

**6.3 Software Management Control**

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

**6.4 Auditing**

- 6.4.1 The Engineer shall carry out an audit of the Software. Further external independent audits may also be arranged at the Engineer's discretion.

**6.5 Software Acceptance**

- 6.5.1 The Contractor also shall submit an Operational Safety Report (Software) for software acceptance by the Engineer.

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

(i) OSR(S) - Introduction

Shall describe the nature of software sufficiently to ensure that the Engineer is given a comprehensive overview of primary characteristics such as structure, functions, criticality, volume and language.

(ii) OSR(S) - Evidence of Quality Management

Shall provide evidence to demonstrate that the software development has been subject to acceptable quality assurance.

(iii) OSR(S) - Evidence of Safety Management

Shall provide evidence to demonstrate that the software development has been subject to acceptable safety management.

(iv) OSR(S) - Technical Report

Shall describe how software integrity has been achieved.

(v) OSR(S) Operation and Maintenance Report

Shall describe the Software operation and maintenance characteristics.

(vi) OSR(S) - Restrictions for Use

Shall define what restrictions are applied to the use of the software.

**6.6 Availability of Complete Documentation And Development Tools**

- 6.6.1 With the exception of commercial, "Off The Shelf" Software, the Engineer shall be provided with full access to application software(s) and any other software /hardware tools which may be specifically required for the intended purpose specified in this specification. For commercial software the Contractor shall provide all available documentation for the application and maintenance of that software. In case any commercially available software has been modified for being used in the train, the same shall be supplied to all depots.



Complete documentation along with the software to be supplied by the Contractor shall comprise of Signal flow diagram, flow charts, functional blocks, details of signals, interpretations so as to enable engineer to debug and implement vehicle/train level modifications based on DMRC's experience, operational & maintenance requirements. Full access to the application software shall be provided for this purpose.

It shall be possible for DMRC to modify/change various parameters used in the software. Complete set of parameters along with necessary changes that may be required to be made in the supplied software shall be furnished so that different makes of equipments if need be, can be integrated. It shall also be possible for engineer to connect/interface additional peripheral equipment as required by DMRC with vehicle/train software or TIMS, as the case may be, and implement system integration for the same. Contractor shall demonstrate to entire satisfaction of the Engineer that DMRC will be able to integrate peripheral equipments of makes other than that have been used by contractor in the train. Any hardware tool required for this purpose shall also be supplied.

DMRC engineers shall be fully trained to the entire satisfaction of Engineer and made conversant with the software and other related issues as found necessary during the contract execution. The documentation of software shall be supplied at the time of testing and commissioning of prototype train set and this shall be considered as a pre-requisite for accomplishment of Key Date no. '3'. The final document including all changes that may be done during the currency of the contract shall be supplied after the expiry of the warranty period and this shall be considered as a pre-requisite for issue of Performance Certificate.

6.6.2 After loading, and the satisfactory functioning of the software, the Contractor shall supply two back-up copies of the software, including any new versions adopted. The documentation of software shall be supplied before the expiry of the warranty period. The final documentation of softwares including all changes that may be done during the currency of the contract shall be supplied at the expiry of the warranty period and this shall be considered as a pre-requisite for issue of Performance Certificate. Employer at his discretion may affect suitable changes considered either desirable or essential during the post warranty Period. Employer shall be solely responsible for any such changes that are made without specific written approval of the Contractor

6.6.3 All software(s), irrespective of contractor's own software or of sub-suppliers, shall be compatible with latest version of Windows Operating software and shall also have upward compatibility. In case, the compatibility of installed software(s) with latest version of Windows is not available, the contractor shall replace the installed software(s) that are compatible with latest version of Windows O.S. without downgrading the train performance. Contactor shall commit to support and supply free of cost any special hardware/software required for ensuring



compatibility with new version of Windows for at least a period of 5 years beyond DLP of the last train.

Beyond this period, in case of obsolescence suitable alternatives solutions shall be implemented (at mutually agreed terms and conditions) and full support shall be provided by the contractor so as to ensure that train performance are not affected adversely.

Diagnostic tools to be provided as per the contract shall include all hardware/software required for the purpose of

- (i) Uploading/downloading of all software's used in the train/system/sub-systems,
- (ii) Downloading of faults and any other information required for trouble shooting and diagnostic purpose.
- (iii) Data analysis and Investigation tools for real-time downloads on the nominated server.

#### 6.7 Re-Use of Existing Software

- 6.7.1 Where existing software (defined to module level) is to be re-used without modification, the Contractor shall provide acceptable evidence to the Engineer as to why that software is suitable for use in the proposed application. This evidence may be historical (certified evidence of previous satisfactory use in a similar environment and application), or it may be sought as cross acceptance from another railway authority or statutory body. Software re-use shall not be acceptable, without detailed review, where the proposed application is of the same or lower safety integrity level than the current application.

