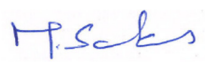




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**CMRL ARE02A**  
**Procurement Technical Specification**  
**For DIESEL OPERATED RELIEF & RESCUE VEHICLE (RRV) WITH**  
**RERAILING RESCUE EQT & AUXILARY TRUCK**  
**for CMRL – Madhavaram Depot with 3 Years DLP**

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Approved	24.04.2025	Sasikumar M	
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Prepared	23.04.2025	R.Iyyapillai	
	Date	Name	Signature

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### REVISION DETAILS

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0	-	-	First Release	24.04.2025

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## 1. Introduction

This document describes the technical requirement of DIESEL OPERATED RELIEF & RESCUE VEHICLE (RRV) WITH RERAILING RESCUE EQUIPMENT & AUXILIARY TRUCK to be procured by BEML for CMRL Metro Phase 2 Project (Corridor 3, Corridor 4, Corridor 5) contract for Chennai Metro Rail Corporation Limited.

The scope of Works under this contract is for Design, manufacture, Supply, delivery (at Madhavaram depot site), installation, testing and commissioning, training, maintenance, supply of operation & maintenance manuals, supply of spares parts and consumables, Special tools & fixtures, Software for periodic, preventive and corrective maintenance during 3 years DLP and spares support after DLP for 15 years for the Diesel Operated Relief & Rescue Vehicle (RRV) With Rerailing Rescue Equipment & Auxiliary Truck mentioned above at Madhavaram Depot.

### **Special Note:**

- 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.
- The Sub-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 BEML / CMRL. 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 (Part 2 – Section VIB (Chapter 1)).

## 2. Definitions and Abbreviations

The following definitions and abbreviations are applicable to the PTS.

### 2.1 Definitions

- “Employer”** means Chennai Metro Rail Corporation Limited (CMRL), its legal successors and assignees.
- “Sub-contractor”** means the supplier who supplies the required DM & P equipment to BEML for CMRL ARE02A Project. Sub-contractor shall carry out the works in accordance with ERTS with regard to Diesel Operated Relief & Rescue Vehicle (RRV) With Rerailing Rescue Equipment & Auxiliary Truck.
- “Contractor”** means the persons or person appointed by the Employer to undertake the execution of the works for CMRL ARE02A project. In order to avoid misunderstanding of the roles of the Contractor in ERTS, the term “Contractor” shall be read as “Sub-contractor” for those ERTS Clauses referred to in this PTS.

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- d) **"Contract"** means the contract between Sub-contractor and BEML in relation to the supply of Diesel Operated Relief & Rescue Vehicle (RRV) With Rerailing Rescue Equipment & Auxiliary Truck for CMRL ARE02A project.
- e) **"Project Manager or Employer's Representative"** means any person nominated or appointed from time to time by the Employer to act as the Project Manager/ Employer's Representative for the purposes of the Contract and notified as such in writing to the Contractor.
- f) **"GTC / STC"** means General Terms and Conditions for Supply of DM & P equipment for CMRL ARE02A Project issued by BEML.
- g) **"BEML"** means the Contractor to procure the DM & P equipment for CMRL ARE02A project.
- h) **"ERTS"** means Employer's Requirements Technical Specification – Rolling Stock or Employer's Requirements Technical Specification - Comprehensive Maintenance Contract for CMRL ARE02A project as applicable.
- i) **"RRV"** means Relief & Rescue Vehicle
- j) **"PTS"** means BEML's Procurement Technical Specification.

## 2.2 Abbreviations

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

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

### 3. Precedence of Documents

The PTS shall be read in conjunction with the General Terms & Conditions (GTC) of the tender, ERGS and ERTS.

The PTS shall be read in conjunction with the General Terms and Conditions (GTC) of tender and ERTS-RS and ERTS-CMC & DP&M. To the extent that any provision of the PTS is inconsistent with any provision of the GTC, the provisions of the GTC shall prevail.

To the extent that any provision of GTC is inconsistent with any provisions of the ERTS, the provisions of ERTS shall prevail.

This PTS in no way relieves the supplier from any requirements specified in the technical specification. The complete requirements are those found in the aforesaid documents. It shall be the supplier's responsibility to ensure that equipment, documentation, and services furnished against this PTS are in full compliance with all the above documents.

However, if a conflict is discovered among any of the above documents, the following order of priority shall govern:

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Order of Precedence	Document Title
1	CMRL Phase-2 ERTS-DM&P and ERTS-CMC
2	GTC
3	PTS

The complete requirements are those found in the above documents. It shall be the subcontractor's responsibility to ensure that equipment, documentation, and services furnished against this PTS are in full compliance with all the above documents.

Also, in the event of any conflict among the requirements of particular parts of the PTS and ERTS, the subcontractor shall seek clarification with BEML prior to making a contract. After making a contract, the subcontractor shall comply with BEML's Interpretation for any discrepancies.

#### 4. Eligibility criteria

Subcontractors / Manufacturers for the following major item of supply or services must meet the following minimum criteria, herein listed for this item:

SI No.	Minimum Criteria to be met	Form
1.	At least two similar Works, incorporating the requirement for Design, manufacture, Supply, Installation, Testing and Commissioning of <b>Diesel Operated Relief and Rescue Vehicle with Rerailing &amp; Rescue Equipment (RRV)</b> for Metro Rail Projects / LRT / High Speed Rail Network / Railways, satisfactorily completed and in Operation <b>for minimum 2 years</b> in the duration from 1st January 2013 to bid submission end date. Proven-ness certificate (issued by end-user) of working satisfactorily outside the country of origin (for foreign company) or within India shall be submitted by the bidder.	Form Sys-17

**4.1** Failure to comply with this requirement will result in rejection of the Subcontractor.

**4.2** In pursuant to PCC to GCC Clause No. 4.4 of Part 3: Section VIII Particular Conditions (Part B: Specific Provisions), It is a mandatory obligation for the Contractor to obtain a Notice of No Objection (NONO) from the Employer / Engineer for the selection of Subcontractors and/or vendors for all items of Work, including for cases where the Subcontractor and/or vendor had already been named in the Contractor's Technical Bid Proposal (Part 1, Section IV, Bidding Forms, Clause 5.13 : Form SUB - Proposed Subcontractors for Major Items of Plant and Installation Service). Purchase of all materials and equipment shall be in accordance with the Standards specified in Part 2 of the Contract. Where the Contractor had proposed more than One (1) Subcontractor the Employer / Engineer reserves the right to choose the vendor and/or Subcontractor from the proposed list. If the Contractor proposes to subcontract the Depot Machinery and Plant scope, then further

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subcontracting to major Suppliers / Vendors shall also require the prior approval of the Employer / Engineer.

#### 4.3 Unclear aspects

If any term / clause / definition is unclear in this specification, sub-contractor shall seek clarifications from design team in BEML, prior to signing contract, to confirm the same.

After signing the contract, sub-contractor shall follow the definition and opinion of design team in BEML.

### 5. General Requirements

#### 5.1 Supply of Documents

5.1.1 The Sub-Contractor shall supply to BEML / CMRL a list of deliverables for the procurement, design, manufacture, Inspection, testing, installation, training, maintenance, and operation of the machine.

5.1.2 The Sub-Contractor's list of deliverables shall be submitted to BEML / CMRL as per instruction of Engineer / Employer.

