shall be interlocked with operation of the body stands ensuring the safety and not permitting incorrect operation.
- d) A control sensor device shall be provided to sense the bogie wheel lifting points to confirm that the wheels are correctly located over the bogie lifting platforms. Upon this verification, the device shall permit the lifting operation to proceed.
- e) The bogie hoist shall not be operable unless the body stands of the same pit are either fully lowered or under load supporting the vehicle.
- f) The selected body stands shall be raised in pairs and stopped once contacts with jacking pockets of the railcars are detected by sensors at the pads of the body stands.
- g) The controls, interlock functions and monitoring of the Jacks shall be executed by PLC, which allows simplicity in wiring and expandability in future control alterations.
- h) All push buttons for motion control shall be of non-latch and spring- return type.
- i) Master Control Console shall be of robust enclosures with material of construction as steel sheets SS-316 (2mm thickness) and duly treated & colour painted (epoxy paint or powder coated) for longer life and suitably braced to form a rigid structure. Adequate electrical insulation and proper ventilation shall be suitably designed. Exterior corners and edges shall be rounded to give a smooth overall appearance. Interior edges shall be smooth.
- j) All pushbuttons shall be electrically interlocked to prevent inadvertent operation of opposing motions. All movements shall be clearly indicated on the control pushbuttons by means of labels in English/ Signs.



- k) A fault display panel shall be provided at the master control console. When a fault occurs, a buzzer on the panel shall sound and a lamp shall flash indicating the location and the nature of the fault. By pressing an acknowledge button, the buzzer shall become silent and the flashing lamp shall become steady. After the fault is rectified, the display shall revert to the normal state by pressing a reset button.
- l) The master control console shall be interlocked with four operator pendent. All four operator pendent shall be provided in opposite side of the master control console. Each operator pendent should be in between the two coaches.

3.4.8 Safety Provision

- a) Locking devices shall be provided to lock the body stands and bogie lifting platforms on removal of the power supply. The devices shall be capable of taking the full system load.
- b) Wheel stops shall be provided at the bogie platforms and fully activated and locked to prevent the railcar from rolling off the platforms whenever the railcar is raised above 50mm from the shop floor. Lifting of bogie platforms shall be interlocked with any failure of stop engagement. While lowering, once the bogie hoist has reached bottom most position, the locking shall be released and stops retracted.
- c) Approaching signals shall be provided and activated whenever any part of the railcars or Jacks has reached a clearance of 150 mm or less from the floor. The Signals shall include an automatic stop of lowering and audible intermittent alarm for approx. 10 seconds. Further lowering shall only be possible by pressing an override button.
- d) Motion limit switches shall be provided in spindle units to prevent over-lifting and over-lowering of any lifting element. The upward and downward level limits shall be predetermined and adjustable.
- e) Lifting nut limit switches shall be provided to prevent the up-lifting operation of the system once any of the lifting nuts has worn to a predetermined amount. The fault shall be indicated on the fault display panel. The advance safety feature of automatic cut off (electrical) on wear in working nut and in safety nut shall be offered.
- f) Overload cut-out devices shall be provided to protect the equipment against damages in the event of equipment being overloaded. Once any of the overload devices are activated, overload lights and buzzers on corresponding panels shall be turned on and all operation modes except lowering shall be prohibited. On removal of the overload, the Jacks shall resume normal operation automatically.
- g) A set of traffic signals shall be provided on the wall on the entry side of Repair Bay. The signal shall include one red light and one green light and give directions to operators for safe entry of Railcar with the lifting hoists at lowered position.
- h) Main control panels shall be fitted with through door electrical isolation switches for the safety of maintenance personnel.
- i) Emergency stop buttons of mushroom type shall be provided on all control stations.
- j) Fully automatic pit Jacks shall be provided with alarm system in case of water flooding in underground sump with subsequent operation of the float operated sump pump along with rigid drain piping (with NRV Installed) connected to the Depot Drain. This system should be



installed in every independent Pit of the System. Flexible drainpipe as per the requirements shall be provided by the Contractor.

- k) In case of fault in PLC, the operation of lifting or lowering of all the system shall be cut off simultaneously both for bogie hoist and body hoist.

3.4.9 Maintenance Provision

- a) The equipment installation shall adopt an open pit design (covered with a chequered plate) to allow adequate space for maintenance of equipment components through steel structural ladders. Scheme for sufficient illumination of the pits for human comfort and ease of maintenance shall be a part of the design of the Foundation for the Pit Jacks. All components including motors, gearboxes and shafts shall be easily accessible.
- b) The equipment shall be of modular design, with components manufactured into sub-assemblies to facilitate easy assembly and removal for maintenance purposes.
- c) An automatic lubrication system shall be provided in each pit to assure proper lubrication of equipment components. All moving parts shall be effectively lubricated by either oil or grease.

3.5 Checks and Tests

The following tests are given as a minimum to be carried out under the Contract. All test reports and certificates shall be provided to Employer's Representative.

3.5.1 In-manufacturer's-plant

- a) Contractor shall submit Test Protocol of Pit Jacks for NoNO from the Project Manager to conduct FAT at the manufacturer's premises along with the invitation for inspection.
- b) FAT may be offered in ckd (complete knocked down) condition of the Assemblies/Sub-assemblies of the Machine.
- c) During manufacture, and especially prior to shipment, verifications and checks shall be carried out in order to ensure that the supply is in accordance with the technical specification and with the approved design documents.
- d) All defined quality checks, as per the Quality Plan, shall be carried out during manufacture of the Equipment on the Contractor's or on the sub-Contractor's premises.
- e) The Contractor shall provide for all checks of supplies on his sub- Contractor's premises prior to delivery of these supplies to his workshops.
- f) Operation of safety and protection devices shall also be checked.

3.5.2 Prior to assembly:

A complete and thorough check (dimensional and machining quality) of all screws shall be carried out on the Contractor's premises. During this check, each screw shall be marked at the top end with a cold- stamped letter, height 6 mm. The same mark shall be made on the corresponding nut.

3.5.3 After assembly:

- a) **Functional tests:** Operational check of limit switches, over-travel switches and locks, measurement of absorbed current, operation of the support monitoring device etc.
- b) **Static tests:** The Jacks shall require static tests according to EN1493. Measurement of



deflections shall be recorded.

- c) The Jacks shall require the following tests and the tests according to EN1493:
- Lifting speeds,
 - Behaviour of components during lifting after a stop,
 - Limit switch contact and brake efficiency,
 - Heating of motors, electrical components and screw nuts,
 - Synchronous travel of the Jacks,
 - Insulation of the electrical installation and current measurements.
 - Noise level when lifting and lowering nominal load to be less than 75 dB at one metre.

3.5.4 At-Site

- a) Pre-commissioning Work:
- After delivery and installation, the equipment shall be operated to ensure functioning of its different sub-systems under power and operating it under no load conditions.
 - The purpose of the tests is to record that the equipment is in functioning state.
- b) Commissioning Work:
- Tests shall be carried out on Jacks in order to check:
 - Synchronisation of jack operation of all control modes,
 - All functional and performance requirements,
 - All safety measures including the efficiency of limit switch contacts and brakes,
 - Insulation of the electrical installation.
- c) Guarantee tests shall be carried out for the trial lifting of 8-car train with the Jacks in order to verify the satisfactory operation of the equipment.
-



4. Technical Particulars- Synchronized Mobile Lifting Jacks (also termed as Mobile Jacks)

4.1 General:

The Contractor shall undertake to comply with the requirements of "Design, Manufacture, Supply, Installation, and Testing & Commissioning" of Mobile Jacks as per the details given below:

Mobile Jacks with Control Panel, one set comprising of 28 Mobile Jacks of 12 Tons Capacity and 4 Mobile Jacks of 17 Ton Capacity (All 32 Jacks synchronized) and One Control Panel for 8-car coupled train at Aarey Depot, Mumbai.

4.2 Detailed Scope of Work:

The scope of the Works, in addition to those specified in the General Specifications and Clause No 1.3, includes the following:

- a) The Mobile Jacks covered under this specification shall be provided to lift and support passenger railcars and other Rolling Stock in Mumbai Metro Line 3, Aarey Depot.
- b) The Mobile Jacks shall allow synchronized lifting of up to 8-car train, either coupled or uncoupled, to be lifted with or without bogies for inspection and maintenance.
- c) 4 numbers of 17 Ton Mobile Jacks out of the above are required to lift the Catenary Maintenance Vehicle (CMV) of tare weight below 68 tons. The approximate tare weight of the CMV is 62 Tons.
- d) Preparation and supply of drawings, documents, samples, specimens and Operation & Maintenance manuals as specified.
- e) Provision of resources, materials, tools, plant and manpower for Manufacture, Supply, Installation & Testing of the equipment to meet the intended functions.
- f) Where necessary, license applications and statutory submissions in accordance with Enactment's up to the commencement of the Defects Liability Period.
- g) The civil work of laying of G.I pipes in trench and construction of pits for cable laying shall be carried out by the Depot Civil Contractor.
- h) Maintenance during DLP.

4.3 System Configurations of Mobile Jacks:

4.3.1 Mobile Jacks shall be provided for the lifting tracks at the Mumbai Metro Line 3, Aarey Depot.

4.3.2 The Control Panel and Mobile Jacks of same capacity shall be interchangeable.

4.3.3 The set of Mobil Jacks as given in Clause 4.1 consists of the following minimum elements:

- a) Mobile Jacks (as per quantity given in Clause 4.1), each with a main frame, lifting spindle with driving gear, lifting carriage with anvil, lifting nut, safety nut, travelling gear and local control box.
- b) Within the frame of Jacks, there shall be suitable encoders, limit switches, emergency limit switches and other safety features as required.
- c) One control console suitable to operate Mobile Jacks in a group of 4, 8, 12, 16, 20, 24, 28 or 32 numbers with PLC synchronisation control, various indications, controls and troubleshooting mechanism.



- d) Underground concealed cables in pre-laid galvanised/PVC conduit pipes, which are for both power cables and control cables of the Mobile Jacks, linking outlet socket points for the Jacks and the console at a central area respectively for one set of Jacks. The cable connecting Jacks shall have connector at both ends.
- e) The power cables, connecting isolator and the Jacks, the portion of the cables running on the ground shall be in concealed galvanised conduits. The isolator for the power cables shall be provided by the Interfacing Contractor but sockets/ plugs etc. will be provided by the Contractor.
- f) It shall be possible to operate the Jacks of any set either individually or in a group of 4, 8, 12, 16, 20, 24, 28 or 32 Jacks together in synchronous mode for railcar lifting / lowering and sustaining loads at any point between the travel limits.
- g) It shall be possible to transport each Jack manually by one person towards the railcar and to align the anvil with the jacking pocket on the railcar. The jack shall be raised by means of the push buttons on the local control box. The raising motion of the anvil shall stop automatically once a contact with the jacking pocket is detected by a switch on the anvil.
- h) The Jacks shall be equipped with ground-support monitoring devices to prohibit carriage movement when one of the Jacks is still bearing on one of the travel wheels.
- i) The control console shall be plugged into the socket at the central area of the coupled railcars for synchronous group operation of the selected Jacks. The group control shall only be allowed if all of the selected Jacks are in contact with the railcars.