#### 6.8 Re-Engineered Software

- 6.8.1 Re-engineered software may be used for applications at all safety integrity levels where the proposed application is of the same or lower safety integrity level than the current application. However, this shall be subject to quality assurance testing as defined above.

#### 6.9 Test Software

- 6.9.1 All test software, with the exclusion of built-in test software, shall be produced in accordance with a quality system controlled under the requirements of accepted international standards. Test software shall be developed and documented using structured techniques and shall be designed to be maintainable throughout the duration of the Contract. All test software shall be documented to be supportive of maintenance. Any test software, which is to be delivered to the Employer (for long term testing use), shall be fully documented to allow the Employer to maintain the software for the life of the supported system.

#### 6.10 Software Rights

- 6.10.1 The Contractor shall ensure that the Employer is granted all necessary rights to use Software embodied in the equipment and there are no restrictions attached to the use of any information supplied by the Contractor which might later prevent or hinder the Employer from modifying or adopting or extending the system. The Contractor shall indemnify the Employer against claim of any party, sub-contractor for the unauthorised possession or use of the software supplied.



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## CHAPTER 7

## INSPECTION, TESTING AND COMMISSIONING

## 7.1 General

7.1.1 The Contractor shall submit Inspection, Testing and Commissioning Plan for Engineer's review as per schedule furnished in table 2-A. The Inspection, Testing and Commissioning Plan shall be prepared in accordance with the requirements of Chapter 15 of the Employer's Requirements – Technical Specification. This plan shall also include Integrated Testing and Commissioning of Trains in the Section, integration with existing RS1, RS6& RS13 'Broad Gauge' trains of DMRC and Service Trials before introduction in Revenue Service. The Plan shall contain, but not limited to, the following topics:

- (i) the Contractor's methodology for inspection, testing and commissioning;
- (ii) all Inspections and Quality Hold Points;
- (iii) the interdependency and inter-relationship with Designated Contractors and their commissioning programme;
- (iv) the objectives of each test and criteria for successful tests;
- (v) organisation chart and CV of key personnel in the Testing and Commissioning team;
- (vi) documentation for conducting tests and submission of Testing and Commissioning procedures.

7.1.2 The Engineer will then check the plans to see whether it meets the requirements. The Engineer shall inform the Contractor in writing within a reasonable period after receipt of the above information;

- (i) that the Contractor's proposed methods of inspection, testing and commissioning (including Integrated Testing and Commissioning) have the consent of the Engineer; or
- (ii) in what respects, in the opinion of the Engineer the Contractor's proposed methods etc
- (iii) fail to comply with the Employer's Requirements and/or the Final Design Document;
- (iv) would be detrimental to the Works and/or to the other works comprising the Project;
- (v) do not comply with the other requirements of the Contract; or
- (vi) as to the further documents or information which are required to enable the Engineer to properly assess the proposed methods of inspections, etc.

7.1.3 In the event that the Engineer does not give his consent, the Contractor shall take such steps or make such changes in the said methods or supply such further documents or information as may be necessary to meet the Engineer's requirements and to obtain his consent. The



Contractor shall not change the methods of inspection, testing and commissioning (including Integrated Testing and Commissioning) which have received the Engineer's consent without further review and consent in writing of the Engineer.

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

## 7.2 Sequence of Tests

- 7.2.1 The sequence of tests shall be:

- (i) Routine and type tests of equipment and sub-systems in accordance with relevant standard and specifications in Contractor/Sub-contractor's factories.
- (ii) Factory and Site Tests of complete cars in accordance with IEC 61133.
- (iii) Testing and Commissioning of cars/trains in Depot in accordance with IEC 61133.
- (iv) Integration Tests in conjunction with all Designated Contractors.
- (v) Instrumentation, and Oscillation Trials on Prototype train set 'T+M' only, if required.
- (vi) Service Trials.



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## CHAPTER 8

## SUPPLY OF SPARES, SPECIAL TOOLS AND TESTING EQUIPMENT

## 8.1 General

8.1.1 The Contractor shall supply the following items of spares:

- (i) Unit Exchange Spares
- (ii) Consumable spares for maintenance of all trains during commissioning, service trials and up to completion of Warranty period;
- (iii) Mandatory Spares
- (iv) Recommended spares (Deleted)
- (v) Overhauling Spares (Deleted)
- (vi) Special Tools, Testing and Diagnostic equipments (Deleted)
- (vii) Special Jigs, Fixtures and Gauges (Deleted)

8.1.2 The relevant list of the spares mentioned above shall be submitted in the technical bids after blanking the prices, where applicable. The financial bid shall have the price details.

## 8.2 Unit Exchange Spares

8.2.1 The contractor shall supply the unit exchange spares for as listed in the Appendix 6 of this Employer's requirements- General specification. The unit exchange spare shall be supplied in the depot nominated by the Engineer. The delivery requirements of different lots are mentioned in the Appendix -6. These shall be delivered as per defined key dates.

