

CHAPTER 1

1. GENERAL REQUIREMENTS AND SCOPE

1.1 INTRODUCTION

- 1.1.1 This chapter covers the general requirements and scope for Depot Machinery and Plant and is to be read in conjunction with the Technical Specification in chapter-2 Part 2 Section VIB as well as employer's drawings and other contract documents.
- 1.1.2 A brand-new depot will be constructed at Madhavaram to stable, maintain and dispatch all types of rolling stocks to be procured for CMRL Phase II project for passenger service. Unless otherwise stated, the machinery and plant referred to in this section is to be installed and commissioned at Madhavaram Depot.
- 1.1.3 The Rolling Stock will be of approx. 2.9-metre-wide air-conditioned cars. The trains, maximum of 6-car configuration shall be capable of sustaining a maximum permissible speed of maximum 90 kmph. All Trains in CMRL phase-II shall be operated in UTO mode (Grade of Automation level-4 for "driverless" Unattended Train Operations). The Contractor shall design the Machinery and Plant accordingly.
- 1.1.4 The main purpose of Madhavaram depot is to carryout Preventive Maintenance (PM), Corrective Maintenance (CM) and overhaul of multiple types of rolling stock fleets serving CMRL Phase II of the network. To improve the efficiency of and reduce downtime for maintenance activities, Chennai Metro Rail Limited has decided to procure below given Machinery and Plant. Provisional Civil works required to provide foundations for the respective Machinery and plant shall be constructed by CMRL's designated civil Contractor. The Contractor shall check and study the climate condition of Chennai to design, manufacture and execute the works for Depot machinery and plant accordingly.

1.2 LIST OF DEPOT MACHINERY AND PLANT:

Table 1-1 : List of Major Machinery and Plant

Machine No.	Major Machinery and Plant	Unit	Qty
DM&P-Q1	Under Floor Wheel Lathe (UFWL)	Nos	1
DM&P-Q2	Automatic Train Wash Plant (ATWP)	Nos	4 2
DM&P-Q3	Synchronised Pit Jacks (SPJ) for 3 Car Length	Set	2
DM&P-Q4	Wheel Profile Measuring System (WPMS- Way Side)	Nos	1
DM&P-Q5	Battery Operated Rail Cum Road Shunter-for 6 car shunting (BORRS)	Nos	2
DM&P-Q6	Synchronised Mobile Lifting Jacks (SMLJ) for 3 Car Length	Set	1
DM&P-Q7	Car Body Stand (CBS) for 3 Car Length	Set	1
DM&P-Q8	Diesel Operated Relief and Rescue Vehicle (RRV) With Rerailing & Rescue Equipment	Nos	1
DM&P-Q9	Bogie Wash Plant (BWP)	Nos	1
DM&P-Q10	Bogie Testing Unit (BTU)	Nos	1
DM&P-Q11	EOT 10/3t Category -1	Nos	2
DM&P-Q12	EOT 10/3t Category -2	Nos	2

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Machine No.	Major Machinery and Plant	Unit	Qty
DM&P-Q13	EOT 5t For ETU Shed	Nos	1
DM&P-Q14	EOT 5t For PWL Shed	Nos	1
DM&P-Q15	Bogie Turn Table (BTT)	Nos	5 6
DM&P-Q16	Bogie Manipulator	Nos	2 1
DM&P-Q17	Catenary Maintenance Vehicle (CMV)	Nos	3

Table 1-2 : List of Other Machinery and Plant

Machine No.	Other Machinery and Plant	Unit	Qty
DM&P-R1	Ultrasonic Flaw Detector (Handheld Device)	Nos	1
DM&P-R2	Battery Operated Platform Truck (2t)	Nos	4
DM&P-R3	Battery Operated Scissor Lift	Nos	4
DM&P-R4	High Pressure Water Jet cleaning machine –Type 1	Nos	2
DM&P-R5	High Pressure Water Jet cleaning machine –Type 2	Nos	1
DM&P-R6	Pallet Truck Manual - 2.5t	Nos	6
DM&P-R7	Battery Operated Forklift Truck(3t)	Nos	4
DM&P-R8	Mobile Lifting Table (MLT) 5t	Nos	1
DM&P-R9	Mobile Lifting Table (MLT) 2t,	Nos	1
DM&P-R10	Automatic Key Management System	Nos	1
DM&P-R11	Vertical Storage System	Nos	2
DM&P-R12	Air Compressor (Stationary) for PWL Shed 21cfm	Nos	1
DM&P-R13	Mobile Air Compressor 21cfm	Nos	1