4.4 Key Parameters:

- a) The Jacks shall comply with the following requirements:

Highest anvil position	≥ 2.10 m
Lowest anvil position	≤ 0.50 m
Anvil extension	600 mm minimum
Contact head width	approx. 0.20 m
Contact head length	approx. 0.22 m
Lifting and lowering speed	0.30 m/min
Maximum Level tolerance between any two Jacks of one set	± 5 mm
Running wheels Per Jack	Two Wheels (Minimum) of heavy-duty nylon made
Wheel diameter:	100 mm (Minimum)

Notes:

- *The Jacks supplier shall interface with the Rolling Stock supplier for the exact size of the contact head of the anvil.
- *Anvil extension is Horizontal length of claw from the face of jack frame.



- b) The Running Wheels shall comply with the following requirements:

Running wheels Per Jack	Two Wheels (Minimum) of heavy-duty nylon made
Wheel diameter:	100 mm (Minimum)
Wheel width:	37 mm (Minimum)

4.5 Jack Construction

4.5.1 Main Frame

- The main frame of the Jack body shall be of welded steel construction and shall consist of side plates with guides for the lifting carriage.
- The Jacks shall be provided with suitable means to prevent relative sliding of coach and the lifting pad.
- The base of the frame shall substantially spread the load over the workshop floor, which will be constructed of reinforced concrete. The approximate area for reinforced floor shall be 1300 mm x 1600 mm under each jack.
- The design and installation of the Jacks shall be based upon heavy-duty workshop application with high safety factors to ensure minimum deflection and low stress values. The Jacks shall be designed in accordance with BSEN 1493 or DIN EN 1493.
- The steel used shall conform to Indian Standard IS 226, IS 2062 or equivalent European/British standards. The welding shall conform to IS 816 or IS 823 or equivalent international / European / British standards. The welding shall be compatible to steel used.
- The Jacks shall be provided with lifting eyes and fork pockets to allow easy transport within the workshop. An easy access shall be available to lifting nut and safety nut for the required monitoring of them.

4.5.2 Lifting Spindle & Drive

- The spindle shall be driven through a fully enclosed reduction gear running in an oil bath by a squirrel cage flanged brake motor designed to IP 55. All motor and gear bearings shall be of roller type. It shall be placed at the top of the jack frame. The motor and drive gear shall be easily removable without requiring dismantling of the jack. The braking system of the drive motor of offered Jacks shall be explained in offer.
- The spindle shall be a robust, vertical, self-locking screw shaft driving a spindle load-lifting nut, which shall be manufactured from cast bronze. A safety nut shall follow the lifting nut.
- The load screw shall be of class 3A as per IS 2004/78 having threads in accordance with IS 4696 or equivalent international / European / British standard. Screw must be irreversible under a 150% of nominal load. Load screw shall be covered with protection boots.
- The spindles shall be fitted with flexible bellows for protection. The bellows shall be grease, acid, water and steam resistant. The fastening of the bellows shall be designed to facilitate quick disassembly for inspection of the spindles.
- A carriage shall be mounted on each body. The carriage shall be fitted with a bronze nut guided by the lower rollers of the body running on sections added to the jack framework.
- The carriage shall be guided up and down the columns by plain and flanged rollers fitted with bearings. The guiding system shall stop any carriage longitudinal or transverse inclination, which may cause seizure or abnormal wear to the screw or to the nut.



- g) The shape of the contact heads shall be compatible with the jacking pockets of the rail cars.

4.5.3 Travelling Gear

- a) The Jacks shall be mounted on 3-roller type travelling gears with steering wheels for one-man operation on the concrete floor. The front two rollers shall be spring-loaded and third steering type roller shall be equipped with dead man type hydraulic pallet jack. The travelling gears shall allow a minimum of 15 mm clearance from the floor for movement of jack.
- b) Handles shall be fitted to the Jacks for easy raising, lowering, steering and transporting on the concrete floor.
- c) The Jacks shall be equipped with ground-support monitoring devices to prohibit carriage movement when one of the Jacks is still bearing on one of the travel wheels. The controls shall ensure that the synchronous lifting shall start only when all the Jacks have touched the load pads and are ready for the lifting.
- d) The Jacks shall be easily transported and safely operated on the flat concrete floor with a level tolerance of ± 5 mm in any length of 2 m.

4.5.4 Control Provision

- a) The operation of the Jacks in a group of multiple of four shall be controlled at the control console. The operation of an individual jack shall be controlled at the jack-mounted local control box.
- b) The control gear shall be protected against phase failure (single phasing), under-voltage, over-current, motor overload and wrong direction movements due to wrong rotation of drive motor as a result of phase reversal etc.

4.5.5 Synchronization controls

- a) The Jacks shall be provided with a levelling synchronisation system ensuring the control and automatic correction of the height of the lifting claws. This system shall detect any obstacle or mechanical locking.
- b) Each jack shall be provided with a levelling synchronization system ensuring the control and automatic correction of the height of the lifting claws and in no case the difference of heights between any two claws shall be more than 5 mm. This system shall also detect any obstacle or mechanical locking.
- c) If for any reason, the height difference exceeds, the lift will stop and a fault will appear.
- d) Both logical control chains and synchronization controls will be realized by a stored-program control PLC of reputed make viz. Siemens or equivalent. Integration of the synchronization control into the PLC can be done without a separate, particularly manufactured electronic component (such as microprocessor control).
- e) The PLC installed will monitor the complete connected hardware (input units, output units, contactors etc) with regard to errors. Furthermore, the control itself is monitored with regard to correct functioning via second independent control equipment.
- f) In the event of a PLC failure when the vehicle is lifted, the operator will have the option to lower the Jacks and each jack stops on its lower limit switch. Only lowering is authorised in this mode.
- g) The control panel will be equipped with a troubleshooting system. It shall suitably indicate



the fault occurred. Bidder shall explain their type of system in the offer. The complete details of PLC control, features, failure recording/ reporting and troubleshooting details shall be provided to the Project Manager for review and shall be subject to Notice of No Objection.

4.5.6 Control Console

- a) The control console shall be mounted on a trolley for the operator to move around for effective monitoring of the operation. It shall be fabricated of sufficiently thick (at least 2 mm) SS-316 steel sheets and duly treated and painted (epoxy paint, or powder coated) for longer life.
- b) The control console shall be equipped with a plug for connecting all Jacks through the socket on the floor at the central area of the lifting bay of 8-car length. The cable of the plug shall be 10-metre long and coiled onto a console-mounted cable reel.
- c) The door of the control console shall be key-lockable. The door shall be connected to the switchboard via an earth braid and the power-on indicator lights shall be mounted on the front.
- d) The control console shall include but not limited to the following controls and indicators:
 - Lockable main power switch c/w indicating light
 - Selector switch for operation of a group of four, eight, twelve, or sixteen Jacks
 - Shrouded pushbuttons for raising and lowering operation
 - Individual jack status lamps in blue
 - Emergency stop button
 - Fault message c/w indicator in amber
 - Overload cut-out indicator in red
- e) The control of lifting operation from the control console shall be prohibited with any of the following conditions:
 - Any of the selected Jacks are under the local control mode
 - Any of the selected Jacks are not in contact with the railcar lifting pads (jacking pockets),
 - Any of the selected Jacks are overloaded,
 - Any single fault signal, trip of travel limit switch, obstruction under anvil.

4.5.7 Local Control Box

- a) The local control box shall be permanently fixed type mounted on the jack. Pendant type local control box with suitable length of cable, which can be hooked on jack frame, is also acceptable.
- b) The Jacks shall be connected to the outlet points of concealed cable network by plugs with approximately 5 m cable lengths.
- c) The local control box shall have the following controls with indicator:
 - Power switch with green indicating light.
 - Overload cut-out indicator in red.
 - Shrouded push buttons for raising and lowering operation.
 - Jack is loaded- with Green Lamp indicator.
 - Jack is resting- with Green Lamp indicator.
 - Emergency Stop Button.
- d) The control of lifting operation from the local control box shall be prohibited with any of the following conditions.
 - The jack is under the remote-control mode.



- The jack is overloaded.
- Any single fault signal, trip of travel limit switch, obstruction under anvil of the jack.

4.5.8 Safety Provisions:

- a) Safety nuts shall be fitted on the spindles to monitor the wear on the load nuts. The safety nuts shall be able to support the full working load in the event of the failure of the load nuts. The safety nut that take up the load shall also activate a switch to allow only lowering of the load.
- b) Nut wear sensor will activate when the gap between the Lifting nut and safety nut reaches the low limit. It shall then allow lowering but not raising operation. It is, then, compulsory to change worn nuts.
- c) Visible and audible signals shall be provided to personnel in vicinity during lifting operation. The audible signal shall be adjustable in volume.
- d) The Jacks shall be equipped with two stage switches for both upper and lower limits of travel. The first stage shall be designed for normal operation and the second stage for emergency. The travel limits shall be adjustable within the designed travel range.
- e) Overload devices shall be provided to protect the equipment against damages while the equipment is overloaded. Once the devices are activated, the Jacks shall only allow the anvil to be lowered until the devices are re-set by unloading.
- f) In the event of power failure or component failure, all Jacks under operation shall compulsorily stop and lock the anvils.
- g) All the push button shall be of "dead man" type.
- h) Safety chain to stop the whole unit in case of wrong connection shall be provided. This device also switches off the jack operation in case of any plug being disconnected or connecting cable being damaged during the operation.
- i) Each jack shall be fitted with an emergency stop button, one of which when activated shall cut off the power supply to all Jacks.
- j) The Safe Working Load (SWL) of each jack shall be clearly marked prominently on the jack.
- k) The jack should be so designed that in case of power failure while the Jacks are in raised condition and are with load; the Jacks shall retain their position indefinitely and shall not come down. Also, once the load is lifted with jack and is in lifted condition; the Jacks should not come down unless demanded by workman operating the Jacks.
- l) As an alternative to above, the PLC stops the motion by counting the encoder impulses; the first jack stops the others. Different height can be easily adjusted from PLC. In case, the PLC doesn't stop the motion, a safety limit switch is mechanically activated and stops. A fault is indicated on central control panel. The lower limit switch stops the lift when it reaches the down position. In case the carriage is stopped or if one of the lower limit switches doesn't work, the Jacks get stopped and a fault is indicated.
- m) Contractor shall describe all the safety provisions in the offer.

4.6 Maintenance Provision

- a) Lubrication nipples/automatic Lubrication Cartridges shall be provided at each jack for lubricating the lifting spindle and moving parts.
- b) The assembling method of lifting spindle shall be designed to facilitate quick and easy



changing of the spindle nuts, without additional lifting equipment.

4.7 Checks and Tests:

The following tests are given as a minimum to be carried out and to be provided under Contract. All test reports and certificates shall be provided to Employer's Representative.

4.7.1 In-manufacturer's-plant

- a) During manufacture, and especially prior to shipment, verifications and checks shall be carried out in order to ensure that the supply is in accordance with the technical specification and with the approved design documents.
- b) All quality checks shall be carried out, as required, during manufacture on the Contractor's or on the sub-Contractors' premises.
- c) The Contractor shall provide details for all checks of supplies on his sub-Contractors' premises prior to delivery of these supplies to his workshops.
- d) Operation of safety and protection devices shall also be checked.