## 8.3 Consumable Spares

8.3.1 The consumable spares shall include lubricants, oils, greases, sealants, brake blocks, filter media, gaskets, lamps, wearable parts like pantograph strips etc. and any other item, **whose declared life is less than one year.**

8.3.2 The consumable spares shall be stored at respective depots of the corridors.

8.3.3 The Tenderer shall provide a recommended list of consumable spares as noted above for maintenance, repairs and overhaul of trains. Any consumable item if required but not included in the above recommended list by the tenderer will be deemed to have been included and shall be supplied as per the provisions of this contract without any extra financial implication to the Employer. Contractor will be required to supply the requisite quantity of spares, as required irrespective of the quantities indicated by the contractor in the recommended list. Employer's decision in determining any particular item(s) as consumable in line with 8.3.1 above will be final and binding. In case any changes are required in the supply of consumables on account of changes at design stage, the contractor shall have to supply the



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

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

Names, addresses, telephone numbers and other particulars of manufacturers and their local representatives;

Models and part numbers,

Full description of spares including a note whether it is sealed unit or an assembly or sub-assembly which can be broken down into component parts;

Quantity installed in the system;

Expected consumption rates;

Overall dimensions and weight including minimum packing (if any) for shelf space purposes;

Interchangeability or otherwise with similar parts

Normal manufacturing and shipment lead times; and

Shelf life.

Area of usage of consumable items.

- 8.3.5 It shall be the responsibility of the contractor to maintain sufficient stock of consumable spares at respective depots of different lines.
- 8.3.6 Recommended list shall be furnished by the contractor as part of design submission for respective systems and subsystems.
- 8.3.7 Payment for the supply of consumable spares shall be made on consumption basis, as certified by contractor and depot officials.

#### 8.4 Mandatory spares

- 8.4.1 The Contractor shall supply the Mandatory Spares as listed in the **Appendix 6** of this Employer's Requirements - General Specification. The Spares shall be supplied in the Depot nominated by the Engineer. The items and quantity required are mentioned in the list in Appendix 6. The price of these spares shall be quoted at actual.
- 8.4.2 No change in quoted cost of any spare will be allowed even when there is change in design of any equipment/sub-system during execution of the contract.
- 8.4.3 Contractor will furnish complete details during contract execution (detailed design stage) as noted below for the listed spares;

Names, addresses, telephone numbers and other particulars of manufacturers and their local representatives;



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Models and part numbers

Full description of spares including a note whether it is sealed unit or an assembly or sub-assembly, which can be broken down into component parts;

Quantity installed in the system;

Overall dimensions and weight including minimum packing (if any) for shelf space purposes;

Designed and shelf life;

Interchangeability or otherwise with similar parts;

Normal manufacturing and shipment lead times;

Procurement Technical Specification with relevant drawings of all major system equipments

**8.5 Recommended spares (Deleted)**

**8.6 Overhauling Spares (Deleted)**

**8.7 Special Tools, Testing and Diagnostic equipments: (Deleted)**

**8.8 Special Jigs, Fixtures and Gauges (Deleted)**

**8.9.1 Manufacture, Delivery and Warranty**

8.9.1 The major spare parts ordered under the Contract shall be manufactured, works tested and inspected in accordance with the relevant quality system, suitably packed and labelled in accordance with Chapter-13 of this Employer's Requirements General Specification "Storage, Packing, Crating and Marking" and delivered by the Contractor to the depot as directed by Engineer. All spares shall be subject to inspection by the Engineer. In the event that any item is known to be going out of production, then the Contractor shall give advance notice to the Engineer.

8.9.2 The warranty period of spares or any other item / equipment delivered shall be:

- (a) either 24 months from the date of acceptance or
- (b) upto expiry of the defect liability period of trains (clause 1.8.1), whichever is later.

**8.10 Purchase of Spares from Vendors**

8.10.1 The Contractor shall furnish an undertaking that he has no objection whatsoever to and shall not in any way deter or obstruct the Employer, its licensee or its representative from dealing directly with the Contractor's Vendors for the purchase of the spares during the Contract period. The spares purchased shall be subject to inspection by the Engineer.

8.10.2 Contractor shall obtain an undertaking from vendors, OEMs etc. at detailed design submission stage that they will deal directly with Employer for supply of spares, equipments and/or sub-systems.