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

- Compliance matrix
- Master Schedule Programme with all activities for entire Works
- Quality & Safety procedures and plans
- Interface Management Plan and Detailed Interface Documents.
- Detailed Design Submission for respective machine.
- General Arrangement drawing showing mounting arrangement & Foundation Drawing (to interface with depot civil Contractor appropriately).
- Installation, Testing, Commissioning and Training programs
- As-built drawings and Manufacturing drawings
- BIM model and drawings

The document “**BIM GUIDELINES FOR ASSET INFORMATION MODEL**” (Enclosure-6) shall be followed to submit the BIM model of the Depot M&P equipment in Autodesk Revit format to ensure its compliance with asset requirements & specified guidelines.

5.1.4 Manuals: The Sub-Contractor shall submit the following detailed manuals and documents for getting notice of no objection from CMRL.

- Installation / Erection manual
- Operations manual
- Training manual
- Preventive Maintenance Manual
- Trouble shooting Manual
- Testing & Commissioning manual
- Electrical and pneumatic schemes
- Spare parts catalogue including supplier details



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## 5.2 Installation, Inspection, Testing & Commissioning

### 5.2.1 General Requirements

- a) The Sub-Contractor shall put in place a full testing program to demonstrate that all the requirements of the Specification are met.
- b) The Sub-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 BEML / CMRL.
- c) The Sub-Contractor shall include in the Integration Testing & Commissioning plan, methodology of ensuring safety during integration testing and commissioning and service trials.
- d) BEML / CMRL may conduct independent safety audits and will therefore require access to all the relevant design and product information. The Sub-Contractor shall provide all necessary assistance to BEML / CMRL.
- e) All the tests shall be carried out by the Sub-Contractor. BEML / CMRL shall be invited to attend as a witness. However, this does not absolve the Sub-Contractor's responsibility to test to the applicable standard and the Specification. All the costs associated with the BEML / CMRL's representative(s) witnessing of tests shall be borne by the BEML / CMRL either in India or abroad.
- f) During the execution of works, the Sub-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) BEML / 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 Sub-Contractor shall provide any simulation equipment, required for testing or commissioning.
  - vi) The Sub-Contractor shall submit a Testing and Commissioning program for the BEML / CMRL's review.
  - vii) The Sub-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 BEML / CMRL to any facility where installation, cutover work, or other tests are in progress.
  - x) BEML / 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, BEML / CMRL shall have the right to request the Sub-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.

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## 5.2.2 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 BEML / CMRL.

b) Factory Acceptance Tests (FAT):

- i) Factory acceptance test plan shall be submitted for BEML / 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. Sub-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 Sub-Contractor at his own cost. For example, for UFWL FAT, a suitable wheel set should be made available by the Sub-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 Sub-Contractor has demonstrated to the satisfaction of the BEML / 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 BEML / CMRL 60 days prior to commencement of the FAT. BEML / CMRL shall have the right to witness or waive- off the FAT.
- vi) Cost related to travel and stay of BEML / CMRL representatives during FAT at manufacturer site as per FAT Program will be borne by BEML / CMRL.
- vii) In case of failure of FAT, the Sub-Contractor shall be responsible for arranging Re-FAT and all the cost incurred associated with travel, accommodation, food visas and permits for BEML / CMRL and GC.

## 5.2.3 Pre-installations tests and inspection

- a) Prior to installation, the Sub-Contractor shall ensure that equipment delivered to Site has not been damaged in transit. Inspection and testing shall be conducted by the Sub-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 Sub-Contractor shall submit to BEML / CMRL a site preparation plan before installation.
- d) The Sub-Contractor shall prepare the site in all respects required for installation.

## 5.2.4 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.

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- 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 Sub-Contractor before Functional Tests to demonstrate that the installation has been carried out correctly.
- d) The Sub-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 BEML / 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 Sub-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.

### 5.2.5 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 Sub-Contractor shall submit a System Acceptance Plan to the BEML / 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 BEML / 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 BEML / 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 BEML / 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 BEML / CMRL for a Notice.
  - ii) All SAT shall be completed, and test records submitted to BEML / CMRL for a Notice.
  - iii) Facilities for the maintenance of the System shall be in place.
  - iv) SAT Plan shall be submitted to the BEML / CMRL for a Notice of at least 60 days

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before the commencement of the SAT.

h) System Acceptance Test Requirements

- i) It shall be the Sub-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 Sub-Contractor shall be tested.


### 5.2.6 Integration Testing and Commissioning

- a) On completion of testing and commissioning of the Sub-Contractor 's own system to the satisfaction of the BEML / CMRL the Sub-Contractor shall carry out all tests necessary to integrate the particular machine with all other systems of BEML / 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 BEML / CMRL for a Notice of No Objection. The tests shall be carried out in coordination with the interface Contractor.
- c) The Sub-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 Sub-Contractor
- d) All the defects and shortfalls in the Sub-Contractor 's system discovered in the course of Integration Testing and Commissioning shall be made good and retested / performed to the satisfaction of the BEML / CMRL before the issue of Taking Over Certificate by BEML / CMRL.
- e) Testing and commissioning shall be managed without perturbation and/or interruption of operation and maintenance.
- f) BEML / CMRL may require additional tests if needed.

### 5.3. Site Visits & Requirements:

The Tenderer should visit and examine the Site of Supply and its surroundings and obtain for himself on his own responsibility for collecting the complete requirements that may be necessary for preparing the Tender and entering into a Contract for the proposed Supply.

- a). The Tenderer should include Cost of Cables, Cable Routing, Isolator, Circuit Breaker, lightning and all other electrical requirement from main distribution panel to the machine.
- b). The Tenderer shall plan the Foundation & Machine Layout suiting to the Depot Civil layout made by the CMRL. Any civil, E&M & requirements / modifications shall be taken care by the contractor at their own cost.
- c). Machine power rating of Diesel Operated Relief & Rescue Vehicle (RRV) With Rerailing Rescue Equipment & Auxiliary Truck should be within the power rating of **32 A & 20 A**. In the event of any conflict among the above requirements, the subcontractor shall seek clarification with BEML / CMRL prior to making a contract.
- d) The costs of visiting the Site shall be borne by the Tenderer. It shall be deemed that the Tenderer has undertaken a visit to the site of Supply and is aware of the site conditions prior to the submission of Tender.

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e) The Tenderer and any of his personnel will be granted permission by BEML / CMRL to enter upon his premises and lands for the purpose of such inspection, but only upon the express condition that the Tenderer and his personnel will release and indemnify the Purchaser and his personnel from and against all liability.

f) The supplier shall be the responsible for complete installation of the equipment in the depot, required material handling equipment, tools (if any), commissioning and testing of the equipment as per relevant IS standard.

## 6. Technical requirements (Ref : Clause 2.8 of ERTS-DM&P Part-2, Section-B)

### 6.1 Purpose of the machine:

The Relief and Rescue is required to carry the re-railing, rescue device & personnel to attend the derailment of train and any other related accident on mainline as well as in depot of CMRL phase-II. The Relief and Rescue shall be driven on Road as well as on the track. Its design shall be equipped with compatible coupler for shunting up to 3 cars of multiple types of rolling stock in the depot when required.

### 6.2 Scope of Works:

The scope of the Works, includes the following but not limited to:

6.2.1 Design, Manufacture, Supply, Testing Training & commissioning of RRV with Re-railing and Rescue equipment. The vehicle shall be fully compatible with suitable storage racks to carry all the Re-railing & Rescue equipment as include in this contract to the required location on the CMRL phase-II alignment by rail or by road.