4.7.2 Prior to assembly

A complete and thorough check (dimensional and machining quality) of all screws shall be carried out on the Contractor's premises. During this check, each screw shall be marked at the top end with a cold-stamped letter, height 6 mm. The same mark shall be made on the corresponding nut.

4.7.3 After assembly

- a) Functional tests: Operation check of limit switches, over-travel switches and locks, measurement of absorbed current, operation of the support monitoring device and etc.
- b) Static tests: The Jacks shall require static tests according to EN 1493. Measurement of deflections shall be recorded.
- c) Dynamic tests on Mobile Jacks
- d) The Jacks shall require the following tests and the tests according to EN 1493:
 - lifting speeds,
 - behaviour of components during lifting after a stop,
 - limit switch contact and brake efficiency,
 - heating of motors, electrical components and screw nuts,
 - synchronous travel of the Jacks in various combinations of 4, 8 and 12.,
 - Insulation of the electrical installation and current measurements.
 - noise level when lifting and lowering nominal load to be less than 75 dB at one metre.

4.7.4 At-Site

- a) Pre- Commissioning Work
 - After delivery and installation, the equipment shall be operated to ensure functioning of its different sub-systems under power and operating it under no load conditions.
 - The purpose of the tests is to record that the equipment is in functioning state.
- b) Commissioning Work:



- Tests shall be carried out on Jacks in order to check:
 - Synchronisation of jack operation of all control modes,
 - All functional and performance requirements,
 - All safety measures including the efficiency of limit switch contacts and brakes,
 - Insulation of the electrical installation.
 - c) Guarantee tests shall be carried out for the trial lifting of 8 Car Train with the Jacks in order to verify the satisfactory operation of the equipment.
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5. Technical Particulars- Bogie Turn Tables

5.1 General description of the Works

Design, Manufacture, Supply, Installation, Testing & Commissioning of Bogie Turn Tables (4 sets) shall be provided in Depot Workshop as indicated in the Maintenance/Workshop Shed Drawing, Section X, Part 4.

5.2 Detailed Scope of Works

- a) The Contractor shall undertake to comply with the requirements of "Design, Manufacture, Supply, Installation, Testing & Commissioning" of Four (04) sets of Bogie Turn Tables.
- b) The Bogie Turn Table shall be capable for the turning (rotating) of one (01) Metro Car bogie for transfer from one track to another.
- c) The Turn tables shall be installed inside concrete pits which shall be made by the Depot Civil Contractor as per the design submitted by the Equipment Contractor and finalized in interface with Civil Contractor. The top of the turntables shall be flush with the workshop floor for workshop vehicular traffic.
- d) The scope shall include steel beams, bearers, curb angles, bed plates and all other associated fittings required for support of bogie turntables in the machine pit or workshop and all necessary supports, rail, bolts and fastenings for all equipment.
- e) The Equipment Contractor shall be responsible for the design of the complete Equipment, which shall not be restricted to following minimum requirement and shall satisfy overall performance standard.
- f) Maintenance during DLP.

5.3 System Configuration

- a) The Contractor shall develop the design based on this Specification. The design details shall be submitted with technical data and calculations to the Project Manager for Notice of No Objection.
- b) The Bogie Turn Tables shall be of proven design. Where similar equipment or sub-systems of a different rating are already proven in service, then the design shall be based on such equipment.

5.4 Specific Requirements of Bogie Turn Tables:

5.4.1 Operating Principle

- a) The turntables shall be designed for transport of bogies from one track to another track in the Bogie Shop area by rotating on the Turn Tables..
- b) The design of each turntable shall have the roll over capacity of 25 Ton with maximum axle load of 12.5 Tons.
- c) The turntables shall allow bogies with a maximum weight of 10 Ton to roll on for turning.
- d) The turntables shall be designed for manual turning by one person with an operating lever. The turning shall be endless in both clockwise and counter-clockwise directions.
- e) The turntables shall be integrated with manual-operated lock bars for securing the turntables in place during bogies being rolled on or off the turntables.



5.4.2 Turntable Construction

- a) The turntables shall be constructed of circular platform decks with 3500 mm in diameter. The decks shall sit on center pivots at the centers and castors on the peripheries for turning.
- b) Two pairs of rails shall be mounted and positioned in perpendicular to each other across diameter on the deck of each turntable to accommodate bogies. Auxiliary rails (Crane Duty) of square/ rectangular Steel bars of suitable grade shall be fitted on the Turn Table.
- c) During over-ride of rail cross the wheel profile should not get any shock load from rail gaps.

5.4.3 Platform Deck

- a) The turntable and supporting frame shall be constructed of welded structural steel box section, wide flange beam, standard 'I' beam or reinforced beam fabricated from structural shapes.
- b) The turntable shall be covered with hot dip galvanized Steel chequered plates and flush with the rail top level to allow normal traffic. The plates shall be stiffened and shall be of minimum 8mm thickness with maximum deflection not exceeding 1/1000 of the span. The plates shall be removable and secured with flush bolts.

5.4.4 Centre Pivot

Centre pivot shall be provided and equipped with a self-aligning spherical roller thrust bearing to facilitate turning operation. Centre pivots shall be designed to take up any horizontal loads.

5.4.5 Castor

Castors shall be provided along the periphery to facilitate turning operation. The castor wheels shall be manufactured from high quality steel for reliability during the service life and equipped with anti-friction bearings for quiet operation.

5.4.6 Running Surface

Running surface for castors shall be designed with considerations of surface wearing and load bearing without deformation. Surface replacement, if necessary, shall be made possible.

5.4.7 Lock Bar

The mechanical locking device shall be provided and located at each 90° segment of rotation. The tracks on turntable shall be aligned with adjacent embedded tracks when bogie turntables are in their locked position at any 90° of rotation. Lock bars shall be accessible with the bogies on the turntables for locking and unlocking operations.

Lock bars shall be flush with the shop floor level for both locked and unlocked positions. The bars shall not be easily removable from the turntables.

5.4.8 Tolerance

The gap between the turntable deck periphery and the pit ring shall be within 5 to 10 mm. The track rails on turntable decks shall be aligned with the rails embedded on the shop floor. The rails shall be positioned within tolerances of ± 2.5 mm for track alignment, ± 2 mm for rail top and ± 1.5 mm for track gauge. The maximum difference in the horizontal and vertical alignment shall be to a maximum of 5 mm.

5.4.9 Pit Ring

The edges of the turntable pits shall be protected with pit rings of steel angle section. The curb angles shall be notched on the field side of the rails in addition to the gauge side to accommodate worn wheels, which may strike the curb angle.



5.4.10 Operating Lever

One operating lever shall be provided to each turntable for manual turning operation. An inbuilt provision shall be provided for storage of the lever within the Turn table.

5.5 Maintenance Provision

- a) Maintenance access shall be provided for inspection and lubrication of center pivot and casters through hinged steel covers on the shop floor level.
- b) Provision shall be allowed for lubrication through a centralized greasing point incorporated into turntable. Lubrication shall be made by pressure grease fittings to all bearing of pivoting shaft and all castors. The greasing point shall be accessible to routine maintenance.
- c) The turntables shall be constructed to allow the entire assembly, except supporting structures, be conveniently removed from the pit as a single unit. The turntables shall be equipped with lifting eyes, which shall be removable or flush with the decks.

5.6 Checks and Tests.

5.6.1 In-manufacturer's-plant

- a) During manufacture, and especially prior to shipment, verifications and checks shall be carried out in order to ensure that the supply is in accordance with the technical specification and with the approved design documents.
- b) All quality checks shall be carried out, as required, during manufacture on the Contractor's or on the sub-Contractors' premises.
- c) The Contractor shall provide for all checks of supplies on his sub-Contractors' premises prior to delivery of these supplies to his workshops.
- d) Operation of safety and protection devices shall also be checked.

5.6.2 Prior to assembly:

A complete and thorough check (dimensional and machining quality) shall be carried out on the Contractor's premises.

5.6.3 After assembly

- a) Functional tests: Operation check of the Turn Table.
- b) Noise level during operation of the Turn Table to be less than 75 dB at one meter distance.

5.6.4 At-Site

- a) Pre-commissioning Work:
 - After delivery and installation, the equipment shall be operated to ensure functioning of its different sub-systems under power and operating it under no load conditions.
 - The purpose of the tests is to record that the equipment is in functioning state.
- b) Commissioning Work:
 - The purpose of the tests is to record and acknowledge that the equipment is capable of performing regular service under different Load and operating conditions.
- c) Guarantee tests shall be carried out for the trial turning of Bogie with the turn table in order to verify the satisfactory operation of the equipment.



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BIDDING DOCUMENTS



MUMBAI METRO LINE 3 (COLABA-BANDRA-SEEPZ)

CONTRACT MM3-CBS-DEQ-9-05

Design, Manufacture, Supply, Installation, Testing & Commissioning of

- A) Synchronized Under Floor Lifting System
- B) Synchronized Mobile Lifting Jacks, and
- C) Bogie Turn Tables

for Project "Mumbai Metro Line-3"

Part 3

Conditions of Contract and Contract Forms

- Section VII General Conditions of Contract (GC)
- Section VIII Particular Conditions of Contract (PC)
- Section IX Contract Forms

August - 2019

**Mumbai Metro Rail Corporation Ltd
MMRC Line 3 Transit Office,
Wing 'A', 'E' Block,
Bandra-Kurla Complex,
Bandra (East), Mumbai 400 051, India**



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Bidding Documents Composition of Documents

PART 1	Bidding Procedures
Section I	Instructions to Bidders
Section II	Bid Data Sheet
Section III	Evaluation and Qualification Criteria
Section IV-A	Bidding Forms
Section IV-B	Pricing Document
Section V	Eligible Source Countries of Japanese ODA Loans
PART 2	Employer's Requirements
Section VI-A	Employer's Requirements – General Specifications
Section VI-B	Employer's Requirements – Technical Specifications
PART 3	Conditions of Contract and Contract Forms
Section VII	General Conditions of Contract (GC)
Section VIII	Particular Conditions of contract (PC)
Section IX	Contract Forms
PART 4	Drawings
Section X	Drawings



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BIDDING DOCUMENTS



MUMBAI METRO LINE 3 (COLABA-BANDRA-SEEPZ)

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- A) Synchronized Under Floor Lifting System
 - B) Synchronized Mobile Lifting Jacks, and
 - C) Bogie Turn Tables
- for Project "Mumbai Metro Line-3"

Part 3

Conditions of Contract and Contract Forms

Section VII

General Conditions of Contract (GC)

August – 2019

Mumbai Metro Rail Corporation Ltd

MMRCL Line 3 Transit Office,

Wing A, Block E,

Bandra-Kurla Complex,

Bandra (East), Mumbai- 400 051, India.