**8.11 Commissioning And DLP Spares**

- 8.11.1 The Contractor during shall submit to the Engineer for review a list of minimum spare parts that he intends to make available during the installation, erection, commissioning and defect liability periods.
- 8.11.2 The Contractor shall keep on Site, at his own cost, throughout the installation, erection, commissioning and defect liability periods, stocks of spare parts, as per the list to enable rapid replacement of any item found to be defective or in any way in non-conformance with the Specification.
- 8.11.3 The Contractor shall not be entitled to use any of the Employer's spare parts during the installation, erection and commissioning periods or during the Defects Liability Period.
- 8.11.4 Contractor shall not be permitted to remove any working/healthy equipment / components / sub-systems / systems from any of the train available at any of the depot for any reason whatsoever without specific approval in writing from DMRC's depot incharge / Engineer's authorised representative.
- 8.11.5 Spares as per the agreed list shall be supplied at least three months before receipt of first train. Stocks of such spares as available in Contractor stores will be jointly checked with Engineer every three months. Certificate by Engineer confirming availability of the spares in contractor stores in Depots as per agreed list will be a pre-requisite for release of interim payments of the Contractor. However, this condition will not be applicable for six months before the expected expiry of the DLP period of the last 'T+M' unit / 'DT+M' unit/ 'Train'.

**8.12 List of Spares**

- 8.12.1 The Contractor shall ensure availability of spare parts for a period of ten year from the last date of taking over of whole of Works. The Tenderer shall furnish an unpriced list of spares for maintenance, overhaul and repair of cars separately (if there are difference in items) for a period of ten years from the date of taking over of the last trains in the Technical Package. The spares shall be in kit form. The Tenderer shall also quote unit prices for the kit of spare at the Depot along with escalation clause in the Financial Package. The Employer at his discretion, during a period of ten years from the date of taking over of the whole works, purchase as many kits of spare parts as required by him, at the rates indicated in this schedule.
- 8.12.2 If during the period of ten years, the Contractor intends to discontinue the manufacture of spare or replacement parts for the Rolling Stock, the Contractor shall immediately give notice to the Employer of such intention. The Employer shall be given the opportunity of ordering at reasonable prices such quantities of such spare or replacement parts as the Employer shall reasonably require in relation to the anticipated life of the Rolling Stock.
- 8.12.3 In the event of Contractor failing to supply the spare parts in accordance with this Clause, he shall in respect of each item of spare, furnish free of cost to the Employer, the drawings, specifications, patterns and other information to enable the Employer to make or have made such spare parts. The Employer shall be entitled to retain the aforesaid drawings etc., for such



time only as is necessary for the exercise by the Employer of his rights under this clause and the drawings, if the Contractor so requires, shall be returned by the Employer to the Contractor in good order and condition (fair wear and tear excepted).

- 8.12.4 Under such circumstances, the Contractor shall also grant to the Employer, without payment of any royalty or charge, full right and liberty to make or have made spare or replacement parts as aforesaid and for such purposes only to use, make and have made copies of all drawings, patterns, specifications and other information supplied by the Contractor to the Employer pursuant to the Contract.
- 8.12.5 The Contractor will so far as it is reasonably able to bind his sub-contractors to conform with the requirements of this Clause and shall, prior to entry into any sub-contracts, provide the Employer with full details of any sub-contractor who will not so conform in which event the Employer may direct the Contractor to seek an alternative sub-contractor.
- 8.12.6 If the Contractor fails to provide spare or replacement parts as described in this Sub-clause and these are available from the Contractor's sub-contractor, the Employer shall have the right to obtain such spare and replacement parts from the sub-contractor or any other supplier and any additional cost incurred by the Employer shall be recoverable from the Contractor.
- 8.12.7 In case the Contractor is unable to supply spares in accordance with Clause above, he shall furnish, free of cost to the Employer, the drawings, specifications, and other technical details, to enable the Employer to manufacture parts, or have them manufactured. Such drawings and technical data shall be provided free of any charge or royalty, on the understanding that the Employer will use such data and drawings, only for the manufacture of parts for his own use.

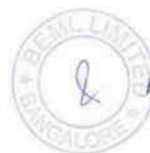
The foregoing shall hold equally good for the Contractor, any or all of his sub-contractors, and vendors.

In the event that technological progress results in improved versions of spares and replacement parts, the latest version shall have the same plug compatibility, and spatial needs of its predecessor, to avoid modifications being required, to accept the up-graded version of the part.

**8.13 Optional Item(s)- Deleted.**



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CHAPTER 9

TRAINING (DELETED)



## CHAPTER 10

## SITE AND SITE MANAGEMENT

## 10.1 Access to Site

- 10.1.1 The Contractor will be given access to the Site in accordance with Clause 2.2 of the General Conditions of Contract.