6.2.2 The Rescue and Re-railing Equipment compartment shall be so designed that it will be easy to retrieve the different items while working in Tunnel / Mainline / Depot etc.


6.2.3 Training of CMRL O&M staff in operations and maintenance.

6.2.4 The Contractor shall get the Registration of Rail-cum-Road Vehicle with Regional Transport Office in the name of CMRL. Also Speed Certification of Rail-cum-Road Vehicle from statutory authority / RDSO is in scope of Contractor. Necessary support shall be provided by CMRL.

6.2.5 The Contractor shall get the vehicle registered in the name of CMRL in the applicable RTO (Regional Transport Office) of Tamil Nadu.

6.2.6 The Contractor shall be responsible for all recurring and non-recurring costs required to keep the RRV eligible to travel on public roads throughout the entire duration of the Project and CMC Periods. This shall include but not be limited to vehicle fitness, permit, Insurance, pollution certificate and any taxes payable.

6.2.7 Provision for the installation of a Mobile Radio Device shall be provided in driver's cab.

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The Telecom & Radio Contractor shall supply the Radio Device and will coordinate with RRV Contractor for installation, testing and commissioning.

6.2.8 The Vehicle shall preferably be designed and manufactured in India.

Note: Indicative data for Track parameters shall be referred from Schedule of Dimensions (SOD), Part-2.

### **6.3 Design requirements of Relief and Rescue Vehicle:**

It shall be powered by diesel engine. The rail-to-road and vice-versa changeover functions shall be easy and effortless. The Contractor shall be responsible for the design of the vehicle and any other equipment considered essential for satisfactory operation of vehicle, which shall include but not be limited to the following:

#### **6.3.1 Engine:**

- i. Minimum 4-cylinder diesel engine for high efficiency,
- ii. Minimum 170 kW capacity,
- iii. EURO VI/ Bharat Stage VI standard or latest equivalent.
- iv. Electronic accelerator, hand throttle and governed max speed.
- v. Noise dampening arrangement as per EU regulation 70/157/EU including 90/20/EU or equivalent.

#### **6.3.2 Transmission:**

- i. Synchromesh reversing transmission equipped with gear box inverter or fully synchronized automatic transmission.
- ii. Right Hand Steering wheel to suit left hand driving practice in India.
- iii. Forward and Reverse gear arrangement.

#### **6.3.3 Brake shall consist minimum (but not limited to):**

- i. Dual brake system,
- ii. Anti-lock brake system,
- iii. Parking brake,

#### **6.3.4 Chassis:**

- i. Fuel tank lockable of light material having adequate capacity for movement of vehicle for at least 150 kms of running on rail or road whichever is higher.
- ii. Front & Rear towing jaw with pin,
- iii. Anti-slip steps with handle for wind shield cleaning,
- iv. Front integral support for fitting front mounting,
- v. Air-intake pipe.

#### **6.3.5 Electrical System:**

- i. Low Maintenance Batteries, capacity as per requirements,



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ii. Centrally located electric box, protected within cab.

#### **6.3.6 Driver's Cab / Personnel compartment**

- i. Cab / Personnel compartment for accommodating 6 persons including the vehicle driver.
- ii. Separate access door for personnel compartment on both sides with safety lock. The access door shall be designed suitable to meet the requirements of its functioning inside tunnel / mainline.
- iii. Large storage compartment under dashboard,
- iv. Storage area behind driver's seat / rear cab wall,
- v. Provision of speedometer-recorder,
- vi. Driver's seat height tilt, backrest tilt and longitudinal adjustable,
- vii. Large rear widow,
- viii. Air Conditioning of driver's cab and personnel compartment for prevailing ambient temperature up to 45 °C,
- ix. Interior lighting with reading light for driver and accompanying staff,
- x. Effective windshield with wind-shield wipers, 3-setting with intermittent setting and windshield washer,
- xi. Seats with integrated safety belts,
- xii. Sun visors

#### **6.3.7 Instruments:**

- i. Vehicle shall have electric controls located in centre console,
- ii. Adjustable dashboard illumination,
- iii. Multi-combination lever,
- iv. Functions of the Levers on left and right Side of Steering Column shall consist of hand throttle, cruise control, speed limiter, exhaust brake, headlight beams, blinker, windshield wash / wipers, and horn.
- v. Large instrument panel LCD displays, and gauge shall indicate the minimum following configurations but will not be limited to:
  - gauges for Speedometer kmph, RPM,
  - brake reservoir pressure,
  - coolant temperature,
  - fuel level, hydraulic oil temperature,
  - differential locks, brake pad wear,
  - coolant level,
  - steering fluid level,
  - air filter maintenance,
  - engine oil level,
  - windshield wiper fluid level,
  - transmission gear,
  - service hour counter,
  - Km and trip Km counter, clock, etc.
- vi. Vehicle shall have facility of GPS based location monitoring system, which shall enable location monitoring of the RRV from Depot Control Centre / Operation Control Centre.

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**6.3.8 Vehicle shall be fitted with Lights:**

- i. Dual Lighting System (Road- Rail): The vehicle shall have 2 ways of lighting system with automatic change over when the vehicle changes from road to rail and vice-versa. When driving on rail, the vehicle uses specific light for rail driving and when on road it shall use the obligatory lights for road driving.
- ii. Headlights,
- iii. Headlight range adjustment,
- iv. Additional side indicators,
- v. Clearance lamps,
- vi. Blinkers,
- vii. Rear lights,
- viii. Fog lights,
- ix. Rear reflector reversing light,
- x. Emergency Light on the cabin of truck.

**6.3.9 Speed (vehicle loaded with all rescue and re-railing equipment):**

- i. Maximum Running speed on roads  $\geq 80$  kmph,
- ii. Maximum Running speed on rails  $\geq 30$  kmph

**6.3.10 Vehicle shall be equipped with minimum following Accessories & Tools:**

- i. Suitable no of cameras in the rear of vehicle and monitor screen in the driver's cab for reverse direction movement,
- ii. Rear mounting brackets,
- iii. Spare Wheel,
- iv. Battery main switch at battery box,
- v. Fine dust and pollen filter,
- vi. Single circuit hydraulic system,
- vii. First aid box,
- viii. Wide angle rear mirror,
- ix. Fire extinguisher, ABC Type, 5 kg - 2 Nos. with bracket,
- x. Air filling hose with manometer,
- xi. Hydraulic jack -suitable capacity,
- xii. Warning triangle,
- xiii. Signal lamp,
- xiv. Search light 2 No.
- xv. 2 nos. of tri-colour torch,
- xvi. On-board tools, wheel chokes.

**6.3.11 Rail Guidance System:**

- i. Rail guiding axles shall be fitted in front of the front vehicle axle and in rear of the rear vehicle axle,
- ii. Rail guiding axles shall take up part of the vehicle weight, which leads to a high safety on rails,
- iii. Full floating rail axle for running on road,



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- iv. Telescopic cylinders at front & rear rail guiding axle,
- v. Rail guiding wheel with UIC profile, minimum wheel diameter 400 mm,
- vi. Rail guiding axle to be raised and lowered by suitable and effective hydraulic pressure,
- vii. Separate hydraulic control of front and rear guide axle with pressure compensation and damping from inside the cabin,
- viii. Automatic pressure adjustment for rail guidance system,
- ix. LCD Panel in driver's cab with audio-visual warning in case of pressure decrease.
- x. Provision of cameras and monitor inside the cabin for ease in checking of proper positioning of front and rear rail wheels to help the driver in changeover from road to rail operation,
- xi. Locking of steering wheel in rail mode,
- xii. Locking of rail axles against lowering during road operation,
- xiii. The hydraulic system shall be provided with constantly pressurized control valves for maximum safety against derailment in every driving situation.