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Bidding Documents

Composition of Documents

Part 1	Bidding Procedures
Section I	Instructions to Bidders
Section II	Bid Data Sheet
Section III	Evaluation and Qualification Criteria
Section IV-A	Bidding Forms
Section IV-B	Pricing Document
Section V	Eligible Source Countries of Japanese ODA Loans
Part 2	Employer's Requirements
Section VI A	Employer's Requirements - General Specifications
Section VI B	Employer's Requirements - Technical Specifications
Part 3	Conditions of Contract and Contract Forms
Section VII	General Conditions of Contract (GC)
Section VIII	Particular Conditions of Contract (PC)
Section IX	Contract Forms
Part 4	Drawings
Section X	List of Drawings



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GENERAL CONDITIONS OF CONTRACT (GC)

The General Conditions governing this Contract are the Standard General Conditions of Contract set forth in Part 3, Section VII of the Standard Bidding Documents for Procurement of Plant Design, Supply and Installation (version 1.1) published by JICA in February, 2013. **Those General Conditions of Contract are available on the JICA's web site shown below:**

http://www.jica.go.jp/english/our_work/types_of_assistance/oda_loans/oda_op_info/guide/tender/index.html

A copy of these General Conditions is not attached to these Bidding Documents/ this Contract.

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BIDDING DOCUMENTS



MUMBAI METRO LINE 3 (COLABA-BANDRA-SEEPZ)

CONTRACT MM3-CBS-DEQ-9-05

Design, Manufacture, Supply, Installation, Testing & Commissioning of

- A) Synchronized Under Floor Lifting System
 - B) Synchronized Mobile Lifting Jacks, and
 - C) Bogie Turn Tables
- for Project "Mumbai Metro Line-3"

Part 3

Conditions of Contract and Contract Forms

Section VIII

Particular Conditions of Contract (PC)

August – 2019

Mumbai Metro Rail Corporation Ltd

MMRC Line 3 Transit Office,

Wing A, Block E,

Bandra-Kurla Complex,

Bandra (East), Mumbai- 400 051, India.



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Section VIII. Particular Conditions

Notes on Particular Conditions

The Particular Conditions (PC) complement the General Conditions (GC) to specify data and contractual requirements linked to the special circumstances of the country, the Employer, or the overall project.

Whenever there is a conflict, the provisions herein shall prevail over those in the GC.



PARTICULAR CONDITIONS OF CONTRACT (PC)

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PARTICULAR CONDITIONS OF CONTRACT (PC)

These Particular Conditions of Contract add, amend, modify or delete Clauses contained in the General Conditions of Contract, and shall take precedence over those contained in the General Conditions of Contract.

PC 1. Definitions	
PC 1.1	<p>“Construction Manager” shall mean the Site Manager/ Site Engineer responsible for Installation, Testing & Commissioning of the Equipment and appointed by the Contractor.</p> <p>“Contract Price” shall be the Grand Summary in Schedule No. 6.</p> <p>The Employer is Mumbai Metro Rail Corporation Ltd. (MMRC).</p> <p>The Project Manager or his Authorised Representative is the General Consultant for Mumbai Metro Line 3, AECOM Asia Company Limited, Louis Berger Group Inc., Egis Rail and PADECO Co. Ltd. Consortium (commonly referred to as MAPLE).</p>
PC 1.1	<p>Add the following to GC 1.1:</p> <p>“Engineer” means the technical representative of the Project Manager/Employer of Mumbai Metro Line 3 project authorised to interact with the Contractor for Facilities.</p> <p>“Equipment” is synonymous to Plant.</p> <p>“Final Payment” shall mean the last payment made to the Contractor for the work done by the Contractor in pursuance of the Contract.</p> <p>“Interim Payments” shall mean all payments made to the Contractor for satisfactory compliance of a part of the Contractor’s Obligations in pursuance of the Contract other than the Final Payment.</p> <p>“Machine” is synonymous to Plant.</p> <p>“Machinery & Plant” abbreviated as M&P is synonymous to Plant & Equipment.</p> <p>“Performance Certificate” means the Performance Certificate issued by the Project Manager on completion of all obligations of the Contractor in the scope of the Contract.</p> <p>“Proprietary Information” means any information or data including without limitation any written, printed or electronic documents, manufacturing, technical, registration and business information, sales, distribution and marketing data, samples, models, intellectual or industrial property including any patent, invention, copyright, design (whether or not it may be registered), trade secret, circuit layout design or tight in relation to circuit layouts, applications for registration of any such items, rights to confidential information, technical information, processes, techniques and know-how.</p> <p>‘Site Engineer’ shall mean the Engineer nominated by the Contractor or his Eqpt Project Manager for Installation, Testing & Commissioning of the Facilities.</p>



	'Site Manager' shall mean in this Contract as Site Engineer.
PC 1.2	<p>Insert the following:</p> <p>Abbreviations:</p> <p>AICPI- All India Consumer Price Index</p> <p>DDP- Delivered Duty Paid</p> <p>CMRS- Commissioner of Metro Safety</p> <p>FOR- Free on Rail/ Road</p> <p>MMRC- Mumbai Metro Rail Corporation Ltd</p> <p>MMRDA- Mumbai Metropolitan Regional Development Authority</p> <p>OEM- Original Equipment Manufacturer</p> <p>Eqpt- Equipment</p> <p>RDSO- Research, Design & Standards Organization</p> <p>WPI- Wholesale Price Index</p>
PC 5. Law and Language	
PC 5.1	The Contract shall be governed by and interpreted in accordance with the laws of Republic of India.
PC 5.2	The ruling language of the Contract is English.
PC 7. Scope of Facilities	
PC 7.3	<p>The period for supply of Spare Parts required for the Operation and Maintenance of the Facilities shall be up to 12 years after issue of Operational Acceptance Certificate. The price of such Spare Parts and Consumables shall be added to the Contract Price corresponding to the value of spares/consumables ordered during the execution of Contract.</p> <p>Contractor shall carry sufficient inventories to ensure an ex-stock supply of all spares for the Plant. Spare parts and components (other than consumable spares) shall be supplied as promptly as possible, but at the most within six (6) months of placing the order. In addition, in the event of termination of the production of spare parts, advance notification for a minimum period of 6 months shall be made to the Employer of the pending termination, 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.</p>
PC 7.4	<p>Add a new Sub-Clause 7.4:</p> <p>The Contractor shall provide his own lifting facilities at the port, transshipment points and depot for loading and unloading heavy equipment. The Contractor shall however, be allowed to use any necessary Depot facilities such as traction power and test track, for assembly, inspection, testing, trials, commissioning and repairs (if any) to equipment, subject to availability. The Employer shall, however, not be responsible for adequacy, reliability and safety of the facilities provided to the Contractor.</p>



	The finished off-shore manufactured plant as well as Spares, Jigs, Fixtures, Special tools and Testing and Diagnostic equipment, etc. required to be delivered directly in the MMRC depot at site from the Indian Port shall be considered on DDP- Delivered Duty Paid basis with sale taking place at High Seas. However, the responsibility, risks and liabilities arising on account of import and delivery of these goods at site, i.e. freight, transportation, Insurance, unloading, custom clearance, inland transportation, unloading at site as specified by the Employer, etc. lie with the Contractor.
PC 8. Time for Commencement and Completion	
PC.8.1	The Contractor shall commence work on the Facilities from the Effective Date for determining Time for Completion as specified in the Contract Agreement.
PC 8.2	The Time for Completion of the Facilities shall be as per “ APPENDIX 1- KEY DATES ”, Section VI-A General Specification, Part 2.
PC 9. Contractor’s Responsibilities	
PC.9.2	<p>The Contractor confirms that he has entered into this Contract related to the Facilities on the basis of proper examination of the data provided by the Employer and on the basis of information that the Contractor could have prudently obtained from data made available to the Contractor by the Employer as of the Base Date.</p> <p>The Contractor acknowledges that any failure to acquaint itself with all such data and information shall relieve his responsibility for properly estimating the difficulty or cost of successfully performing its obligations under the Contract</p>
PC 10. Employer’s Responsibilities	
PC 10.2	<p>Insert the following sentences at the end of GC Sub-Clause 10.2:</p> <p>Access and Possession to the site may not be exclusive to the Contractor for the purpose of Installation, Testing and Commissioning of the Facilities. Shared access shall be provided for the above specified work.</p> <p>For the above work of the Facilities, the Contractor may set up his office or install a portable cabin on the site allotted to him for this work. The Contractor will be provided, subject to availability, a total space approximately up to maximum 20 sq. m. at (or near) depot for the setting up of Contractor’s site offices and stores, and for working on the Facilities. This site office shall be built after obtaining the approval of Employer for its broad design.</p>
PC 10.5	<p>Replace GC Sub-Clause 10.5 with the following:</p> <p>The Contractor shall provide adequate number of properly qualified operating and maintenance personnel. He shall also 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 Employer to properly carry out Pre-commissioning, Commissioning and Guarantee Tests, all in accordance with the provisions of the Appendix 6 to the Contract Agreement titled “Scope of Works and Supply by the Employer”, at or before the time specified in the program furnished by the</p>



	Contractor under GC Sub-Clause 18.2 hereof and in the manner thereupon specified or as otherwise agreed upon by the Employer and the Contractor.
PC 11. Contract Price	
PC 11.2	The Contract is a Fixed Price contract and shall not be adjusted for any price adjustment to the Contract Price.
PC 13. Securities	
PC 13.3.1	Replace GC Sub-Clause 13.3.1: The Contractor shall, within twenty-eight (28) days of the receipt of the Letter of Acceptance, provide a security for the due performance of the Contract for an amount equalling 10% of the Contract Price in the forms specified in these bidding documents.
PC 13.3.2	The Performance Security shall be in the form of a Bank Guarantee as per the Form CF3, Section IX, Contract Forms, Part 3 as applicable and shall be issued or confirmed by a Scheduled Bank in India.
PC 13.3.3	The Performance Security shall be released as under: <ul style="list-style-type: none"> a) 50% within 28 days from the date of Operational Acceptance or deemed Operational Acceptance. b) 50% within 42 days from the date of satisfactory completion of DLP. Note: The Contractor may, if so considered necessary, furnish separate Bank Guarantees which can be released at different time intervals.
PC 14. Taxes and Duties	
PC 14.2	This Sub-Clause is deleted.
PC 14.3	Replace GC Sub-Clause 14.3 with the following: Without prejudice to the Provisions made in Clause 1.2.4, Clause 1.2.5, Clause 1.2.6 & Clause 1.2.7 of Section IV-B, Part 1, 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 provide necessary supporting documents, where admissible, to enable the Contractor to benefit from any such tax savings to the maximum allowable extent.
PC 15. License/Use of Technical Information	
PC 15.2	Insert the following sentences at the end of GC Sub-Clause 15.2: The Contractor declares that other than Licensed Proprietary Information, all material and information collected or developed by the Contractor or any Sub-Contractor throughout the performance of the Contract or related thereto, including the Design, Manuals, all documents, drawings, opinion papers, analyses, ideas data, assessments, pre-final copies and any other written or unwritten product of the Contract, will remain in the hands of the Contractor or applicable Sub-Contractor, without derogating from the right of unlimited use by the Employer at no additional cost to the Employer. Notwithstanding the foregoing, the Contractor agrees that if the Employer demonstrates that such Work Products are not applicable to other projects and were not independently developed by or for the Contractor without reference to