## 10.2 Site Facilities

- 10.2.1 The Contractor can be provided subject to availability, approximately 100 sq mtrs of total built up space at nominated depots for working on the vehicles, for setting up of the contractors' site offices and stores at the prevailing market rates as decided by Employer. The site office shall be handed over to Employer after the completion of the defect liability period.
- 10.2.2 The contractor shall arrange its furnishing, security etc. Charges for the electricity consumption shall be payable by the contractor at the prescribed rates.
- 10.2.3 (Deleted)
- 10.2.4 (Deleted)
- 10.2.5 (Deleted)
- 10.2.6 The Contractor shall also arrange for the constant and hygienic disposal of all effluent, sewage and rubbish from the buildings.
- 10.2.7 All buildings shall be supplied with electricity 240V 50Hz that shall be distributed to each room in accordance with the Regulations. Lighting and electrical power points shall be provided to each room.
- 10.2.8 Fire fighting equipment shall be provided in accordance with the recommendations of the Delhi City Fire Brigade.
- 10.2.9 The Contractor shall provide, erect and maintain appropriate name boards as specified for each of the offices.
- 10.2.10 Traction power at 25kV a.c. will be made available to Contractor free of charge for testing and commissioning. The Contractor shall liaise with Designated Contractors for availing of the power and assuring compliance of all safety procedures. The Employer shall provide his own EMU train drivers for Testing, Commissioning and Service Trials. A test track is installed in each of the depot. It will be available for the testing of first prototype unit. The Contractor will be allowed use of the test track free of charge.
- 10.2.11 The Contractor shall provide his own lifting facilities for unloading of EMU trains and any heavy equipment, at the port of arrival, transshipment point and depot. The Contractor shall however, be allowed to use any necessary Depot facilities free of charge for assembly, commissioning, inspection, repairs to EMU cars and equipment, subject to availability. The



Employer shall, however, not be responsible for adequacy, reliability and safety of the facilities provided to the Contractor.

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

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

- (i) Electricity at site area (other than traction and inside the shed);
- (ii) Compressed air other than the depot inspection shed;
- (iii) Communication facilities; and
- (iv) Instrumentation.

10.2.14 The Contractor shall be responsible for making applications or requests to the concerned Authorities for availing of the above facilities. In the event that electricity or water supplies are arranged by another Designated Contractor in the Depot area, the Contractor may avail himself of those supplies from the Designated Contractor, either directly on agreed terms and conditions. The Contractor shall comply with all regulations of the utility companies and Government departments concerned.

10.2.15 The Contractor shall allocate at his Works, and those of his major sub-contractors, adequate office space, furniture and equipment for the use of the Employer's Representative's Inspection Engineers. Such accommodation shall include secure filing for Contractual and other sensitive documents, and secure telephone and facsimile facilities. Such facilities shall apply equally to the overseas and the local building phases of the Works.

### 10.3 Site Management

10.3.1 The particular use to which the Site is put shall be submitted to the Engineer for review within 120 days of the Date of Notice to Proceed. The Contractor shall:

- (i) confine his use of the areas of the Site to purposes having been reviewed without objection by the Engineer who reserves the right to extend, amend or restrict the uses to which areas of the Site will be put;
- (ii) where required under the Contract, provide and maintain fencing and lighting around and within the areas of the Site when or where necessary for the safety and convenience of the public or others or as directed;
- (iii) refrain from depositing rubbish or causing nuisance or permitting nuisance to be caused



and, except where reviewed without objection by the Engineer, depositing earth on or removing earth from areas of the Site;

(iv) refrain from felling trees, other than those specifically identified in the Contract to be felled, and refrain from depositing earth around the trunks of trees and protect all trees remaining on Site to the satisfaction of the Engineer.

(v) except where otherwise provided, not permit any person to reside on the Site.

unless otherwise stated, pay all rates and charges of any nature whatsoever arising out of his use of the Site and all work areas provided therein under the Contract.

(vii) not use any part of the Site or Works for advertising purposes except with the acceptance of the Engineer.

10.3.2 The Site shall be maintained in a clean and tidy condition. Materials, including those required for Temporary Works, shall be stored in an orderly manner. The Contractor shall, throughout the period of the Contract, provide a central collection point on Site, as reviewed without objection by the Engineer, for collecting all empty cans, drums, packing and other receptacles capable of holding water. The Contractor shall ensure the regular collection and removal of such debris from the Site. After every shift of works, all work areas shall be cleaned and made tidy to the satisfaction of the Engineer.

10.3.3 The Contractor shall ensure that gases, fuels, explosives and other dangerous goods are stored and handled in a safe manner and in accordance with the Statutory Regulations pertaining to their storage and handling. The Contractor shall be responsible for obtaining the requisite licences at his own cost.

10.3.4 The Contractor shall provide all necessary protective clothing, safety equipment, hand tools, ladders, trestles, power supply, and replacement equipment for the staff engaged on Site maintenance.

10.3.5 Because of the multi-disciplinary nature of the Project, several different parties may require access to the same portion of the Site during the construction phase, for the installation, erection and testing of the Works.

10.3.6 To facilitate the organisation and co-ordination of access and occupation requirements, the Contractor shall maintain a close liaison with other Contractors.

10.3.7 As soon as any or all of the Contractor's installations are no longer required for the execution of the Works, the Contractor shall remove those facilities and ensure that the area is left free of debris, excess materials, and obstructions.