Table 1-3 : List of Storage Items

Machine No.	Storage Items	Unit	Qty
DM&P-S1	Storage Racks	Nos	80
DM&P-S2	Mechanical Work Bench	Nos	30
DM&P-S3	Storage Bins – Type 1	Nos	150
DM&P-S4	Storage Bins – Type 2	Nos	100
DM&P-S5	Storage Bins – Type 3	Nos	100
DM&P-S6	Pallet (Heavy Duty)	Nos	50
DM&P-S7	Storage Cabinet – Almirah type	Nos	35
DM&P-S8	Personnel Lockers	Nos	200
DM&P-S9	Flammable Liquid Storage Safety Rack	Nos	5

Table 1-4 : List of Tools and other minor items

Machine No.	Tools And Other Minor Items	Unit	Qty
DM&P-T1	Weighing Machine (Capacity 1000kg)	Nos	1
DM&P-T2	Piece Counting Weighting Machine	Nos	1
DM&P-T3	Welding Machine Portable	Nos	2
DM&P-T4	Portable Hand Grinder	Nos	2
DM&P-T5	Drilling Machine Portable	Nos	2
DM&P-T6	Pedestal Grinding Machine (2 Disc Type)	Nos	1
DM&P-T7	Pillar Drilling Machine	Nos	1
DM&P-T8	Metal Cutting Machine	Nos	2
DM&P-T9	Dewatering Pump Portable	Nos	2

1.2.1 The scope of Works under this contract is for Design, manufacture, Supply, delivery (at Madhavaram depot site), installation, testing and commissioning, training, supply of operation & maintenance manuals, supply of spares parts and consumables for periodic, preventive and corrective maintenance during DLP and CMC (15 years) for all the machines mentioned above at Madhavaram Depot.

1.2.2 Special Note:

- i) All Depot Machinery and Plant given in the tender scope, shall be utilized for multiple types of rolling stocks. The above depot machinery shall be designed, manufactured, and demonstrate its compatibility during testing commissioning for multiple rolling stocks in CMRL phase -II project.
- ii) The Contractor shall comply with the Interface Requirements (specified in Chapter-4 of this section VIB) and shall undertake all trials, and acceptance tests required to verify the compatibility with multiple train fleets at no additional cost to CMRL.
- iii) Unless otherwise stated, the clause conditions specified this document shall apply to all the machines listed in Table 1-1, Table 1-2, Table 1-3 & Table 1-4.

1.3 SUPPLY OF DOCUMENTS

1.3.1 The Contractor shall supply to CMRL a list of deliverables for the procurement, design, manufacture, Inspection, testing, installation, training, maintenance, and operation of each machine.

1.3.2 The Contractor's list of deliverables shall be submitted to CMRL as per instruction of Engineer / Employer.

1.3.3 The Contractor shall submit the following detailed documents for getting notice of no objection from CMRL (but not limited to)

- a) List of sub-Contractors / suppliers / vendors of all the DM&Ps.
- b) Compliance matrix
- c) Master Schedule Programme with all activities for entire Works
- d) Project Management plan
- e) Quality & Safety procedures and plans
- f) Proposed planning and programming of manufacturing and execution of the work relating to the procurement / availability of the equipment and achieving the completion of the work as per technical specifications within the stipulated period of completion.
- g) Interface Management Plan and Detailed Interface Documents.
- h) Monthly progress reports

- i) Detailed Design Submission for respective machine.
 - j) General Arrangement drawing showing mounting arrangement & Foundation Drawing (to interface with depot civil Contractor appropriately).
 - k) Installation, Testing, Commissioning and Training programs
 - l) As-built drawings and Manufacturing drawings
 - m) BIM model and drawings
- 1.3.4 Manuals : The Contractor shall submit the following detailed manuals and documents for getting notice of no objection from CMRL.
- a) Installation / Erection manual
 - b) Operations manual
 - c) Training manual
 - d) Preventive Maintenance Manual
 - e) Trouble shooting Manual
 - f) Testing & Commissioning manual
 - g) Electrical and pneumatic schemes
 - h) Spare parts catalogue including supplier details