#### **6.3.12 Hydraulic hand pump:**

Hydraulic hand pump of suitable capacity shall be provided for emergency operation of rail guidance system in case of failure of vehicle hydraulic system.

#### **6.3.13 Earthing:**

Earthing connection shall be from the mounting parts to the vehicle frame. It shall be connected to flexible Cu-cable with one ball pin at the front side and one at the rear side of the vehicle.

#### **6.3.14 Lighting system:**

- i. Vehicle lighting shall be suitable for movement on rail as well as on road for both running directions,
- ii. Automatic changeover of lighting for forward and reverse,
- iii. Automatic changeover of lighting when changing between rail and road and vice versa,

#### **6.3.15 Super Structure:**

- i. The complete vehicle with its cabin and compartment for Re-railing and Rescue Equipment shall be designed to conform to the Kinematic Envelope of SOD of CMRL phase-II.
- ii. The Vehicle along with compartment for staff and all equipment dimensions shall be finalised at design stage provided all its functions are satisfactorily complied with and that the dimensions are within the SOD of the Project.

#### **6.3.16 Bodywork construction:**

- i. Bodywork construction shall be of suitable material which shall provide adequate strength and protected from the corrosion.
- ii. The Contractor shall justify the selection of material and construction in the design stage.

#### **6.3.17 Compartment for Re-railing and Rescue Equipment and Tools**

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- i. Compartment for Re-railing and Rescue Equipment and tools is to be located directly behind the personnel compartment. This compartment has the following requirements.
- ii. Compartments made of section profile, to be hinged down by means of toggle levers (with anti-skid cover inside made of light metal chequered plate).
- iii. Sliding shutters or rolling shutters shall be provided on both sides, viz. on left hand and right-hand side for convenience in working inside tunnel / mainline.
- iv. Buffers with adequate strength at the rear.
- v. Rollers immersed in the body sub frame serving as guide for the re-railing bridge.
- vi. Adequate illumination of the compartment.
- vii. Two telescopic spotlights mounted at suitable location on the vehicle.

#### **6.3.18 Coupling System:**

- i. A suitable coupler adopter / head to match Rolling stock couplers of multiple types shall be provided on each side of the RRV for coupling rail cars from both ends. RRV Contractor to interface with rolling stock Contractor for the coupler type / details.
- ii. Height of coupler shall be manually adjustable if required to match with automatic coupler height of rolling stock for proper coupling.
- iii. RRV shall also have cranked tow bar with flange at both ends.

### **6.4 Technical Requirements of Re-railing and Rescue Equipment:**

#### **6.4.1 Re-railing Equipment:**

- i. The following Re-railing equipment shall be capable of quickly lifting, displacing, tilting and slewing into position the de-railed rolling stock of CMRL Phase-II.
- ii. The equipment shall be suitable for use in tunnel, mainline as well as on viaducts and inside depot premise.
- iii. The equipment shall be suitable for operation under dusty smoke-filled atmosphere at accident site.
- iv. The quantities of each item are listed in Appendix 1.

##### **6.4.1.1 Power Pack for Jacks:**

- i. Hydraulic Pumping Set shall be powered by Portable 4-stroke Petrol engine complying with BS VI or equivalent smoke emission norms. The engine shall develop capacity of min 4.2 HP and combined discharge of at least 2.5 lpm. All hydraulic piston pumps shall be capable of generating minimum 490 bar pressure. Bypass pressure and maximum pressure valve shall be provided. Bypass valve should switch to idle position when jacks are not in operation.
- ii. Oil tank shall have a capacity of minimum 40 litres and provided with an oil filter with optical clogging indicator, a filling filter with integral venting filter, oil sight glasses and oil drain screw with magnet insert.
- iii. The weight of pumping set including oil filled shall be less than 105 kg.
- iv. Power pack shall have carrying handles to facilitate ease of storage and transportation, even in rough areas.

##### **6.4.1.2 Control Console or Control Table:**

- i. Control Console or Control Table shall be complete with all necessary valves, controls and

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safety features including dead man switch. Control Console should have minimum four control valves for simultaneous / independent operation of lifting and lowering of four jacks. Necessary pressure gauges for pressure monitoring and safety valves shall be provided. Control Table should have colour coded hose outlet for connecting colour coded hoses to make connections to jacks. Control table should have a sturdy portable frame and the weight shall be less than 70 kg.

ii. Control Console shall be provided with separate oil flows for simultaneous or independent lifting operation and a provision of inbuilt pressure gauge for individual control valves. It should have selector valve having position for lifting and traversing for a safe re-railing process.

iii. A suitable filter capable of working under operating pressure shall be used to prevent the dust and sand from the pump unit to get into the hydraulic system during lifting / lowering operation.

iv. Separate oil flows of same quantity through each control valve shall facilitate simultaneous or independent lifting / lowering operation of jacks with ease, while eliminating chance of load falling from the jack and thus preventing accidents while rerailing due to unbalanced loads on jacks. Separate oil flows for each control valve shall also facilitate functioning of remaining jacks in case one or more jack fails.

#### **6.4.1.3 High-Pressure hoses with QC Coupling:**

i. High pressure hoses, approx. 10 m long (bound in pairs) with quick connection couplings shall be provided with oil retaining valves to prevent the leakage of oil when uncoupled with protective caps to prevent soiling.

ii. Hoses shall be colour coded for ease of connection. They should be capable of withstanding the working pressure provided by the hydraulic pump. Low-pressure hoses shall be capable to handle return oil.

iii. The hoses shall be capable of coupling and uncoupling even under pressure without oil loss.

#### **6.4.1.4 Telescopic Jack with Base Plate:**

i. Telescopic jacks of following capacity and specification shall be supplied:

a) Capacity 60/30 Tons, close height max. 465 mm, stroke min. 500 mm

b) Capacity 60/30 Tons, close height max. 250 mm, min stroke 185 mm

ii. The telescopic jacks shall have hydraulically releasable non-return valve for safe holding of the load even in the event of hose ruptures. The jacks shall also have over pressure valves.

iii. The telescopic jacks shall have carrying handles, colour coded connections, working pressure of minimum 300 kg/cm<sup>2</sup> and weight less than 35 kg.

iv. Jacks with integrated Base Plates or separate Base Plate are acceptable to ensure optimum stability during the operation of lifting / traversing. In case separate Base Plates are proposed, price of Jacks shall be inclusive of Base Plates.

#### **6.4.1.5 Displacement Jacks or Auto Traversing Jack:**

i. Displacement Jacks shall be of minimum 12/6 T capacity (12 T for pushing, 6 T for pulling), closed height max. 575 mm, stroke min. 350 mm with steel counter support. The working pressure shall be minimum 300 kg/cm<sup>2</sup>. The displacing jack shall have integral oil retaining valves, colour coded connections and the weight shall be less than 25 kg.

ii. Alternatively, Auto Traversing Jack of adequate capacity can be provided. The Traversing

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Jack shall have single point control from the Control Table.