10.3.8 Deleted.

10.3.9 Deleted.

#### 10.4 Site Safety

10.4.1 The Engineer will issue to the Contractor with the latest edition of the Employer's Project

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Safety Manual. The Contractor shall, as a minimum, comply with the Safety Manual. However, this shall not relieve the Contractor of any of his statutory duties, obligations or responsibilities under the Contract. The Engineer reserves the right to order the immediate removal and replacement of any item of Contractor's equipment, which is deemed to be in an unsafe condition.

- 10.4.2 The Contractor shall submit, as part of his Safety Plan, a Site Safety Plan, and also designate a member of his staff as Safety Officer.
- 10.4.3 The Contractor shall establish and maintain and staff at all times when personnel are on site, a First Aid Post. Portable First Aid Boxes shall be maintained in a fully equipped state at each site work centre. The Contractor shall ensure that at least one employee on every working shift, is a trained First Aider, capable of administering First Aid competently until the arrival of professional help, in an accident situation.
- 10.4.4 The Contractor shall be fully responsible for the safety of the Works, his personnel, his sub-contractors' personnel, the public, and any persons directly or indirectly associated with the Works, or on or in the vicinity of the depot site. The Contractor shall treat safety measures as high priorities in all his activities throughout the execution of the work.
- 10.4.5 The Contractor shall submit to the Engineer, regular Site Safety Reports, and shall notify immediately the occurrence of an accident involving his staff or that of his sub-Contractors, or to any person within the area of the depot for which the Contractor is responsible.



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## CHAPTER 11

## TRAFFIC, ROAD &amp; APPURTENANCES

## 11.1 General

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

## 11.2 Transportation to Site

- 11.2.1 The Contractor shall make all arrangements and assume full responsibility for transportation to the site at nominated depots of the passenger rolling stock, and all plant, equipment, materials and supplies needed for the proper execution of the Works. Procedures for access to and from the Site shall be co-ordinated with the relevant Authorities.
- 11.2.2 A loading / unloading line is constructed at Shastri Park (SP) depot and Khyber Pass (KP) depot where the coaches brought by road can be lifted using road cranes/ loaded on road trailer for further movement on road. Road transportation of coaches from SP depot to other Depots is possible using road trailers. Transportation from Line#2 to Line#3 is also possible through DMRC network. Coaches can be transported to other depots directly by road. The Contractor shall undertake survey of the site and determined the most suitable means for transportation of coaches.
- 11.2.3 The Contractor shall use such routes and rights of entry to the Site as may be decided by the Engineer from time to time. Routes for 'very large' or 'very heavy' loads shall be discussed with the Engineer in advance and all arrangements thereafter shall be submitted to the Engineer. In this context, the definition of the terms "very large" and "very heavy" refer to articles that cannot be transported by normal road vehicles or be handled by readily available methods. Where doubt exists, it shall be the responsibility of the Contractor to notify and discuss the nature of the load in question with the Engineer in accordance with Paragraph 11.2.2.
- 11.2.4 The Contractor shall be responsible for obtaining permission from the Traffic Police and other relevant authorities to move "very large" and "very heavy" loads and for arranging police escorts if required. The Contractor shall ensure that all roads and pavements, etc. leading to and around the Site are kept free from obstructions and shall not cause inconvenience or hindrance to traffic or persons either by its vehicle or its workmen, scaffolding, plant, materials, equipment, etc. All Workmen working on the road shall wear approved reflective safety vests at all times.
- 11.2.5 The Contractor shall repair damage caused to existing roads, footpaths, steps, cables, sewers, drains, etc. and shall reinstate the same at his own expense to the satisfaction of the relevant authorities.



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**CHAPTER 12****OPERATION AND MAINTENANCE MANUALS****12.1 General**

- 12.1.1 The Contractor shall provide Operation and Maintenance manuals, wherever design changes with respect to existing stock are envisaged, for use by supervisory, operating and technical staff of DMRC, in English. The cost of supply of such operation and maintenance manuals covered under this chapter shall be deemed to be included in quoted lump sum price. No additional cost whatsoever shall be payable to the contractor on this account.
- 12.1.2 Thirty days before the date of commencement of test running of the first 'T+M' Units, the Contractor shall deliver the originals and 3 coloured copies each of the final Operation and Maintenance manuals. These manuals shall have been submitted for proof reading and training purposes prior to delivery. It is accepted that further amendments may subsequently be required.
- 12.1.3 Each and every manual shall be divided into indexed sections explaining the subject matter in logical steps. Most manuals shall consist of A4-size printed sheets bound in stiff-cover wear-resistant binders clearly and uniformly marked with the subject matter and reference number. Where alternative sizes are proposed, (e.g. A5/A6 pocket books of schematic wiring diagrams) these shall be for review and acceptance. The binding shall allow for all subsequent changes and additions to be readily effected.
- 12.1.4 Information shall be provided in pictorial form wherever whenever possible and shall include step-by-step instructions and views of the particular equipment including exploded views. Programmable equipment shall be supplied with sufficient flow charts and fully documented programmes to enable faults to be quickly identified and system modification to be undertaken at any time.
- 12.1.5 The Contractor shall provide clarifications and amendments to the Operation and Maintenance manuals as necessary during the execution of contract. Updates shall be provided for the originals and all copies.