1.4 INSTALLATION, INSPECTION, TESTING & COMMISSIONING

1.4.1 General Requirements

- a) The Contractor shall put in place a full testing program to demonstrate that all the requirements of the Specification are met.
- b) The Contractor shall develop an Integration Testing & Commissioning plan to verify the machines in all modes of operation and with all necessary interfacing requirements. Test programs, methods and results shall be documented and submitted to CMRL.
- c) The Contractor shall include in the Integration Testing & Commissioning plan, methodology of ensuring safety during integration testing and commissioning and service trials.
- d) CMRL may conduct independent safety audits and will therefore require access to all the relevant design and product information. The Contractor shall provide all necessary assistance to CMRL.
- e) All the tests shall be carried out by the Contractor. CMRL shall be invited to attend as a witness. However, this does not absolve the Contractor's responsibility to test to the applicable standard and the Specification. All the costs associated with the CMRL's representative(s) witnessing of tests shall be borne by the CMRL either in India or abroad.
- f) During the execution of works, the Contractor's support shall include, but not be limited to:
 - i) Provision of test equipment.
 - ii) Attendance of competent staff.
 - iii) Provision of test procedures.
 - iv) CMRL may request that repeat tests be carried out to simulate the failure mode of any critical hardware / software component that is deemed to have a significant effect on the safety or reliability of the system.
 - v) The Contractor shall provide any simulation equipment, required for testing or commissioning.
 - vi) The Contractor shall submit a Testing and Commissioning program for the CMRL's review.
 - vii) The Contractor shall provide details of the testing activities as specified in the Specification.
 - viii) All alterations to equipment, systems and designs shall be carried out within the scheduled time prior to installation & commissioning.
 - ix) Access shall be granted to the CMRL to any facility where installation, cutover work, or other

tests are in progress.

- x) CMRL reserves the right to access at any time the records of all pre and post installation inspection and testing of equipment. In the absence of adequate documentation, CMRL shall have the right to request the Contractor to repeat these tests to avoid problems being accumulated at subsequent phases. Testing and commissioning will not be allowed to start until the Post Installation Inspection and Testing phases are completed.

1.4.2 Sequence of Tests

- a) Type Tests is not required to be performed. However previous type test reports of similar Design shall be submitted for information of CMRL.
- b) Factory Acceptance Tests (FAT):
 - i) Factory acceptance test plan shall be submitted for CMRL's review. The plan shall adopt a top-down approach and describe the FAT strategy as regards to methodology, procedures to be followed and records to be submitted. Contractor shall submit the comprehensive list of specifications to be followed.
 - ii) FAT plan / submission shall include the appropriate testing and inspection items for Notice of No Objection.
 - iii) FAT shall demonstrate that each machine/subsystem meets its functional specification. Prerequisites, if any shall be made available by the Contractor at his own cost. For example, for UFWL FAT, a suitable wheel set should be made available by the Contractor/manufacturer at his facility for demonstrating the capabilities of the machine.
 - iv) No equipment or software should be delivered to the Site until the Contractor has demonstrated to the satisfaction of the CMRL that the equipment or software conforms to the Specification by carrying out the FAT.
 - v) The Site for the FAT of equipment shall be notified to the CMRL 60 days prior to commencement of the FAT. CMRL shall have the right to witness or waive- off the FAT.
 - vi) Cost related to travel and stay of CMRL representatives during FAT at manufacturer site as per FAT Program will be borne by CMRL.
 - vii) In case of failure of FAT, the Contractor shall be responsible for arranging Re-FAT and all the cost incurred associated with travel, accommodation, food visas and permits for CMRL and GC.

1.4.3 Pre-installations tests and inspection

- a) Prior to installation, the Contractor shall ensure that equipment delivered to Site has not been damaged in transit. Inspection and testing shall be conducted by the Contractor to determine that the equipment has not been damaged or the performance impaired in any manner subsequent to shipment.
- b) Test procedures shall be carefully planned to ensure that the work can be completed within the time available. If the time available is restricted, this planning shall include a contingency plan to be implemented if testing proceeds slower than anticipated or defects are identified, which cannot be corrected.
- c) The Contractor shall submit to CMRL a site preparation plan before installation.
- d) The Contractor shall prepare the site in all respects required for installation.

1.4.4 Post Installation Tests

- a) Site tests shall be carried out in order to verify that the installations are correct and that, when the system as a whole is connected together, they function safely as an integrated system.
- b) All tests shall be documented, and tests results recorded. Test certificates with completed test records, which demonstrate equipment and components meet the performance requirements of the specification, shall be submitted for information.
- c) Post Installation tests shall be carried out by the Contractor before Functional Tests to demonstrate that the installation has been carried out correctly.
- d) The Contractor shall submit a Post Installation Inspection and Testing Plan prior to the

commencement of the post installation inspection and testing.