#### **6.4.1.6 Re-Railing Bridges and Bridge Coupling:**

- i. Re-Railing Bridges shall have the carrying capacity of  $60 \pm 5$  Tons for the following dimensions:
  - ii. 3.30 m length,
  - iii. 2.20 m length,
  - iv. 1.10 m length.
- v. The Re-railing bridges shall be fitted out with carrying handles and mounting points for bridge couplings.
- vi. The maximum weight for the longest bridge shall be less than 180 kg.
- vii. Bridge couplings shall be suitable for joining together two Re-Railing Bridges and shall be compatible to the loading capacity and height of Re-Railing Bridges.

#### **6.4.1.7 Roller Carriages:**

- i. Roller carriages shall have a capacity of  $60 \pm 5$  T with removable top plate. The height shall be less than 110 mm (without plate) and 140 mm (with plate). The weight shall be less than 60 kg (without plate) and 85 kg (with plate). The width shall be compatible and suitable to operate with Re-railing Bridge.
- ii. The Roller Carriages shall have carrying handles. It shall be equipped with low friction rollers and guiding pin to ensure a linear movement.
- iii. Roller carriages shall be equipped with Counter supports, stopping device with carrying handle and one distance bar having an adjustable length to couple two roller carriages.

#### **6.4.1.8 Tilting Jack:**

- i. Tilting jack shall have 20 T capacity for pulling and have a height of  $575 \pm 25$  mm, working pressure shall be minimum 300 kg/cm<sup>2</sup>, stroke minimum 400 mm with hooked wheel stop. Tilting jack shall be complete with accessories and suitable for quick re-railing of single wheel or car.
- ii. The tilting jacks shall have carrying handles, colour coded connections and the weight shall be less than 25 kg.

#### **6.4.1.9 Accessories:**

- i. Lifting cable ladder complete: The lifting cable ladder shall be complete with accessories. The carrying capacity is  $40 \pm 5$  T with factor of safety not less than 3. The length shall be at least 3m.
- ii. Holding Rope: The holding rope shall be complete with accessories. The carrying capacity is  $40 \pm 5$  T with factor of safety not less than 3m.
- iii. D-Shackles: D Shackles shall be complete with accessories and capacity is  $40 \pm 5$  T with factor of safety not less than 3m.

#### **6.4.1.10 Single Piston Claw Jack (Step Jack):**

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- i. Single Piston Claw jack shall have a minimum capacity of 35 T, working pressure shall be minimum 300 kg/cm<sup>2</sup>, height with claw minimum 1150 mm and accessories including following:

i. Head Piece to Single piston claw jack	2 Nos.
ii. Round Head Piece to Single piston claw jack	2 Nos.
iii. Rocker bearing support (Swivel Radius Plate) to Single piston claw jack.	2 Nos.

- ii. The single piston step jack shall be provided with carrying handles, colour coded connections and the weight shall be less than 70 kg.

#### **6.4.1.11 Axle Pusher:**

Axle pusher unit shall be used for movement of wheel resting on the rail by a flange or for lateral displacement of the lifted vehicle consisting of two arms with hooks and with a crossbeam of light metal alloy.

#### **6.4.1.12 Auxiliary Trolley 25 T Capacity:**

i. Auxiliary Trolley shall be suitable for insertion below wheels of bogie of Rolling Stock to carry it to depot for wheel re-profiling as and when need arises due to wheel skidding or any other reason. Its construction shall be such that there is no infringement for its placement beneath bogie and wheel and during its movement while carrying skidded wheel.

ii. Auxiliary trolley shall consist of side sections with rollers and carrying handle, connecting tubes suitable for a 1435 mm track gauge, rated carrying capacity of 16 T and maximum capacity of 25 T. It shall have its maximum towing speed as 25 km per hour. The maximum weight of any individual part of the Equipment in dis-assembled state shall not be more than 70 kgs for ease in carrying manually. If however, the equipment is supplied in fully assembled state which cannot be dis-assembled the total weight of the equipment shall not be more than 150 kgs."

#### **6.4.1.13 Hauling Device:**

i. Hauling Device, capacity min. 22 T shall be complete with accessories including following:

- a) Pulling jack: 1 No.
  - b) Fastening Rope: 1 No.
  - c) Pulling Rope: 1 No.
  - d) Retaining Rope: 1 No.
  - e) Rail Block: 2 Nos.
  - f) Wedges: 4 Nos.
- ii. The diameter of ropes shall be between 25 mm to 32 mm.

#### **6.4.1.14 Plates and Boards:**

i. The following plates and boards, suitable to take the load while the jacks are used to lift load, are to be supplied:

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- ii. Steel plates with two handles each, size 800 x 300 x 30 mm – 2 Nos
- iii. Steel plate with handles, size 500 x 250 x 20 mm – 1 No
- iv. Hard wood boards, size 700 x 350 x 60.mm – 14 Nos
- v. Hard wood boards size 700 x 350 x 80 mm – 9 Nos
- vi. Hard wood boards, size 300 x 120 x 50 mm – 4 Nos
- vii. Hard wood blocks, size 300 x 120 x 30 mm – 6 Nos

#### **6.4.2 Rescue equipment:**

The quantities of each rescue item are given in Appendix 1.

##### **6.4.2.1 Rescue Devices:**

- i. Rescue devices shall comprise the following items:
  - a. Hydraulically Operated Cutter with maximum Cutting Force being at least 600 kN and adequate for cutting 5 mm thick Steel Sheet SS 301LN- HT. The weight of the cutter shall not be more than 15 kgs.
  - b. Hydraulically Operated Spreader with maximum Spreading Force being at least 300 kN and adequate for spreading 5 mm thick Steel Sheet SS 301LN- HT. The weight of the spreader shall not be more than 20 kgs.
- ii. The Contractor shall arrange the samples of above material, viz. SS 301LN-HT 5 mm thick, for FAT at OEM's works and for acceptance tests at Depot site.
- iii. Hydraulically operated cutter and spreader shall be complete with a pair of 10 m long high pressure hoses. In addition, the following accessories need to be supplied:
  - a. two pairs of replacement blades for cutter,
  - b. two pulling chains, two pairs of spare tips and two pairs of peeling tips for spreader.

##### **6.4.2.2 Power Pack for Hydraulic Cutter and Spreader:**

- i. The hydraulically operated cutter and spreader shall be operated with a power pack of 4-stroke petrol engine for their independent simultaneous use for a minimum of 2 hrs continuously.
- ii. The capacity of power pack shall be at least 2.1 kW.
- iii. The weight of power pack of 4-stroke petrol engine shall not be more than 30 Kg including full filled tank with fuel.
- iv. Engine of the Power pack shall comply with the Euro VI / Bharat Stage VI smoke emission norms.

##### **6.4.2.3 Airbags:**

Airbags of following capacity shall be supplied:

- i. Lifting capacity : 300 ± 10% kN,
- ii. Lifting height : 350 ± 10% mm

##### **6.4.2.4 Compressor:**

- i. Pneumatic air compressor shall have displacement of at least 230 lpm with in-built air receiver capacity of at least 10 litres at minimum 10 bar pressure for inflating air bags. Compressor shall be provided for connecting and operating 2 airbags at a time and reinforced

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air hoses at-least 10 m long for connection between air compressor and the air - bags.

ii. Engine of the Compressor shall be with capacity of at least 2.1 kW and complying with smoke emission norms of Euro VI / Bharat Stage VI shall be supplied.

iii. Two set of hoses shall be supplied in different colour.