	<p>this Contract or the Works hereunder, then the rights in such work products will belong solely to the Employer and will be deemed the Employer's Proprietary Information, and neither the Contractor nor anyone on its behalf will have any claim or right (including any intellectual property right) with respect thereto, except the right to indicate its name on the applicable work product. In this case the Employer will be entitled to make any reasonable use of the work product at its sole discretion.</p>
<p>PC 16. Confidential Information</p>	
PC 16.2	<p>Replace GC Sub-Clause 16.2 with the following: Contractor and Employer shall treat the details of the Contract as private and confidential, except to the extent necessary to carry out their respective obligations under the Contract or to comply with applicable Laws. Each of them shall not publish or disclose any particulars of the Contract prepared by the other Party without the previous agreement of the other Party.</p>
<p>PC 17. Representatives</p>	
PC 17.1	<p>Insert the following sentences at the end of GC Sub-Clause 17.1: The Project Manager may from time to time assign duties and delegate authority to assistants and may also revoke such assignment or delegation. These assistants may include an Engineer, and/or Independent Inspectors appointed to inspect and/or test items of Facilities and/or materials.</p>
<p>PC 20. Design and Engineering</p>	
PC 20.3.1	<p>Replace GC Sub-Clause 20.3.1 with the following: The Contractor shall prepare or cause its Sub-Contractors to prepare and furnish to the Project Manager the documents required in the Employer's Requirement VI-A & VI-B, documents required to satisfy all regulatory approvals including documents required for CMRS and RDSO approval, where required, as built documents and Operation & Maintenance manuals for Approval or Review, for its approval or review as specified and in accordance with the requirements of GC Sub-Clause 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.</p>
PC 20.3.2 to 20.3.7	<p>GC Sub-Clauses 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.</p>
PC 20.3.5	<p>Replace GC Sub-Clause 20.3.5 with the following: 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 28 days, then 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. The dispute shall be resolved through arbitration and the Contractor shall be reimbursed by the Employer, if the Arbitrator(s) uphold the</p>



	Contractor's view on the dispute, 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 Arbitrator(s) shall decide.
PC 22. Installation	
PC 22.2.5	<p>Working Hours: Normal working hours will be from 9:00 AM to 6:00 PM with one-hour lunch break. Any change in Normal working hours shall be advised by the Project Manager or the Employer.</p> <p>Multiple shifts involving work at night or outside normal working hours is permitted for all operations provided temporary lighting equipment as per a layout issued with a Notice from the Project Manager, shall be provided, installed, maintained for the duration of the Contract and removed after completion of work by and at the expense of the Contractor.</p> <p>The Contractor shall allow in his construction programme for local festivals that are not included in the list of Maharashtra public holidays. No extra payment will be made to the Contractor for the provision of such measures.</p>
PC 22.2.8	<p>Replace GC Sub-Clause 22.2.8 with the following: 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 at Contractor's own risk and cost. The Contractor shall indemnify both the Employer and Project Manager for any harms/loss.</p>
PC 23. Test and Inspection	
PC 23.6	<p>Add the following as second Paragraph to GC Sub-Clause 23.6: If such rejection and retesting cause the Employer or Project Manager or their Representatives to incur additional costs, such costs shall be recoverable from the Contractor by the Employer and may be deducted by the Employer from any sum due, or to become due, to the Contractor.</p>
PC 23.7	<p>Replace GC Sub-Clause 23.7 with the following: As there is no Dispute Board in this Contract, in case of any dispute or difference of opinion, the work shall be continued as per the directions of the Project Manager or the Employer and the matter may be referred, if so considered necessary, to Arbitration.</p>
PC 24. Completion of the Facilities	
PC 24.2	Delete the Sub-Clause
PC 24.3	Delete the Sub-Clause
PC 25. Commissioning and Operational Acceptance	
PC 25.1.2	<p>Replace GC Sub-Clause 25.1.2 with the following: The Contractor shall supply the operating and maintenance personnel for commissioning of the Facilities or any part thereof. The Contractor shall also provide, at his cost, the spares, lubricants, facilities,</p>



	services and other matters required for commissioning of the Facilities or any part thereof.
PC 25.2.2	The Guarantee test of the Facility or the relevant part thereof needs to be completed within the period of 180 days from the date of completion.
PC 25.3.1 (b)	Add the following as Second paragraph to GC Sub-Clause 25.3.1(b): In such a case, the Guarantee test shall be conducted by the Contractor as and when facilities are available for carrying out this test and latest by the end of DLP.
PC 26. Completion Time Guarantee	
PC 26.2	The liquidated damages shall be as specified in Appendix 1, Contract Key Dates & Access Dates, Section VI-A, Part 2. The aggregate amount of such liquidated damages is also given in Appendix 1, Contract Key Dates & Access Dates, Section VI-A, Part 2.
PC 26.3	No bonus will be given for earlier Completion of the Facilities or Part thereof.
PC 27. Defect Liability	
PC 27.2	Replace the first sentence in GC Sub-Clause 27.2 with the following: Defect Liability Period (DLP) The Defect Liability Period for the Facility shall commence from the date of issue of Operational Acceptance Certificate and expire twenty-four (24) months thereafter.
PC 27.7	Reasonable period of time shall be taken as 14 days.
PC 27.8	Replace GC Sub-Clause 27.8 with the following: If a defect is made good under this GC 27, the Defect Liability Period for the item which has been made good shall extend for a period of twenty-four (24) months from the date the defect is rectified. However, in no event shall the Defect Liability Period extend beyond forty-eight (48) months after the date of Operational Acceptance Certificate.
PC 27.10	Add new GC Sub-Clause 27.10: Upon satisfactory completion of DLP of the Facilities, the Project Manager shall issue the "Performance Certificate for the satisfactory performance of the Contract", stating the date on which the Contractor completed his obligations under the Contract. The Project Manager shall issue the Performance Certificate within 28 days after the latest of the expiry dates of the Defect Liability Period for Contract and after the Contractor has supplied all the Documents required under the Contract. A copy of the Performance Certificate shall be issued to the Employer.
PC 30. Limitations of Liability	
PC30.1 (b)	The multiplier of the Contract Price is: 1



PC 31. Transfer of Ownership	
PC 31.1	Replace GC Sub-Clause 31.1 with the following: 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 having delivered to the Site (MML3 Depot).
PC 34. Insurance	
PC 34.6	Delete 2nd sentence in this Sub-Clause 34.6.
PC 39. Change in the Facilities	
PC 39.2.7	Replace the last para of GC Sub-Clause 39.2.7 with the following: If the Contractor and the Employer cannot reach agreement within sixty (60) days from the date of issue of the Pending Agreement Change Order, then the matter shall be resolved through Arbitration and the Contractor shall be reimbursed by the Employer, if the Arbitrator(s) uphold the Contractor's view on the dispute, 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 Arbitrator(s) shall decide.
PC 40. Extension of Time for Completion	
PC 40.2	Replace the 1st para of GC Sub-Clause 40.2 with the following: 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 and the Employer do not reach an agreement, then 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. The dispute shall be resolved through arbitration and the Contractor shall be reimbursed by the Employer, if the Arbitrator(s) uphold the Contractor's view on the dispute, 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 Arbitrator(s) shall decide.
PC 44. Claims, Disputes and Arbitration	
PC 44.1	Replace the last para with the following: 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 arbitration as per Clause PC 45.5.
PC 44.2	Add new Sub-Clause PC 44.2: Employer's Claims If the Employer considers himself to be entitled to any payment under any Clause of these Conditions or otherwise in connection with the Contract, and/or to any



	<p>extension of the Defects Liability Period, the Employer or the Project Manager shall give notice and Particulars thereof to the Contractor.</p> <p>The notice shall be given as soon as practicable and no longer than 28 days after the Employer became aware, or should have become aware, of the event or circumstances giving rise to the claim. A notice relating to any extension of the Defects Liability Period shall be given before the expiry of Defects Liability Period.</p> <p>The Particulars shall specify the Clause or other basis of the claim and shall include substantiation of the amount and/or extension to which the Employer considers himself to be entitled in connection with the Contract.</p> <p>The Employer/ Project Manager shall determine</p> <p>(i) the amount (if any) which the Employer is entitled to be paid by the Contractor, and/or</p> <p>(ii) the extension (if any) of the Defects Liability Period.</p> <p>This amount as at (i) above may be included as a deduction in the Contract Price and Payment Certificates. The Employer shall only be entitled to set off against or make any deduction from an amount certified in a Payment Certificate, deduct the same from Performance Security or to otherwise claim against the Contractor, in accordance with this Sub- Clause.</p> <p>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 arbitration as per clause PC 45.5.</p>
PC 45. Disputes and Arbitration	
PC 45.1	Replace GC Sub-Clause 45.1 with the following: There will be no Dispute Board appointed for this Contract.
PC 45.2	Deleted.
PC 45.3	Deleted
PC 45.4	Replace GC 45.4 with the following: In case of any dispute between the Parties arising out of or in connection with the Contract, both Parties shall attempt to settle the dispute amicably. In case of failure to reach a settlement on the full or a part of the dispute or if the Parties agree otherwise, the case shall be settled through Arbitration by a sole Arbitrator. Unless both Parties agree otherwise, arbitration may be commenced on or after the fifty-sixth (56 th) day after the day on which notice of intention to commence arbitration was given, even if no attempt at amicable settlement has been made.
PC 45.5	Replace GC Sub-Clause 45.5 with the following: Arbitration shall be conducted as per Indian Arbitration and Conciliation Act 1996 (as amended from time to time): The place of arbitration shall be any International Arbitration Centre located in India and the arbitration shall be conducted in the language for communications defined in GC Sub-Clause 5.3 (Law and Language).
PC 45.6	Deleted
PC 45.7	Deleted



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BIDDING DOCUMENTS



MUMBAI METRO LINE 3 (COLABA-BANDRA-SEEPZ)

CONTRACT MM3-CBS-DEQ-9-05

Design, Manufacture, Supply, Installation, Testing & Commissioning of

- A) Synchronized Under Floor Lifting System
- B) Synchronized Mobile Lifting Jacks, and
- C) Bogie Turn Tables

for Project “Mumbai Metro Line-3”

Part 3

Conditions of Contract and Contract Forms

Section IX

Contract Forms

August – 2019

Mumbai Metro Rail Corporation Ltd

MMRC Line 3 Transit Office,

Wing A, Block E,

Bandra-Kurla Complex,

Bandra (East), Mumbai- 400 051, India.



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CF1 -Notification of Award - Letter of Acceptance

(On letter head paper of the Employer)

(----- dd-mm-yyyy -----)

To: [-----name and address of the Contractor-----]

Subject: Notification of Award of Contract No.MM3-CBS-DEQ-9-05

This is to notify you that your Bid dated (----date----) for execution of the “ Design, Manufacture, Supply, Installation, Testing & Commissioning” of Synchronized Underfloor Lifting Systems, Synchronized Mobile Lifting Jacks & 4 nos. of Bogie Turn Tables (**MM3-CBS-DEQ-9-05**) for the ‘Contract Price’ in the aggregate of (----amount in words and figures-----) (-----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 @ 10% of the Contract Price for the work of “Design, Manufacture, Supply, Installation, Testing & Commissioning” of Synchronized Underfloor Lifting Systems, Synchronized Mobile Lifting Jacks for 8-car train & 4 nos. of Bogie Turn Tables within twenty-eight (28) days in accordance with the Conditions of Contract, using for that purpose the Performance Security Form, CF3, Section IX, Contract Forms, Part 3.