**12.2 Operation Manuals**

- 12.2.1 The Contractor shall provide operation manuals explaining the purpose and operation of the complete system together with its component subsidiary systems and individual item of equipment. The characteristics, ratings and any necessary operating limits of the Equipment and Sub-systems shall be provided.

**12.3 Maintenance Manuals**

- 12.3.1 The Contractor shall provide maintenance manuals showing details of all the various systems and sub-systems from a maintenance and fault finding standpoint, with particulars of operating parameters, tools for dismantling and testing, methods of assembly and disassembly,



tolerances, repair techniques and all other information necessary to set up a repair and servicing programme.

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

- (i) manufacturers' documentation supplied as standard with the equipment;
- (ii) hardware configuration with details of expansion capabilities and options;
- (iii) programme loading instructions, including runtime environment configuration;
- (iv) Deleted.
- (v) flow charts, data flow diagrams and state diagrams as appropriate;
- (vi) description of software modules including purpose, linkage with other modules, error routines and any special considerations;
- (vii) memory maps for both internal and peripheral memory showing description of all programmes, data files, overlay areas, memory available for expansion and the like;
- (viii) loading and operating instructions for diagnostic programmes and specifically developed debugging tools; and
- (ix) programming manuals relevant to operating systems, languages, development tools, etc.

12.3.3 The documentation of software may be supplied after the expiry of the warranty period, under terms and conditions to be mutually agreed at Contract pre-award stage. The manual shall also include inspection/overhaul procedure and periodicity of various inspection/overhaul schedules in detail including the tools, special tools/plants, and facilities required. The manual shall be subject to review by the Engineer.

12.3.4 A preliminary maintenance schedule specifying the frequency of inspections and the scope of work during such inspections, including facilities, manpower and down-time required shall be included within the Tender.

12.3.5 The maintenance manual shall also include an illustrated parts catalogue of all equipment & components supplied and shall contain sufficient information to identify and requisition the appropriate part by maintenance staff. The catalogue shall comprise 3 sub-sections.

The first sub-section shall be an alphanumeric parts list, which shall include the following information:

- (i) Part number
- (ii) Description
- (iii) Name of manufacturer
- (iv) Quantity and Unit



- (v) Part number of next higher assembly (usually a line replaceable unit).
- (vi) Cross-reference to figure number.
- (vii) Category : e.g. consumable, line replaceable unit, repairable.
- (viii) Life-expected life, Mean time between failure or mean distance between failure where available.
- (ix) General or specific purpose
- (x) Purchase and technical specification

The second sub-section is a series of illustrations to indicate the location of each replaceable item, which shall be clear and progressive with exploded views to enable parts to be identified easily by cross-reference with the alpha-numeric list.

And the third sub-section, an indicative price list which shall list in alpha-numeric sequence the part number with the price, lead time and vendor.

#### 12.4 Electronic Manuals

- 12.4.1 The Contractor shall provide manuals in electronic format. This is in addition to the submission of manuals in hard-copies.
- 12.4.2 The format of the electronic copies shall be proven in at least two other applications and shall allow for links between parts catalogue and maintenance instructions.
- 12.4.3 The contractor shall develop a complete Database Management System (DBMS) consisting of a publishing engine and a browser engine. The Design Data including As-Built drawings and Final Design documents, Spare Parts Catalogue, the Maintenance Schedule, the Maintenance Instructions Manuals, Engineering Changes details etc. shall be the main modules of DBMS and shall allow for links between different modules. The DBMS and Language used shall be subject to Engineer's review and approval. The contractor shall handover the complete package of DBMS for use by DMRC after Defect Liability Period (DLP). Till expiry of DLP, DBMS will be provided as an internet access web service to DMRC and the Contractor shall ensure sufficient training of DMRC personnel in the DBMS during this period.



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## CHAPTER 13

## STORAGE, PACKING, CRATING AND MARKING

## 13.1 General

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

13.1.2 The Contractor shall prepare, protect and store in a manner to be accepted by the Engineer, all equipment and materials so as to safeguard them against loss or damage from repeated handling, from climatic influences and from all other hazards arising during shipment or storage on or off the Site. Secure and covered storage shall be provided for all equipment and materials other than those accepted by the Engineer as suitable for open storage.