#### 6.4.2.5 Portable Inflatable Lights:

Portable inflatable lights shall be suitable for illumination of about 10,000 m<sup>2</sup>, using 400 W HPMH or any other superior lamp mounted at height of about 4.5 m from ground with its independent diesel / petrol operated light weight power pack (Generator) for electricity and air.

#### 6.5 Details of Quantities for Re-Railing & Rescue Equipment:

The quantities of different items of Re-railing & Rescue equipment as required to be supplied under the Contract are given in Appendix 1.

#### Appendix 1 Quantities of Items to be supplied.

S. No.	Description of Item	Unit	Qty.
1	Power Pack for Jacks	Nos.	2
2	Control console or Control Table	No.	1
3	High pressure hoses with Quick connection coupling	Pairs	7
4	Telescopic Jack with base plate, 60/30T capacity, maximum closed height 465 mm, minimum stroke 500 mm	Nos.	4
5	Telescopic Jack with base plate, 60/30T capacity, maximum closed height 250 mm, minimum stroke 185 mm	Nos.	2
6	Displacing / Auto Traversing Jacks	Nos.	2
7	Re-railing bridge 3.30 m long,	No.	1
8	Re-railing bridge 2.20 m long,	No.	1
9	Re-railing bridge 1.10 m long,	No.	1
10	Bridge coupling	Nos.	2
11	Roller Carriages with distance bar	Nos.	4
12	Tilting jack 20 T Capacity	Nos.	2
13	Accessories		
a)	Lifting cable ladder	Nos.	2
b)	Holding rope	Nos.	2
c)	D-Shackles	Nos.	2
14	Single piston Claw jack with claw, 35T, with accessories	Set	2
15	Axle pusher	Nos.	2
16	Auxiliary Truck 25 T capacity	No.	1
17	Hauling device 25T capacity	Set	1
18	Plates & Boards	Set	
19	Rescue device consisting of cutter and spreader		
i	Hydraulically operated Cutter, with high pressure hoses, pulling chains	No.	1



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	, etc.		
ii	Hydraulically operated Spreader with high pressure hoses, pulling chains, etc.	No.	1
iii	Power Pack for hydraulically operated Rescue devices	No.	1
<b>S. No.</b>	<b>Description of Item</b>	<b>Unit</b>	<b>Qty.</b>
20	Airbags	Nos.	2
21	Compressor, 230 lpm at 10 bars	No.	1
22	Portable inflatable emergency light	No.	2

### 6.6 Standards:

Work related to the design and manufacturing of the RRV shall comply with relevant international standard or equivalent Indian standards.

## 7. Interface Management

### 7.1 Introduction

7.1.1 In conjunction with other associated Contractors the Contractor shall be responsible for all interface matters related to the design, manufacture, supply, testing & commissioning of the respective machine(s) under their scope of supply.

7.1.2 Major Interfacing Contractors for machinery and plant Contractor are (wherever applicable):

- a) Depot Civil Contractors (DC)
- b) Depot Electrical & Mechanical Contractor (E&M/MEP)
- c) Rolling Stock Contractor(s) (RS)
- d) Track Contractor (TRW)
- e) Signalling & Train control Contractor (STC)
- f) Overhead Electrical Contractor (OHE)
- g) Asset Maintenance Management System Contractor (*Refer Part 2 Section VI B Chapter 6C*)
- h) Telecom & Radio (RAD) Contractor

7.1.3 If any part of the execution of the Works for the Chennai Phase-II programme should require the Contractor to undertake coordinated interface works and/or exchange information with any other party or Contractor; then the Depot Machinery and Plant Contractor shall provide those services as part of their obligation of this Contract at no addition cost to BEML / CMRL. The appointed Interface Manager shall facilitate coordination of the same.

7.1.4 The Contractor shall apply best endeavours to resolve all interfaces applicable to the Contract and shall be proactive in seeking out interface issues and to identify their optimal solution.

7.1.5 It is foreseen that multiple rolling stock fleets (up to a maximum of three (3)) shall serve the Chennai Metro Phase-II network and shall be maintained at Madhavaram Depot. The Depot M&P Contractor is therefore required to coordinate the interface requirements of all fleets during design, manufacturing, testing & commissioning to ensure that all machines are cross-



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compatible with all fleet types (except for cases where it is explicitly stated otherwise in the machine specification).

#### 7.1.6 Interface Responsibilities

- i. The responsibility for specification and provision of the requirements for the works that interface with Designated Contractors' equipment is tabulated in corresponding section of the document.
- ii. The requirements specified herein are by no means exhaustive and it remains the Contractors responsibilities to develop and execute jointly an Interface Plan after the commencement of the works and throughout the execution of works, to ensure that:
  - a) All interfacing issues between the two Contracts are satisfactorily resolved.
  - b) Supply, installation and testing of equipment and software are fully co-ordinated.
  - c) That all equipment supplied under the respective Contracts are fully compatible with each other, whilst meeting the requirements of the respective Specifications.
  - d) All the construction tolerances at the point of interface shall meet the requirements of the respective specifications relating to the interface points.
  - e) Interfacing Contractors shall mutually respect each other's project timelines with respect to the interface requirements.
  - f) Interfacing Contractors shall finalize their respective interface equipment only after clear agreement on interface requirements with the other designated Contractors.
  - g) Interfacing Contractors shall ensure that in any case, no equipment of their system shall be put into production or installation without meeting the interface requirements spelt out in this Chapter and/or in the Technical Specification.
  - h) Test procedures, troubleshooting manuals and any other documentation shall be updated with technical details from each Contractor and shall be submitted to BEML / CMRL.

#### 7.1.7 Interface Management

- i. All Interfacing Contractors (which are listed under clause 7.1.2) with the exception of the Rolling Stock Contractor shall assume the role of Lead Interface Contractor.
- ii. Where the DM&P Contractor is not the Lead Interface Contractor, the DM&P Contractor's role is defined as a Participating Contractor with respect to interface management.
- iii. The Lead Interface Contractor shall be responsible to initiate, plan, coordinate and produce jointly with the Participating Contractors a list of all the required interfaces, interface design documents and shall produce interface progress reports. The Lead Interface Contractor shall also prepare and issue all interface meeting of minutes within 3 days of the meeting and provide bi-weekly interface progress reports to all the participating Contractors for information.
- iv. Participating Contractors shall collaborate fully with the Lead Interface Contractor in the development and finalization of the interface design, joint production of the interface documents and interface progress reports. Participating Contractors share responsibility of ensuring that the Lead Interface Contractor is able to submit a copy of the all-interface design documents (including the Detailed Interface Design (DID) deliverable) to the Engineer/CMRL for approval.

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v. The costs for all interface design and testing works shall be deemed to be included in the Contract sum of respective contracts regardless of the actual extent of effort required or expended by the Contractor.

vi. The Contractors shall be fully responsible for the management and control of their respective Subcontractors in relation to all interfacing activities carried out under the Contract.