Authorized Signature:

Name and Title of Signatory:

Name of Agency:



CF2- Contract Agreement

THIS AGREEMENT is made the _____ day of _____, 2019

BETWEEN

- (1) Mumbai Metro Rail Corporation Ltd., a corporation incorporated under the laws of India and having its principal place of business at Mumbai Metro Rail Corporation Ltd, MMRC Line 3 Transit Office, Wing 'A', 'E' Block, Bandra-Kurla Complex, Bandra (East), Mumbai- 400 051, India, (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 for the ‘Design, Manufacture, Installation, Testing & Commissioning’ of Synchronized Underfloor Lifting Systems, Synchronized Mobile Lifting Jacks & 4 nos. of Bogie Turn Tables (MM3-CBS-DEQ-9-05) (hereinafter called “the Facilities”) and the Contractor has 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 General Conditions (“GC”) 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 including hereto
 - b) The Letter of Acceptance
 - c) Addenda
 - d) Letter of Technical Bid
 - e) Letter of Price Bid
 - f) Particular Conditions of Contract (Part 3, Section VIII)
 - g) General Conditions of Contract (Part 3, Section VII)
 - h) Employer’s Requirements (Part 2, Section VI-B)
 - i) Employer’s Requirements (Part 2, Section VI-A)
 - j) Pricing Document (Part-1, Section IV-B)
 - k) Other completed Bidding Forms submitted with the Bid
 - l) Evaluation and Qualification Criteria (Part-1, Section III)
 - m) Reference Drawings (Part 4, Section X)
 - n) Pre-bid and post-bid clarifications and reply thereof
 - o) Acknowledgment of Compliance with Guidelines for Procurement under Japanese ODA Loans
 - p) Any other documents _____
- 1.2 Order of Precedence (Reference GC 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 GC 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 GC Clause 11)

The Employer hereby agrees to pay to the Contractor the Contract Price in the aggregate of (~~---- amount(s) in foreign currency (ies) in words and figures -----~~), and (~~---- amount in local currency in words and figures-----~~) in consideration of the performance by the Contractor of its obligations hereunder.

The Contract Price of the Contract shall be the aggregate of (~~----- amount(s) in foreign currency (ies) in words and figures -----~~), and (~~---- amount in local currency in words and figures -----~~) as specified in Schedule No. 6 (Grand Summary), or such other sums as may be determined in accordance with the terms and conditions of the Contract

2.2 Terms of Payment (Reference GC Clause 12)

The Contract Price shall be paid by the Employer to the Contractor at the times, in the manner, and in accordance with the provisions of 'Appendix 1: Terms and Procedures of Payment' hereto.

The Employer shall instruct its bank to issue an irrevocable confirmed Letter of Credit made available to the Contractor for payments in foreign currencies 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 No. 1 less the advance payment to be made for Plant and Equipment supplied from abroad -----~~); and shall be subject to the Uniform Customs and Practice for Documentary Credits 1993 Revision, ICC Publication No. 600.

In the event that the amount payable under Schedule No. 1 is adjusted in accordance with GC 11.2 or with any of the other terms of the Contract, the Employer shall arrange for the documentary credit to be amended accordingly.

Article 3.
Effective Date

3.1 Effective Date (Reference GC Clause 1)

The Effective Date, from which the Time for Completion of the Facilities shall be counted, is the date of execution of this Contract Agreement for and on behalf of the Employer and the Contractor.

Article 4.

4.1 The address of the Employer for notice purposes, pursuant to GC Clause 4.1 is Mumbai Metro Rail Corporation Ltd, MMRC Line 3 Transit



Communications Office, Wing 'A', 'E' Block, Bandra-Kurla Complex, Bandra (East),
Mumbai 400 051, India.

4.2 The address of the Contractor for notice purposes, pursuant to GC Clause
4.1 is (----- Contractor's address -----).

Article 5. Appendices 5.1 The Appendices listed in the attached List of Appendices shall be
deemed to form an integral part of this Contract Agreement.

5.2 Reference in the Contract to any Appendix shall mean the Appendices
attached hereto, and the Contract shall be read and construed
accordingly.

IN WITNESS WHEREOF the Employer and the Contractor have caused this Agreement to be
duly executed by their duly authorized representatives the day and year first above written.

Signed by, for and on behalf of the Employer

[Signature]

[Title]

in the presence of _____

Signed by, for and on behalf of the Contractor

[Signature]

[Title]

in the presence of ____



APPENDICES

APPENDIX 1	Terms and Procedures of Payment
APPENDIX 2	Prices Adjustment
APPENDIX 3	Insurance Requirements
APPENDIX 4	Time Schedule
APPENDIX 5	List of Major Items of Plant and Installation Services and List of Approved Subcontractors
APPENDIX 6	Scope of Works and Supply by the Employer



Appendix 1- Terms and Procedures of Payment

In accordance with the provisions of GC Clause 12 (Terms of Payment), the Employer shall pay the Contractor in the following manner and at the following times, on the basis of the Contract Price given in the section on Price Schedules.

Payments will be made in the currencies quoted in the Price Schedules by the Contractor.

Applications for payment in respect of part deliveries may be made by the Contractor as work proceeds. However, not more than one invoice for payment shall be accepted in any one month.

ADVANCE PAYMENT

An Advance Payment up to the extent of 10% of the Contract Price will be given on application from the Contractor and on receipt of a security, in the form of Bank Guarantee, for an amount equal to the Advance Payment and in any of the currency(-ies) prescribed in the Price Schedules.

Advance payment shall be made within 28 days of the receipt of application and the required Bank Guarantee.

The Advance Payment shall be recovered in two equal instalments from the payments due to the Contractor when the payments, including the Advance Payment, reach a level of 40% and 80% of the Contract Price of the Contract respectively. Where the payments reach a level of 80% directly, full amount of Advance Payment shall be recovered from the payments due to the Contractor.

Terms of Payment

All payments against the work, except the Final payment, to Contractor's shall be made in accordance with GC Clause 12 within forty-two (42) days of the receipt of required documents. The final payment shall be made within fifty-six (56) days of the receipt of required documents.

Schedule No. 1. Plant and Mandatory spare parts to be supplied from abroad

- i) In respect of Plant and Equipment supplied from abroad, due payments against Price Schedule No. 1 and thereafter subject to recoveries if any, by way of liquidated damages, shall be made as mentioned below:
 - 1) Sixty percent (60%) of the total or pro rata DDP (Delivered Duty Paid) amount of Schedule No 1 derived as at i) above, through irrevocable Letter of Credit (LC) to be opened by MMRC, payable on submission of the following documents:
 - (a) Signed/ Certified commercial invoice of shipped items showing the description, quantity, and price of items shipped in duplicate.
 - (b) Non-negotiable shipping documents / proof of dispatch (Bill of Lading/ Airway Bill).
 - (c) Inspection Certificate issued by Employer's Representative after Factory Acceptance Test.
 - (d) Insurance documents of shipped items.
 - (e) Works Test Certificate.
 - (f) Crate-wise packing list along with weight of each item in the list.
 - (g) Certificate of country of origin issued by the appropriate authority.



- 2) Twenty percent (20%) of the total or pro rata DDP amount of Schedule No. 1, derived as at i) above, on issue of
 - a) Signed/ Certified commercial invoice of items delivered at Depot site showing the description, quantity, and price of items in duplicate
 - b) Certified copy of Certificate of receipt of supplies at Depot site.
- 3) Ten percent (10%) of the total or pro rata DDP amount of Schedule No. 1 on issue of Completion Certificate as per Clause 24.5 or 24.6, Section VII, Part 3.
- 4) Five percent (5%) of the total or pro rata DDP amount of Schedule No. 1 on completion of Guarantee tests and issue of Operational Acceptance Certificate as per Clause 25.3, Section VII, Part 3.
- 5) Five percent (5%) of the total or pro rata DDP amount of Schedule No. 1 in eight (08) equal Quarterly instalments on satisfactory maintenance services (as per Section VI A & VI B of Part 2) during DLP. The last quarterly payment shall, however, become due at the end of DLP or the extended DLP whichever is later.

Schedule No. 2. Plant and Mandatory spare parts to be supplied within the Employer's country

- i) In respect of Plant and Equipment supplied from within the country, due payments against Price Schedule No. 2 and thereafter subject to recoveries if any, by way of liquidated damages or any other account, shall be made as mentioned below:
 - 1) Eighty percent (80%) of the total or pro rata FOR amount of Schedule No. 2, derived as at i) above, on delivery at Depot site on submission of the following documents:
 - (a) Signed/ Certified commercial invoice of supplies delivered at Depot site showing the description, quantity, and price of items shipped in duplicate.
 - (b) Non-negotiable shipping documents / proof of dispatch (Bill of Lading/ Airway Bill)
 - (c) Inspection Certificate issued by Employer's Representative after Factory Acceptance Test.
 - (d) Insurance documents of shipped items
 - (e) Work Test Certificate.
 - (f) Packing List.
 - (g) Certified copy of Certificate of delivery of items at Depot site.
 - 2) Ten percent (10%) of the total or pro rata FOR amount of Schedule No. 2 for the respective Equipment on issue of Completion Certificate as per Clause 24.5 or 24.6, Section VII, Part 3.
 - 3) Five percent (5%) of the total or pro rata DDP amount of Schedule No. 1 on completion of Guarantee tests and issue of Operational Acceptance Certificate as per Clause 25.3, Section VII, Part 3.
 - 4) Five percent (5%) of the total or pro rata FOR amount of Schedule No. 2 for the respective Equipment in eight (08) equal Quarterly instalments on satisfactory maintenance services (as per Section VI A & VI B of Part 2) during DLP. The last quarterly payment shall, however, become due at the end of DLP or the extended DLP whichever is later.



Schedule No. 3. Design Services

- i) In respect of design services as in Schedule No. 3, the payments shall be made as % expressed below against each milestone in Table-1 below on receipt of Notice of No Objection from the Project Manager certifying the receipt and completeness of documents:

Table-1: Milestones

Item	Description	Percentage for Sub-Items
3.1	Submission and acceptance of the following: 1) Work Program 2) Preliminary Design drawings.	40
3.2	Submission and acceptance of the following: 1) Final Design drawings. 2) Safety Plan & Quality Plan 3) RAMS Plan 4) Inspection & Testing Plan 5) 3-D Revit model	60
	Total	100

Schedule No. 4. Installation, Testing & Commissioning, and Other Services

The amount quoted in Price Schedule No. 4 in respect of Installation, Testing & Commissioning Services shall be paid as under:

- 1) 70% of the total or pro-rata Price quoted in Schedule No 4 for the respective Equipment after completion of Installation, Testing & Commissioning as per Clause 25.1 (excluding Guarantee tests), Section VII, Part 3, completion of training of O&M staff of the Employer and on receipt of invoice with documents as given below:
 - a) Signed/ certified commercial Invoice in duplicate,
 - b) Completion Certificate issued by the Project Manager,
 - c) Completion of Testing and Commissioning of the Facilities as per Clause 25.1 (excluding Guarantee tests) Section VII, Part 3.
 - d) Certificate of completion of training to Employer's O&M staff.
 - e) Submission of Training Manual, O&M Manual and Spare parts catalogue,
- 2) 30% of the total or pro-rata Price quoted in Schedule No. 4 for the respective Equipment on, completion of all other Contractor's obligations on issue of Operational Acceptance Certificate/ deemed Operational Acceptance and on receipt of the following documents as below:
 - (a) Signed/ certified commercial Invoice in duplicate,
 - (b) Certificate of completion of Contractor's all obligations under this Contract.