13.1.3 The Contractor shall provide all packing, crating and markings. In so doing he shall comply with the following requirements:

- (i) All packing procedures shall be subject to acceptance by the Engineer.
- (ii) Spare parts shall be tropicalised in their packing for prolonged storage in accordance with BS 1133 or equivalent and shall be suitably labelled to indicate :
  - Ownership (DMRC)
  - Shelf life.
  - Type of storage.
  - Description of item and relevant part number.
  - Serial number, if applicable.
  - Inspection Certificate number and batch number, that is, the number allocated by the Contractor's Inspector at the time of manufacture or packing.
- (iii) Protection requirements shall include but not be limited to:
  - (a) Electrical and other delicate items or equipment shall be properly protected to the Engineer acceptance.
  - (b) Tube ends, cable ends, cable entry points into equipment and other similar terminations and openings shall be blanked off to prevent ingress of dirt, moisture, vermin or insects and to provide protection against damage.
  - (c) Flanged ends shall be protected by adhesive tape or jointing material covered by a properly secured wooden blank not smaller than the flange itself. Plain tube ends shall be closed off with bungs or plugs or suitable materials firmly fixed in position.
  - (d) Particular care shall be taken to prevent damage to or corrosion of shafts and



journals where they rest on timber or other supports, which may contain moisture. At such points, wrappings impregnated with anti-rusting composition shall be used. Wrapping shall be of sufficient strength to resist chafing under the pressures and movements likely to occur in transit.

- (e) Spare ball and roller bearings and similarly protected items shall not be removed from the manufacturer's wrappings or packing.
- (iv) Each case, crate or package shall be legibly and indelibly marked in large letters with the name (DMRC), address, Contract Number, "right way up", opening points and other markings as necessary to permit materials and Plant to be readily identified and handled during transit and when received at Site.
- (v) Each case, crate or package shall contain a comprehensive packing list showing the number, mark, size weight and contents together with any relevant drawings. A second copy of the packing list shall be enclosed in a watertight enclosure on the outside of each case.
- (vi) All items heavier than 100 kg shall be marked on the outside of the case to show the gross and net weights, the points for slinging, and where the weight is bearing.
- (vii) Care shall be taken to prevent movement of equipment within cases, crates or packages by the provision of bracings, straps and securing bolts as necessary. Bags of loose items shall be packed in cases and shall be clearly identified by well-secured labels on which the quantity and name of the part and its index or catalogue number have been stamped.

In order to reduce fire risk and prevent obstruction, all empty cases, crates, or packages whether or not returnable shall be removed from the Site as soon as possible. If this requirement is not complied with, after due notice, the Engineer will instruct the Civil Contractor or others to remove them and the Employer will back-charge the Contractor the costs incurred together with handling charges.

- 13.1.4 If sea transportation of trains from manufacturer's works to site at New Delhi is required, seaworthy packing/ treatment of Trains shall be carried out for the safe transportation of trains. It shall apply to sea transportation of spares and other materials also.



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## CHAPTER 14

## PUBLIC RELATIONS MATTERS AND PROGRESS PHOTOGRAPHS

## 14.1 General

- 14.1.1 The Contractor shall, in conjunction with the Engineer, liaise with Public Relations Officer, DMRC on all press and public relations matters in connection with the Contract.
- 14.1.2 All press releases, press statements, articles or printed material prepared by the Contractor shall be submitted to DMRC, in consultation with the Engineer prior to publication or release to the news media.
- 14.1.3 All press queries relating to the Contract received by the Contractor must be referred to DMRC for clearance, in consultation with the Engineer. The Contractor is not allowed to be interviewed by the press or divulge any information freely to reporters without first seeking clearance from DMRC.
- 14.1.4 Use of the DMRC logo in the Contractor's publications shall be subject to approval of DMRC.
- 14.1.5 The Contractor shall provide DMRC and the Engineer with schedules relating to night works, traffic diversions, closure of road etc. that may cause inconvenience to the public.
- 14.1.6 The Contractor shall extend to DMRC all the necessary assistance and co-operation with regard to requests for photo-taking, video-taking and visits to the Site by the DMRC official photographer or appointed film-maker, in consultation with the Engineer.
- 14.1.7 The Contractor shall include a section on matter concerning Public Relation in his monthly report to the Engineer.
- 14.1.8 All hoardings and signboards put up by the Contractor shall be maintained in good condition.
- 14.1.9 All public complaints should be thoroughly investigated and acted upon by the Contractor on an urgent basis.
- 14.1.10 The Contractor shall give full support to all functions and events e.g. community talks for residents, Site visits for the media etc. organised by the DMRC during the period of the Contract.

## 14.2 Progress Photographs

- 14.2.1 After design, manufacturing and testing activities start, the Contractor shall furnish photographs showing the progress of the Works during the month. The actual number of photographs taken and the subjects photographed shall be as directed by the Engineer.
- 14.2.2 Each photograph shall have a forty millimetres by eighty millimetres title block in the lower right-hand corner, which shall show the following information:

DMRC CONTRACT No. :



000330



CONTRACT NAME :

CONTRACTOR :

PHOTOGRAPH No. :

DATE

DESCRIPTION :

- 14.2.3 Three colour prints of each photograph shall be submitted. Prints shall be standard commercial quality on single-weight glossy paper 200mm by 250mm in size inserted back-to-back in clear plastic envelopes made for the purpose. Diskettes capturing Office software shall be provided together with the colour prints.