## 7.2 Interface Specification: Depot Machinery & Plant (DM&P) Contractor & Rolling Stock (RS) Contractor

Item	Responsibility DM&P Contractor	Responsibility of Each RS Contractor
1. Diesel Operated Relief and Rescue vehicle (RRV) with Rerailing and Rescue devices	a. Shall collect all relevant details regarding RS characteristics including weight, dimensions for the effective design of RRV.	a. Shall provide all relevant details regarding RS characteristics including weight, dimensions etc.
	b. Shall collect all relevant information and details of type of coupler of RS and provide the RRV coupler with compatibility accordingly.	b. Shall provide all relevant information and details of type of coupler of RS.
	c. Shall demonstrate the testing and commissioning of RRV coupling and uncoupling test with RS, shunting upto 3 coupled car with RRV (pulling and pushing), braking etc.	c. Shall attend and provide necessary support to DM&P Contractor during testing and commissioning as necessary.
	d. Shall demonstrate the testing and commissioning of all Re-railing and Rescue devices with and without RS as decided by Engineer/Employer at agreed site/location.	d. Shall attend and provide necessary support to DM&P Contractor during testing and commissioning as necessary.
2. General	a. DM&P Contractor shall ensure all the interface requirements pertaining to RS Contractor are shared and agreed mutually.	a. RS Contractor shall ensure all the interface requirements pertaining to DM&P Contractor are shared and agreed mutually.
	b. DM&P Contractor shall prepare Detailed Interface document (DID) and shall ensure that it covers Design, Interface Hazard log, Construction, Testing & Commissioning, Test report formats, Maintenance as applicable.	b. RS Contractor shall provide the necessary information and support as requested by DM&P Contractor.

## 7.3 Interface Specification: Depot Machinery & Plant (DM&P) Contractor and Track Works (Tw) Contractor

Item	DM&P Contractor Responsibility	TW Contractor Responsibility
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Diesel Operated Relief and Rescue vehicle (RRV) with Rerailing and Rescue devices	a. DM&P Contractor shall provide drawings of equipment to TW Contractor to ensure SOD requirement.	a. TW Contractor shall provide Track geometry (type, profile, track gradient, curve etc.) for Mainline & depot yard to DM&P Contractor to ensure SOD requirement.
General	Shall provide the necessary information and support as requested by Track Contractor.	Shall prepare Detailed Interface document (DID) and shall ensure that it covers Design, Interface Hazard log, Construction, Testing & Commissioning, Test report formats, Maintenance as applicable.

#### 7.4 Interface Specification: Depot Machinery & Plant (DM&P) Contractor and Depot Electrical & Mechanical Contractor (E&M / MEP) Contractor

Item	DM&P Contractor Responsibility	MEP/E&M Contractor Responsibility
General	a. Shall ensure all the interface requirements pertaining to MEP/E&M Contractor are shared and agreed mutually.	a. Shall ensure all the interface requirements pertaining to DM&P Contractor are shared and agreed mutually.
	b. Shall provide the necessary information and support as requested by MEP/E&M Contractor	b. Shall prepare Detailed Interface document (DID) and shall ensure that it covers Design, Interface Hazard log, Construction, Testing & Commissioning, Test report formats, Maintenance as applicable.

*Note : It shall be noted that the scope of E&M/MEP is included with Depot civil contract. DM&P Contractor shall coordinate and Interface for all the required aspects as stated above (but not limited to) and other as necessary for the effective execution of project.*

#### 7.5 Interface Specification: Depot Machinery & Plant (DM&P) Contractor And Signalling Train Control (STC) Contractor

Item	DM&P Contractor Responsibility	STC Contractor Responsibility
General	Shall provide the necessary information and support as requested by STC Contractor.	Shall prepare Detailed Interface document (DID) and shall ensure that it covers Design, Interface Hazard log, Construction, Testing & Commissioning, Test report

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		formats, Maintenance as applicable.
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## 7.6 Interface specification: depot machinery & plant (DM&P) contractor and overhead equipment (OHE) contractor

Item	DM&P Contractor Responsibility	OHE Contractor Responsibility
General	Shall provide the necessary information and support as requested by OHE Contractor.	Shall prepare Detailed Interface document (DID) and shall ensure that it covers Design, Interface Hazard log, Construction, Testing & Commissioning, Test report formats, Maintenance as applicable.

## 7.7 Interface Specification: Depot Machinery & Plant (DM&P) Contractor and Telecom & Radio (Rad) Contractor

Item	DM&P (RRV&CMV) Contractor Responsibility	Telecom & Radio (RAD) Contractor Responsibility
Diesel operated Relief and Rescue (RRV) with rerailling, rescue device.	a. Shall interface with RAD Contractor for the Radio device requirements (space proofing, power supply, installation etc) in the driver's cab and incorporate the same into design of Vehicle (s).	a. Shall share the details of onboard radio device, power input, location etc to DM&P Contractor.
	c. Shall install the Radio device in the driver's cab.	c. Shall supply the Radio device with all accessories and interconnecting /interface cables to DM&P Contractor. Also shall guide and support DM&P contractor to install Radio device successfully.
	d. Shall conduct testing jointly with RAD Contractor for the onboard Radio device.	d. Shall attend and provide necessary support to DM&P Contractor during testing and commissioning as necessary to ensure Interface fulfilled and radio device working accurately.
	e. Shall validate the joint maintenance procedures prepared by RAD Contractor.	e. Shall prepare and finalise the joint maintenance procedure involving Radio device.

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	f. Shall provide the necessary information and support as requested by RAD Contractor.	f. Shall prepare Detailed Interface document (DID) and shall ensure that it covers Design, Interface Hazard log, Construction, Testing & Commissioning, Test report formats, Maintenance as applicable
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### 7.8 List of Employer's drawing:

SI No	Drawing No	Drawing Title
1	GFC503-DD-MMC-AR-DW-28001	Madhavaram Depot Site Plan
2	GFC503-DD-MMC-AR-DW-28010	Workshop and Deep cleaning Bay
3	GFC503-DD-MMC-AR-DW-28017	Workshop Bay Ground Floor plan
4	GFC503-DD-MMC-AR-DW-28273	Auto Coach Wash Plant
5	GFC503-DD-MMC-AR-DW-28192	Auto Coach Washing Plant -Control Room Plan
6	GFC503-DD-MMC-AR-DW-28193	Auto Coach Washing Plant- Sections & Elevations
7	GFC503-DD-MMC-AR-DW-28019	Workshop Bay- Sections
8	GFC503-DD-MMC-AR-DW-28021	Depot Store -Ground Floor Plan
9	GFC503-DD-MMC-AR-DW-28031	ETU and PWL Block- Ground Floor Plan
10	GFC503-DD-MMC-AR-DW-28036	ETU and PWL Block- Sections
11	GFC503-DD-MMC-AR-DW-28113	Depot Store -Enlarged Section 1-1

*The applicable drawings will be shared to the bidder.*

*Note : The reference documents / drawings included under this section are for general information only and any interpretation of the results shall be construed as opinions only and not as representations as to the actual site conditions. The accuracy or reliability of the documents / drawings included under this section and of any other information supplied, prepared at any time by the Employer or others in connection with the Contract is not warranted.*

## 8. Training

- The Sub-Contractor has to prepare a comprehensive training plan for the DM&P equipment / machine and submit to BEML / CMRL for notice of no objection.
- The Sub-Contractor shall provide training that enables operators and maintainers to work with the machine in the most efficient and safe manner.
- The Sub-Contractor shall provide comprehensive training and documentation to the BEML / CMRL's staff including Machine Operators & Machine Maintainers.
- The Sub-Contractor shall adapt the content of its standard training courses to the CMRL' infrastructure and also to the trainees' skills background.
- The Sub-Contractor shall:
  - provide classroom training to trainees at the CMRL's depot premises.
  - provide competent training instructors, training manuals, all necessary aids and materials as required for training.
  - provide handouts for each trainee during the training.