Note: If the Employer fails to make any payment on its respective due date, the Employer shall pay to the Contractor interest on the amount of such delayed payment at the annual rate of three (03) percentage points above the discount rate (Repo rate in case of RBI) of the central bank in the country of the currency (ies) of payment.



Payment Procedure

The following procedure shall be followed in applying for certification and making payments:

Application for Completed Items Certificate and Payment:

- 1) The Contractor shall be entitled to submit to the Project Manager Requests for Payment only upon the achievement of one or more of the Completed items described in the Schedules of Pricing Document (Section IV-B, Part 1) or milestones described in Table-1 above for Schedule No. 3. The Contractor shall not submit more than one request for payment per month.
- 2) The Contractor shall submit a Statement in six copies to the Project Manager after the end of each schedule/ milestone, in a form approved by the Project Manager, showing in detail the amounts to which the Contractor considers himself to be entitled, together with supporting documents which shall include the relevant report on progress. The Statement shall include the following items, as applicable, which shall be expressed in the various currencies in which the Contract Price is payable, in the sequence listed.
- 3) Any amount due in respect of Completed Items under each Payment Schedule; (including Variations and items described in sub-paragraphs (a) to (d) below);
 - (a) Any amounts to be added and deducted for changes in legislation and changes in cost, in accordance with Part-3, Section VII Clause 14 [Taxes and Duties] and Sub-Clause 14.4;
 - (b) Any amount to be deducted as required for fulfilling statutory requirements;
 - (c) Any other additions or deductions which may have become due under the Contract or otherwise, including but not limited to those with Part-3, Section VII under Clause 44 [Contractor's Claims]; and the deduction of amounts certified in all previous Payment Certificates.
 - (d) Any amounts recoverable from the Contractor in accordance with the Contract for liquidated damages for not achieving key dates and or /milestones.

Issue of Payment Certificates

- 1) The Employer or the Person authorised by the Employer shall certify the supplies/items completed in accordance with the Pricing Document (Part 1 Section IV-B). This sheet shall be signed by the Authorised Person and presented along with the Contractor's Payment Application to the Project Manager.
- 2) Where quantities/items are specified against Price Schedule, the Project Manager shall ensure all quantities submitted for payment have been completed and are fit for purpose with no outstanding NCR's, etc.
- 3) All certified quantities shall have supporting documents where specified and shall be submitted as part of the Contractor's application.
- 4) For payment against Foreign Currency portion as mentioned in Pricing Schedules, the Contractor shall issue a certificate of spending money in same currency(-ies) as part of supporting document with the application for payment to the satisfaction of Project Manager.
- 5) Thereafter, the Project Manager shall, on receiving the Statement and supporting documents from the Contractor, deliver to the Employer, with a copy to the Contractor, a Payment



Certificate showing the amount which the Project Manager considers to be due; if no payment is considered to be due, the Project Manager shall promptly notify the Contractor accordingly.

- 6) Where only a part of the payment applied for is disputed, payment certificate shall be issued for the undisputed amount.

Issue of Final Payment Certificate.

- 1) The Final Payment Certificate for the completion of 'Facilities' shall be prepared after completion of the Contract towards 'Facilities' in all respects in accordance with the Contract as determined by the Project Manager (Refer GC Clause 23, 24, 25, & 26).
- 2) On receiving the Operational Acceptance, in accordance with Part 3, Section VII, GC Clause 25.3, the Project Manager shall issue, to the Employer with a copy to the Contractor, the Final Payment Certificate, which shall state:
 - (a) The amount which is finally due, and
 - (b) the balance (if any) due from the Employer to the Contractor or from the Contractor to the Employer, as the case may be after giving credit to the Employer for all amounts previously paid by the Employer and for all sums to which the Employer is entitled.

Payment- Interim and Final.

- 1) After issue of Payment Certificate by the Project Manager corresponding to Contractor's Request for Payment, payment of 100% of the certified Interim amounts shall be made by the Employer. The amount certified shall account for all deductions, including statutory deductions, recoveries for advances and any amounts due from the Contractor.
- 2) The Employer shall pay the amount certified in the Final Payment Certificate within 14 days from the date of issue of the Certificate.

The Employer reserves the right to carry out a post payment audit and/or technical examination of the Facilities, and the Final account, including all supporting vouchers, abstracts, etc., and to make a claim on the Contractor for the refund of any excess amount paid to him, if as a result of such examination, any over-payment to him is discovered to have been made in respect of any work done or alleged to have been done by the Contractor, under the Contract. If any under-payment is discovered, the Employer shall pay the same to the Contractor. Such payments or recoveries, however, shall not be subject to any interest.



Appendix 2- Price Adjustment

1. Price Adjustment:

1.1 The portion of the contract for supply of Equipment is a fixed price contract.

2. Price Adjustment on Recommended Spares:

2.1 Employer may exercise the option to procure individual Spares listed in the Schedule No. 7, Price Schedule, Section IV-B, Part 1 at any time up to twelve (12) years from the date of issue of Operational Acceptance Certificate. The price quoted for these spares shall remain fixed till the issue of Operational Acceptance Certificate. Thereafter, the Procurement Price shall be escalated on the basis of WPI published by Economic Advisor, Ministry of Commerce & Industry, Govt of India; <https://eaindustry.nic.in> (e.g. Commodity Code 1318000000, 1317000000, 1310030000 and 1202000009 for Mechanical (mettalic) items, Electrical items, plastic & synthetic rubber and Lubricants respectively) from the month in which the Operational Acceptance Certificate is issued to the month corresponding to the date of Purchase Order.



Appendix 3- Insurance Requirements

Insurances to be Taken Out by the Contractor

In accordance with the provisions of GC 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 insurances 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 subcontractor's.

Data to be filled in by Bidder based on Bidder's quote in pricing documents.

Amount [in currency(ies)]	Deductible limits [in currency(ies)]	Parties insured [names]	From [place]	To [place]

The Contractor shall insure the plants, Facilities, all material and Contractor's document for not less than the full replacement cost including costs of demolition, removal and professional fee and profit.

b) **Installation All Risks Insurance**

Covering physical loss or damage to the Facilities at the Site, occurring prior to Operational Acceptance of the Facilities, with 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.

Data to be filled in by Bidder based on Bidder's quote in pricing documents.

Amount [in currency(ies)]	Deductible limits [in currency(ies)]	Parties insured [names]

The Contractor shall insure the Works, plant, Material and Contractor's document including fire, theft, accidental damages and other natural calamities for not less than the full reinstatement cost including costs of demolition, removal and professional fee and profit.



c) **Third Party Liability Insurance**

Covering bodily injury or death suffered by third parties (including the Employer's Personnel) and loss of or damage to property (including the Employer's property and any parts of the Facilities that have been accepted by the Employer) occurring in connection with the supply and installation of the Facilities.

Amount [in currency(ies)]	Deductible limits [in currency(ies)]	Parties insured [names]	From [place]	To [place]

The Insurance shall cover for 0.8 million Indian rupees for any one incident and for unlimited number of incidents.

d) **Automobile Liability Insurance**

Covering use of all vehicles used by the Contractor or its Subcontractor's (whether or not owned by them) in connection with the supply and installation of the Facilities. Comprehensive insurance in accordance with statutory requirements.

Automobile Liability should confirm to requirements of Indian Motor Vehicles Act.

e) **Workers' Compensation**

In accordance with the statutory requirements applicable in any country where the Facilities or any part thereof is executed. Each worker shall be insured as per "The Workmen's Compensation Act. 1923" and for not less than 0.8 million Indian rupees.

f) **Employer's Liability**

In accordance with the statutory requirements applicable in India where the Facilities or any part thereof is executed. Each worker shall be insured as per "The Workmen's Compensation Act. 1923" and for not less than 0.8 million Indian rupees.

g) **Professional Indemnity**

The Contractor shall provide insurance cover for not less than 3% (three percent) of the Contract Price. The cover is for the financial consequences of professional negligence, following a breach of professional duty by way of neglect, error or omission, additionally, cover is provided in respect of any legal and other costs and expenses incurred, occurring in connection with the design and construction of the temporary and permanent works of the Facilities.

h) **Other Insurances:**

The Contractor is also required to take out and maintain at its own cost the following insurances: Not Applicable.

The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GC Sub-Clause 34.1, except for the Workers' Compensation and Employer's Liability Insurances, and the Contractor's Subcontractor's shall be named as co-insurers under all insurance policies taken out by the Contractor pursuant to GC Sub-Clause 34.1, except for the Cargo, 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.



Insurances - To be taken out by the Employer

The Employer will not take out any insurance during the performance of the Contract.

The Contractor shall at its own expense take out, including paying any additional dues for any claim and maintain in effect during the performance and including the Defect Liability Period of the Contract all insurances as stated in the Specification and Contract Agreement.



Appendix 4- Time Schedule

[The Contractor shall be required to submit with its Bid a detailed program, normally in the form of a bar chart, showing how and the order in which it intends to perform the Contract and showing the key events requiring action or decision by the Employer. The attached schedule shall adhere to the Time(s) for Completion as given in key dates in Appendix 1, Section VI-A, Part 2.

The whole of the works shall be completed and delivered in stages (key dates) within time stipulated as shown in Appendix 1, Section VI-A, Part 2.



Appendix 5- List of major items of plants & installation services & approved sub-contractor

A list of major items of Plant and Installation Services is provided below.

The following Subcontractor's and/or manufacturers are approved for carrying out the items of the Facilities indicated below. Where more than one Subcontractor are listed, the Contractor is free to choose between them, but it must notify the Employer of its choice in good time prior to appointing any selected Subcontractor. In accordance with GC Sub-Clause 19.1, the Contractor is free to submit proposals for Subcontractor's for additional items from time to time. No Subcontracts shall be placed with any such Subcontractor's for additional items until the Subcontractor's have been approved in writing by the Employer and their names have been added to this list of Approved Subcontractor's.

Major Items of Plant and Installation Services	Approved Subcontractors/Manufacturers	Nationality



Appendix 6- Scope of Works and Supply (ies) by the Employer

- 1) The Shed & Civil Work for at grade level in Maintenance workshop shall be got constructed by the Employer through Depot Civil Contractor.
 - 2) Electricity, water and compressed air, if available and in a position to be offered for use, shall be provided by the Depot Civil Contractor as per the standard rates. However, the Contractor shall keep his arrangements ready and available for commissioning the Facilities.
 - 3) Employer's operating and maintenance staff may be present during the installation and commissioning phase for training purpose.
-



CF3- Performance Security Form - Bank Guarantee

(To be stamped in accordance with the Stamp Act of the Country of Issuing Bank)

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: Mumbai Metro Rail Corporation Ltd. (MMRC) NaMTTRI Building, Plot No. R-13, 'E' - Block, Bandra Kurla Complex, Bandra (East), Mumbai 400051, India

Date: (-----date of issue-----)

PERFORMANCE GUARANTEE No.: (-----guarantee reference number-----)

Guarantor: (-----name and address of place of issue-----)

We have been informed that _____ (hereinafter called “**the Applicant**”) has entered into Contract Agreement No. _____ vide LOA No. _____ dated _____ with the Beneficiary, for the execution of “Design, Manufacture, Supply, Installation, Testing and Commissioning of **Synchronized Underfloor Lifting Systems, Synchronized Mobile Lifting Jacks for 8-car train & 4 nos. of Bogie Turn Tables**” (MM3-CBS-DEQ-9-05) for the Mumbai Metro Line 3 Project (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 Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of INR _____ and USD _____, such sum being payable upon receipt by us of the Beneficiary’s complying demand supported by the Beneficiary’s statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its obligation(s) under the Contract, without the Beneficiary needing to prove or to show grounds for its demand or the sum specified therein.