- e) Inspection shall verify that equipment has been installed to the procedures and designs that have received no objection from the CMRL, and equipment is correctly located and labelled.
- f) Inspection shall verify that any false feed, temporary wiring, and redundant items have been removed and that equipment is correctly protected against interference, damage and deterioration.
- g) The Contractor shall maintain inspection records to demonstrate that each item of equipment has been inspected and found to be satisfactory and attach to this record a detailed list of any discrepancies found and remedial work carried out. Inspection records shall be kept for all installed equipment and a detailed list attached of any discrepancies.
- h) As the discrepancies are rectified, the record sheets shall be amended to record the corrections.

1.4.5 System Acceptance Tests (SAT)

- a) System Acceptance Tests shall comprise comprehensive testing of the completely assembled installation to ensure that every item has been installed, adjusted, and to demonstrate that all machines operate correctly in accordance with the Specification, perform in accordance with the Specification and the local configuration and are available for integration testing & commissioning.
- b) Prior to System Acceptance Testing, the Contractor shall submit a System Acceptance Plan to the CMRL for Notice of No Objection. The plan shall adopt a top-down approach and describe the System Acceptance strategies and processes.
- c) System Acceptance Plan shall identify a comprehensive list of specifications, standards, method statements, procedures, drawings and records to be submitted to CMRL for Notice of No Objection. The Plan shall also include a programme which identifies the dates for system acceptance submission and tests.
- d) Any tests carried out which are deemed as System Acceptance Tests shall be identified. If these tests have been carried out earlier or form the part of earlier carried tests, the same need not be repeated unless desired by the CMRL. However, these tests should be identified and included in the System Acceptance Test Plan.
- e) These tests shall be conducted in the presence of the CMRL who may decline for witness.
- f) Any defects which become apparent in the course of these tests shall be made good and modifications as approved shall be implemented and recorded. All affected equipment shall be retested and certified before the system is accepted.
- g) Prerequisites for SAT;
 - i) All documentation for the Safety Report shall be submitted to the CMRL for a Notice.
 - ii) All SAT shall be completed, and test records submitted to CMRL for a Notice.
 - iii) Facilities for the maintenance of the System shall be in place.
 - iv) SAT Plan shall be submitted to the CMRL for a Notice of at least 60 days before the commencement of the SAT.
- h) System Acceptance Test Requirements
 - i) It shall be the Contractor 's responsibility to conduct all tests and record data and restore the machines to full operational use following the SAT.
 - ii) During the SAT, all interfaces with external systems other than those pertaining to the designated Contractor shall be tested.

1.4.6 Integration Testing and Commissioning

- a) On completion of testing and commissioning of the Contractor 's own system to the satisfaction of the CMRL the Contractor shall carry out all tests necessary to integrate the particular machine with all other systems of CMRL such as multiple Rolling Stock, Track, Communication / signalling and train control, Overhead Equipment, Civil, etc. and demonstrate correct operation of all internal and external interfaces as applicable.
- b) Integration Testing & commissioning plan containing the schedule of integration tests in

coordination with the interface Contractor s and test procedures shall be submitted to the CMRL for a Notice of No Objection. The tests shall be carried out in coordination with the interface Contractor.

- c) The Contractor shall be required to lead in certain Integration Testing and Commissioning where such tests are required to prove the performance of system provided by the Contractor .
- d) All the defects and shortfalls in the Contractor 's system discovered in the course of Integration Testing and Commissioning shall be made good and retested / performed to the satisfaction of the CMRL before the issue of Taking Over Certificate by CMRL.
- e) Testing and commissioning shall be managed without perturbation and/or interruption of operation and maintenance.
- f) CMRL may require additional tests if needed.

1.5 NOT USED

1.6 TRAINING

- 1.6.1 The Contractor has to prepare a comprehensive training plan for all the machines and submit to CMRL for notice of no objection.
- 1.6.2 The Contractor shall provide training that enables operators and maintainers to work with the machines in the most efficient and safe manner.
- 1.6.3 The Contractor shall provide comprehensive training and documentation to the CMRL's staff including Machine Operators & Machine Maintainers.
- 1.6.4 The Contractor shall adapt the content of its standard training courses to the CMRL's infrastructure and also to the trainees' skills background.
- 1.6.5 The Contractor shall:
 - a) provide classroom training to trainees at the CMRL's depot premises.
 - b) provide competent training instructors, training manuals, all necessary aids and materials as required for training.
 - c) provide handouts for each trainee during the training.
- 1.6.6 The Contractor shall provide training for at least 6 CMRL nominated staff for each machine at Madhavaram depot. Period of training should be adequate (but not less than 7 working days for each major machinery and minimum 3 working days for each other machinery and plant other than major machinery and plant) and shall cover all aspects to make nominated staff of CMRL to carry out operation, schedule attention, troubleshooting and repairs to these machines as and when required. A competency certificate shall be issued to each trainee after completion of training on the respective machine. Training should be imparted in English. Cost of training should be included in the cost of equipment.