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- vi. The Sub-Contractor shall provide training for at least 6 BEML / CMRL nominated staff for the machine at Madhavaram depot. Period of training should be adequate (but not less than **7 working days** and shall cover all aspects to make nominated staff of BEML / CMRL to carry out operation, schedule attention, troubleshooting and repairs to this DM&P equipment / machine as and when required. A competency certificate shall be issued to each trainee after completion of training on the DM&P equipment / machine. Training should be imparted in English. Cost of training should be included in the cost of equipment.

## 9. Maintenance, Spares and Consumables during DLP

Throughout the DLP / DNP period, the Sub-Contractor shall be responsible for all the maintenance activities & always maintain sufficient stock of all Spares and Consumables at Madhavaram depot to the full extent necessary to carry out all scope of activities but not limited to the following:

- Corrective Maintenance
- Preventive Maintenance
- Asset and Maintenance Management System (AMMS)
- Spares management
- Operation of Depot Machinery & Plant Equipment.
- Coordination with OCC/ BCC/ DCC/ PPIO

Recommended spares:

Tenderer shall quote separately for list of recommended spares with price for equipment supplied after completion of 3 years DLP. The price offered shall remain valid for a period of 2 years beyond DLP. BEML at its sole discretion reserve the right to purchase recommended spares or not. (This shall not be included in the financial offer).

### TOOLS:

The Special Tools & Jigs, Software (if applicable) required and as recommended by the OEM shall be provided by Supplier.

- Deleted.
- 3 sets of keys for each applicable machine.
- 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.

## 10. Commitment beyond DLP Period:

The Sub-contractor shall commit to support BEML / end customer CMRL for requirement of any additional Equipment, Spares, Service required for 15 years beyond DLP period of 3 years.

Spares support and Technical Guidance should be provided to carry out the below mentioned activity (but shall not limited) beyond DLP for 15 years,

- ☐ Preventive / periodic / Schedule Maintenance,



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- ☐ Unscheduled Maintenance, Corrective Maintenance
- ☐ Providing Emergency support during Operational failures.
- ☐ Software upgradation
- ☐ Documentation upgradation
- ☐ Remote diagnosis (where applicable)
- ☐ And other as applicable

## 11. Availability During DLP Period

### 11.1 DM&P Availability Target

Penalties for not achieving availability target will be as per ERTS **PART- 2: Section VI C** of the respective equipment.

### 11.2 Penalty Clause:

If the Works or sections are not available for usage by the Employer for more than 48 hrs, then a penalty shall be paid by the Contractor as set out below. The cumulative amount shall be deducted by the Employer from the subsequent bills submitted by Contractor.

Depot Machinery & Plant: Rs. 5,000 per day/ equipment.

A penalty of Rs. 2 lakhs for each case shall be levied for the failure or malfunction in the Works or sections during passenger operation which interrupt metro operations in the specific corridor for more than 10 mins.

## 12. DNP / DLP / Warranty

12.1. The Contractor shall warrant that all equipment and spares etc. supplied against the contract shall be free from defects and faults in design, materials, workmanship and manufacture and shall be of the highest grade and consistent with the established and generally accepted standards for goods of the type ordered and in full conformity with the contract specifications.

12.2. The warranty period shall be 36 months after the date of issue of successful commissioning and proving test certificate of the machine at site. Any approval of acceptance issued by BEML during the course of installation, commissioning & proving out test shall not in any way limit the Contractor's liability.

12.3. In case where replacement of parts takes place during the warranty period, for replaced item and concerned sub-assembly shall extend further 36 months from the date of replacement of the defective parts. This extended period shall be known as extended warranty period.

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12.4. The Contractor's liability in respect of any defects shall be to supply, install & commission any defective part free of any charge or the repair the defective parts, so as to ensure minimum down time of the machine

12.5. In case of delay in replacement/repair of defective parts, BEML may get the replacement carried out through any other outside agency. In such a case the cost of repair, replacement shall be borne by the Contractor.

12.6. Failure of the Contractor to meet with the warrantee obligations shall result in unsatisfactory performance of the contractor and the consequence of the same shall be applicable at the risk and cost of the contractor.

12.7. The decision of BEML in regard to Contractor's liability and amount if any payable under this warranty shall be final and conclusive.

### 13. List of Enclosures

Enclosure No.	Document Description	No of Pages
1.	PART- 2: Section VI B Chapter-1 – GS & Scope_ERTS DM&P	12
2.	PART- 2: Section VI B Chapter-2, Clause 2.8– TS_ERTS DM&P	11
3.	PART- 2: Section VI B Chapter-4 –Interface Management_ERTS DM&P	11
4.	PART- 2: Section VI C: Comprehensive Maintenance Contract (CMC)_ERTS DM&P	68
5.	SYS Form - 17	1
6.	BIM Guidelines for Asset Information Model	55
7.	Applicable Depot Layout drawings (SI no 9,10 of CI 7.8)	2
8.	Vendor approval / Manufacturer Credentials form	1

### 14. Submittals with Technical Offer

**The sub-contractor shall submit all the document as per Annexure 1**



	<b>TECHNICAL OFFER</b>  <b>SUBMITTALS CHECK SHEET</b>	Project CMRL ARE02A
		ANNEXURE-1
		Page 1 of 1
M&P Equipment	DIESEL OPERATED RELIEF & RESCUE VEHICLE (RRV) WITH RERAILING RESCUE EQUIPMENT & AUXILIARY TRUCK	PTS Doc No: GR/TD/7728

#### Annexure-1

SL. No.	Details	Submitted	Not Submitted	Ref Doc.
1.	Duly filled <b>Vendor approval / Manufacturer Credentials form</b> meeting the EQC along with SYS Form & Performance Certificates.	<input type="checkbox"/>	<input type="checkbox"/>	
2.	Complete <b>Technical offer</b> for Procurement Technical Specification for Diesel Operated Relief & Rescue Vehicle (RRV) With Rerailing Rescue Equipment & Auxiliary Truck	<input type="checkbox"/>	<input type="checkbox"/>	
3.	Clause-wise Compliance / comments against the <b>PTS</b> .	<input type="checkbox"/>	<input type="checkbox"/>	
4.	Clause-wise Compliance / comments to <b>Section VI B</b> (Chapter 1, 2 & 4) Technical Specifications ( <b>ERTS</b> ) – Depot Machinery & Plant (DM&P)	<input type="checkbox"/>	<input type="checkbox"/>	
5.	Clause-wise Compliance / comments to <b>Section VI C</b> Technical Specification ( <b>ERTS</b> ) – Comprehensive Maintenance Contract (CMC) of Depot Machinery & Plant. ( <b>Applicable for DLP Period</b> )	<input type="checkbox"/>	<input type="checkbox"/>	
6.	Clause-wise Compliance / comments to BIM Guidelines for Asset Information Model	<input type="checkbox"/>	<input type="checkbox"/>	
7.	Company profile, ISO certificates, Organization chart, Quality Control Process.	<input type="checkbox"/>	<input type="checkbox"/>	

**It is to be noted that incomplete submission is liable for rejection.**

**Signature of the Bidder with seal**