The Guarantee shall be reduced by half of the amount upon our receipt of:

- (a) a copy of the Operational Acceptance Certificate; or
- (b) a registered letter from the Applicant (i) attaching a copy of its notice requesting issuance of the Operational Acceptance Certificate and (ii) stating that the Project Manager has failed to issue such Certificate within the time required or to provide in writing justifiable reasons why such Certificate has not been issued, so that Operational Acceptance is deemed to have occurred.

This Guarantee shall be further reduced by remaining half of amount upon our receipt of the notification issued by the Employer/Project Manager of the end of the Defect Liability Period (DLP).

This guarantee shall expire no later than the later of:



- (a) 28 days after the end of the Defect Liability Period of Two (02) years after our receipt of either (a) or (b) above; or
- (b) The ____ day of ____, 20__.

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

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758 (or subsequent ICC Publications).

SIGNATURE AND SEAL OF THE
GUARANTOR

NAME OF BANK -----

ADDRESS -----

DATE -----



CF4- Bank Guarantee Form for Advance Payment

(To be stamped in accordance with the Stamp Act of the Country of Issuing Bank)

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: Mumbai Metro Rail Corporation Ltd, MMRC Line 3 Transit Office, Wing 'A', 'E'
Block, Bandra-Kurla Complex, Bandra (East) Mumbai 400 051, India

Date: [-----date of issue-----]

ADVANCE PAYMENT GUARANTEE No.: [-----guarantee reference number-----]

Guarantor: [-----name and address of place of issue-----]

We have been informed that [-----name of Contractor or name of the joint venture-----]
(hereinafter called "the Applicant") has entered into Contract Agreement No. _____ dated
_____ with the Beneficiary, for the execution of "Design, Manufacture, Supply, Installation,
Testing and Commissioning of **Synchronized Underfloor Lifting Systems, Synchronized
Mobile Lifting Jacks for 8-car train & 4 nos. of Bogie Turn Tables**" (MM3-CBS-DEQ-9-05)
for the Mumbai Metro Line 3 Project.

Furthermore, we understand that, according to the conditions of the Contract, an advance payment
in the sum of ----- (amount in words and figures) ----- is to be made against an advance
payment guarantee.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the
Beneficiary any sum or sums not exceeding in total an amount of ----- (amount in words and
figures) ----- upon receipt by us of the Beneficiary's first demand in writing accompanied by a
written statement stating that the Applicant is in breach of its obligation under the Part A of the
Contract because the Applicant used the advance payment for purposes other than toward the
execution of the Works.

A demand under this guarantee may be presented as from the presentation to the Guarantor of a
certificate from the Beneficiary's bank stating that the advance payment referred to above has been
credited to the Applicant on its account number _____ at ___ (name and address of
Applicant's bank) _____.

This guarantee shall expire, at the latest, upon the Guarantor's receipt of documentation indicating
full repayment by the Applicant of the amount of the advance payment, or on the ___ day of
_____, 2____, whichever is earlier. Consequently, any demand for payment under this guarantee
must be received by the Guarantor at its office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 758.

SIGNATURE AND SEAL OF THE GUARANTOR

NAME OF BANK -----

ADDRESS -----

DATE -----



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BIDDING DOCUMENTS



MUMBAI METRO LINE 3 (COLABA-BANDRA-SEEPZ)

CONTRACT MM3-CBS-DEQ-9-05

Design, Manufacture, Supply, Installation, Testing & Commissioning of

- A) Synchronized Under Floor Lifting System
- B) Synchronized Mobile Lifting Jacks, and
- C) Bogie Turn Tables

for Project "Mumbai Metro Line-3"

Part 4 Drawings

Section X Drawings

August - 2019

Mumbai Metro Rail Corporation Ltd
MMRC Line 3 Transit Office,
Wing 'A', 'E' Block,
Bandra-Kurla Complex,
Bandra (East), Mumbai 400 051, India



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Bidding Documents

Composition of Documents

PART 1	Bidding Procedures
Section I	Instructions to Bidders
Section II	Bid Data Sheet
Section III	Evaluation and Qualification Criteria
Section IV-A	Bidding Forms
Section IV-B	Pricing Document
Section V	Eligible Source Countries of Japanese ODA Loans
PART 2	Employer's Requirements
Section VI-A	Employer's Requirements – General Specifications
Section VI-B	Employer's Requirements – Technical Specifications
PART 3	Conditions of Contract and Contract Forms
Section VII	General Conditions of Contract (GC)
Section VIII	Particular Conditions of contract (PC)
Section IX	Contract Forms
PART 4	Drawings
Section X	Drawings



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BIDDING DOCUMENTS



MUMBAI METRO LINE 3 (COLABA-BANDRA-SEEPZ)

CONTRACT MM3-CBS-DEQ-9-05

Design, Manufacture, Supply, Installation, Testing & Commissioning of

- A) Synchronized Under Floor Lifting System
 - B) Synchronized Mobile Lifting Jacks, and
 - C) Bogie Turn Tables
- for Project "Mumbai Metro Line-3"

**Part 4
Drawings**

**Section X
Drawings**

August - 2019

**Mumbai Metro Rail Corporation Ltd
MMRCL Line 3 Transit Office,
Wing 'A', 'E' Block,
Bandra-Kurla Complex,
Bandra (East), Mumbai- 400 051, India**



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Bidding Documents Composition of Documents

Part 1	Bidding Procedures
Section I	Instructions to Bidders
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Section III	Evaluation and Qualification Criteria
Section IV-A	Bidding Form
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Section VII	General Conditions of Contract (GC)
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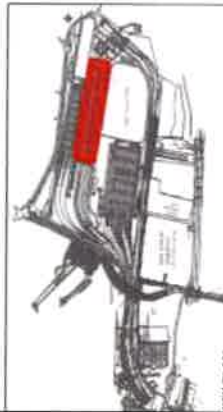
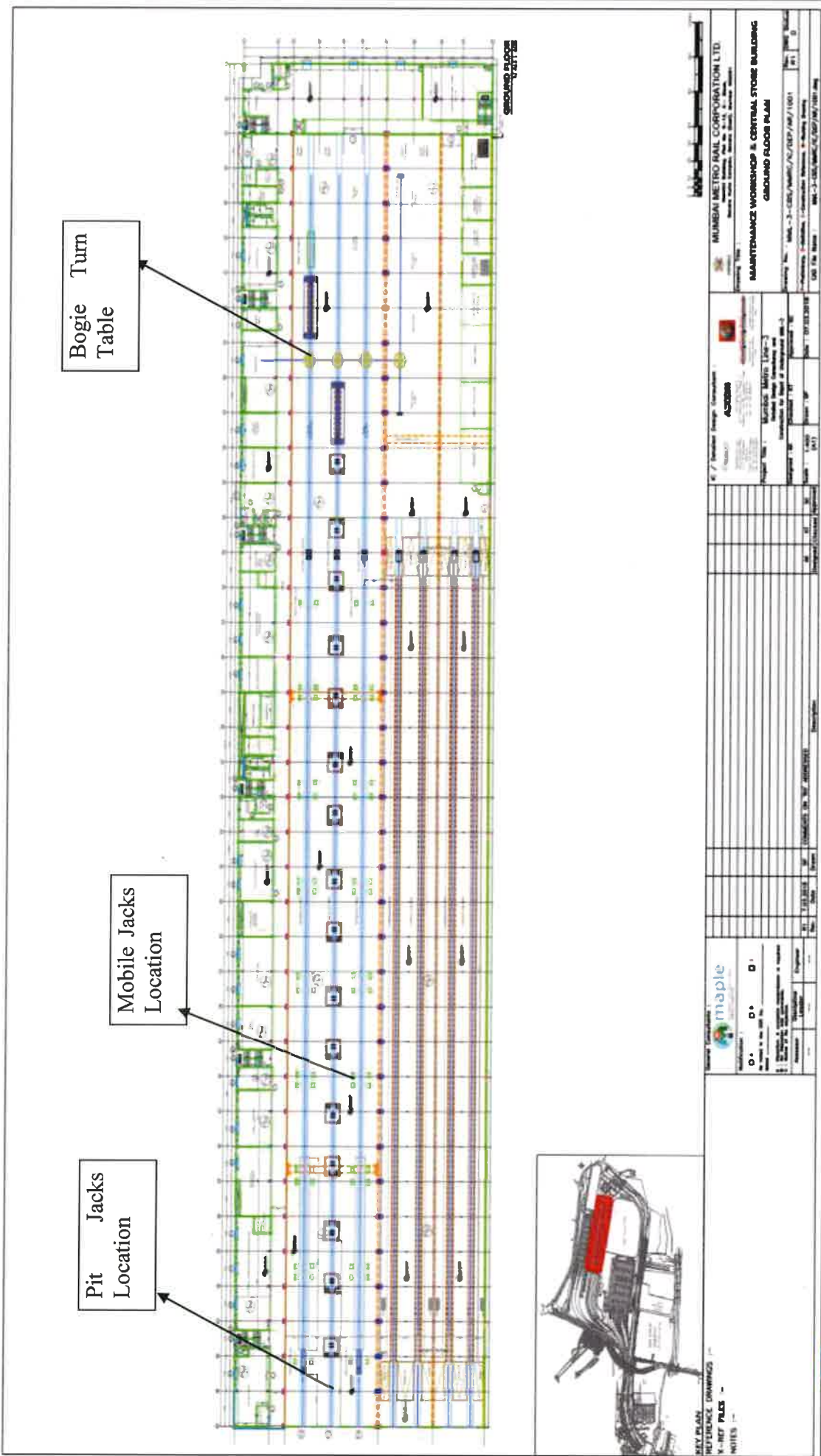
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List of Drawings

Drg.No.	Drawing No.	Drawing Title
1	MML3-CBS/MMRC/IC/DEP/AR/106	Aarey Depot Masterplan
2	DEPOT-ARP-D10-0001	Maintenance/Workshop Shed
3	DEPOT-STR-D02-SKETCH-09	Details of Pit & Trech



Maintenance/ Workshop Shed



SEE PLAN
 REFERENCE DRAWINGS
 X- REF FILES
 NOTES

		MUMBAI METRO RAIL CORPORATION LTD. MAINTENANCE WORKSHOP & CENTRAL STORE BUILDING GROUND FLOOR PLAN	
Project No.: MM3-CBS-DEQ-9-05/1001 Drawing No.: MM3-CBS-DEQ-9-05/1001-01	Date: 07/10/2018 Scale: 1:100	Author: [Name] Checker: [Name]	Approved: [Signature] Date: 07/10/2018