1.7 TOOLS:

- 1.7.1 ~~The Contractor shall provide Industrial Laptop (windows OS) with machine (where applicable) with latest specification for software loading / failure logs downloading etc. During the design stage Contractor shall provide details among the latest specification / configuration laptop for approval by CMRL.~~

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The Contractor shall provide one (1) individual Industrial Grade Laptop (windows OS) with each machine quantity (ATWP, UFWL, SPJ, WPMS, BORRS, BWP, BTU, VSS and CMV) for software loading / failure logs downloading etc :

Such laptops, shall comply with (but not be limited to) the following minimum specification:-

- a) Core i7 processor
- b) RAM 32GB
- c) SSD Storage Unit 1TB and above

d) Screen 14 Inch

e) Enhanced Battery Life

The Contractor shall submit details of the laptop specification / configuration to CMRL for approval during design stage.

1.7.2 3 sets of keys for each applicable machine.

1.7.3 Any other tools such as special keys, measuring and monitoring tools etc which are required for rectifying the machine failures, shall be supplied for each machine. Contractor shall furnish details of such above special tools.

1.8 NOT USED

1.9 NOT USED

1.10 NOT USED

1.11 STANDARDS (WHERE APPLICABLE):

1.11.1 Work related to the design, manufacturing, and execution etc of the equipment shall comply with the relevant European / International Standards, Codes of Practice or equivalent Indian codes & standards (subject to CMRL approval) and latest Statutory Requirements of India (subject to CMRL approval), as given in Table below (but not limited to) The respective standards for few machines are indicated vide given respective machine specification too.

Table 1-5: Standards

Standard	Description
BS EN ISO 4413:2010	Hydraulic fluid power. General rules and safety requirements for systems
IS 8623/1977	Factory built assembly switch gear and control gear
IS 4460/1967	Specifications for gears
IS 3028	Sound Level
ISO 1217	Displacement compressors - Acceptance tests-09/1996.
ISO 1711	Assembly tools for screws and nuts – Technical Specification - Hand operated wrenches and sockets
BS 5378	Safety colours and safety signs
BS EN 287	Approval testing of welders for fusion welding
BSEN 288	Specification and approval of welding procedures for metallic materials
BS 5304	Code of practice for safety of machinery
BS 5395	Stairs, ladders and walkways
BS 5950	Structural use of steelwork in building
BSEN 60073	Specification for coding of indicating devices and actuators by colours and supplementary means
EN 60204	Electrical equipment
BSEN 60529	Specification for degrees of protection provided by enclosures (IP code)
EN 954-1	Safety for Control System

Standard	Description
IS 325	Electric Motor
ISO 9001-3:1991	Guideline for the Application of ISO9001 to the Development, Supply and Maintenance of Software

1.11.2 Where no standard is identifiable, the Contractor shall make a proposal, based on the best international practice, which shall be subject to review and approval by CMRL. 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 and approval by CMRL. All drawings and design calculations submitted with the Bid, or in accordance with the requirements of the Contract, shall use SI units.

1.11.3 Surface Treatment:

- Surface treatment of the Equipment shall be suitable for the working environment under the climatic conditions of Chennai.
- 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.

1.11.4 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.
- Paint color scheme shall be submitted to CMRL for his notice of No Objection and shall be finalized during the design phase separately for each machine.
- 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 machine enters the service.
- If any of above aspect under Finish and Painting vary for any machine, the same shall be finalized during design stage.

1.12 Marking and Identification:

- 1.12.1 A plate indicating Name of manufacturer, Important technical particulars, Year of Manufacture & Serial Number shall be fixed on each Machine at suitable location.
- 1.12.2 Logo of CMRL shall be affixed at suitable location(s) on each Machine.
- 1.12.3 The Contractor shall submit the proposed scheme of identification to the CMRL for his Notice of No Objection
- 1.12.4 The Contractor shall arrange its own lifting / handling facilities for unloading, shifting, execution or any other handling activity / work before & during installation and commissioning of Machinery and Plants at depot site.
- 1.12.5 The Contractor shall supply and deliver the machine till Madhavaram depot site in good condition. Suitable safe unloading arrangement shall be made by Contractor. Safety and security of each machine and its associated assembly, parts, spares etc shall be well taken care by Contractor.

1.13 NOT USED

1.14 ABBREVIATIONS & DEFINITIONS:

- 1.14.1 Various abbreviations used in this tender are set out in alphabetical order in the below table where applicable (but not limited to):

Table 1-6: Abbreviations & Definitions

Abbreviation	Description
AC	Alternating Current
AMS	Asset Management System
ATP	Automatic Train Protection
BIM	Building Information Modelling
BS	British Standard
CAD	Computer Aided Design and Drafting
CD	Compact Disc
CNC	Computer Numerical Control
CMV	Catenary Maintenance Vehicle
CMC	Comprehensive Maintenance Contract
DC	Depot Contractor
DDC	Detail Design Consultants
DM&P	Depot Machinery & Plant
E&M	Electrical & Mechanical
EMC	Electro Magnetic Compatibility
EMI	Electro Magnetic Interference
ES	European Standard
FAT	Factory Acceptance Test
GA	General Arrangement
GC	General Consultants
IMP	Interface Management Plan
IP	Ingress Protection
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
OHE	Over Head Equipment
OHS&E	Operational Health, Safety & Environment
O&M	Operation and Maintenance
PM	Project Manager
QA	Quality Assurance
RS	Rolling Stock

Abbreviation	Description
SAT	Site Acceptance Test
SI	International System (of Measurement)
STC	Signalling and Train Control
Telecom	Telecommunication
TRW	Track Works Contractor

1.15 PERSONNEL

- 1.15.1 The Contractor shall submit their Complete Staffing proposal for all the following Key Staffs duly in compliance with the conditions / criteria specified below, within 7 days from the Date of Commencement, for Notice of No Objection (NONO) from CMRL. At any time during the course of the Works, if the Contractor wants to replace any of the Key staffs, the Contractor shall propose replacement candidate with equal or better qualification / experience criteria and shall obtain NONO from CMRL at least 30 days before such replacement.

Position	Total Work Experience (Minimum number of years)	Experience in Similar Works * (Minimum number of years)
Interface Manager	10	6
Service Manager	10	6

Note: The above project resources shall be exclusive to this project.

** Only time served in a role / designation which has direct involvement in similar responsibilities, duties and industrial sector will be counted as experience in similar Works*

- 1.15.2 Interface Manager:
 Shall be responsibility to coordinate for all the activities pertaining to interface requirement including interface with other designated system Contractor for designing, manufacturing and execution of each respective machinery and plant successfully. The Interface Manager (must be minimum engineering graduate in Electrical / Electronics / Mechanical) will be responsible satisfactory coordinate and resolution of all interface issues. Interface manager shall be available at depot project site within 28 days of the commencement of project works until the completion of defect notification period of last machinery and plant.
- 1.15.3 Service Manager:
 Shall be responsible for Installation, Testing & Commissioning, Training, DNP and CMC period services for each respective machinery and plant successfully. The Service Manager (must be minimum engineering graduate in Electrical / Electronics / Mechanical) will be responsible for satisfactory resolution of all execution related issues. Service manager shall be available at depot project site prior to arrival of machinery and plant at site until the completion of CMC period of last machinery and plant.

1.16 PROJECT MANAGEMENT INFORMATION SYSTEM (PMIS)

- 1.16.1 The Contractor shall refer clause 16.17 of Part 2 Section VIA for details.

1.17 DOCUMENTATION AND CAD STANDARDS

- 1.17.1 The Contractor shall refer Appendix G of Part 2 Section VIA for details and shall follow as applicable.

1.18 OTHER

- 1.18.1 All types of consumables (oil, greases, inserts, detergents, chemicals, hardware, software,

components etc) for each machine shall be deemed included and maintained by the Contractor during the maintenance period.

1.18.2 Unless otherwise stated in Chapter 2 ERTS DM&P Section VIB, the noise level of the respective machine during its operation shall not exceed 75 dBA when measured at a distance of one meter from the machine. Minor variation to above limits is acceptable on discretion of employer.

1.18.3 Internet connection for all M&Ps (where applicable) shall be in scope of Contractor for the purpose of remote diagnosis etc.

1.19 TECHNICAL SPECIFICATION

1.19.1 The technical specification and details for each machine is given in CHAPTER 2.