PHILIPPINE BIDDING DOCUMENTS

(As Harmonized with Development Partners)

Procurement of GOODS

Design and/or Supply and Delivery of Forty-Eight (48) Light Rail Vehicles with On-board Communication System (Radio, Public Address, Intercom), On-board ATP System and One (1) Unit Train Simulator

Government of the Republic of the Philippines

Fourth Edition
December 2010

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Section I. Invitation to Bid

Department of Transportation and Communications
INVITATION TO BID FOR *MRT3 CAPACITY EXPANSION (CAPEX) Project*

1. The *Department of Transportation and Communications (DOTC)*, through the *General Appropriations Fund*, intends to apply the sum of *Three Billion Seven Hundred Sixty Nine Million Three Hundred Eighty Two Thousand Four Hundred Pesos (Php 3,769,382,400.00)* being the Approved Budget for the Contract (ABC) to payments under the contract for the *DOTC-MRT3 Capacity Expansion Project*. Bids received in excess of the ABC shall be automatically rejected at bid opening.

2. The *DOTC* now invites bids for the Design, Supply and Delivery of 48 Lights Rail Vehicles (LRVs) including but not limited to On-board Communication System (Radio, Public Address, Intercom), On-board ATP System and one (1) unit Train Simulator (please see the Terms of Reference for detailed Specifications). Delivery of the Goods is required *within fifteen (15) months from issuance of the Notice to Proceed*. Bidders should have completed, within *ten (10) years* from the date of submission and receipt of bids, a contract similar to the Project. The description of an eligible bidder is contained in the Bidding Documents, particularly, in Section II. Instructions to Bidders.

3. Bidding will be conducted through open competitive bidding procedures using a non-discretionary "pass/fail" criteria as specified in the Revised Implementing Rules and Regulations (IRR) of Republic Act (RA) 9184, otherwise known as the "Government Procurement Reform Act".

   Bidding is open to all interested bidders, whether local or foreign, subject to the conditions for eligibility provided in the Revised IRR of RA 9184.

4. Interested bidders may obtain further information from DOTC Primary BAC and inspect the Bidding Documents at the address given below during weekdays at 9:00AM to 5:00PM.

   A complete set of Bidding Documents may be purchased by interested Bidders on 28 February 2013 until the date of the bid opening at the address below and upon payment of a nonrefundable fee for the Bidding Documents in the amount of Php 75, 000.00.

   It may also be downloaded free of charge from the website of the Philippine Government Electronic Procurement System (PhilGEPS) and the website of the Procuring Entity, provided that Bidders shall pay the nonrefundable fee for the Bidding Documents not later than the submission of their bids.

5. The DOTC will hold a pre-bid on 07 March 2013 at 8:00 A.M. at the 16th Floor Conference Room, The Columbia Tower, Ortigas Avenue, Mandaluyong City which shall be open to all interested parties.

6. Bids must be delivered to the address below on or before 22 March 2013 at 9:00 a.m. All bids must be accompanied by a bid security in any security in any of the acceptable forms and in the amount sated in ITB 18.

   Bid opening shall be on 22 March 2013 at 9:00 a.m. at the 16th Floor Conference Room, Unit 165, The Columbia Tower, Ortigas Avenue, Mandaluyong City. Bids will be opened in the presence of the Bidders' representatives who choose to attend at the address below. Late bids shall not be accepted.

7. The *DOTC* reserves the right to accept or reject any bid, to annul the bidding process, and to reject all bids at any time prior to contract award, without thereby incurring any liability to the affected bidder or bidders.

8. For further information, please refer to:

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(Sgd.) Atty. JOSE PERPETUO M. LOTILLA
Undersecretary
and Chairman, Bids and Awards Committee

Section II. Instructions to Bidders

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A. General

1. Scope of Bid

1.1. The procuring entity named in the **BDS** (hereinafter referred to as the "Procuring Entity") wishes to receive bids for supply and delivery of the goods as described in Section VII. Technical Specifications (hereinafter referred to as the "Goods").

1.2. The name, identification, and number of lots specific to this bidding are provided in the **BDS**. The contracting strategy and basis of evaluation of lots is described in ITB Clause 28.

2. Source of Funds

The Procuring Entity has a budget or has applied for or received funds from the Funding Source named in the **BDS**, and in the amount indicated in the **BDS**. It intends to apply part of the funds received for the Project, as defined in the **BDS**, to cover eligible payments under the contract.

3. Corrupt, Fraudulent, Collusive, and Coercive Practices

3.1. Unless otherwise specified in the **BDS**, the Procuring Entity as well as the bidders and suppliers shall observe the highest standard of ethics during the procurement and execution of the contract. In pursuance of this policy, the Procuring Entity:

(a) defines, for purposes of this provision, the terms set forth below as follows:

(i) "corrupt practice" means behavior on the part of officials in the public or private sectors by which they improperly and unlawfully enrich themselves, others, or induce others to do so, by misusing the position in which they are placed, and includes the offering, giving, receiving, or soliciting of anything of value to influence the action of any such official in the procurement process or in contract execution; entering, on behalf of the government, into any contract or transaction manifestly and grossly disadvantageous to the same, whether or not the public officer profited or will profit thereby, and similar acts as provided in RA 3019.

(ii) "fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Procuring Entity, and includes collusive practices among Bidders (prior to or after bid submission) designed to establish bid prices at artificial, non-competitive levels and to deprive the Procuring Entity of the benefits of free and open competition.

(iii) "collusive practices" means a scheme or arrangement between two or more Bidders, with or without the knowledge of the Procuring Entity, designed to establish bid prices at artificial, non-competitive levels.

(iv) "coercive practices" means harming or threatening to harm, directly or indirectly, persons, or their property to influence their participation in a procurement process, or affect the execution of a contract;

(v) "obstructive practice" is

(aa) deliberately destroying, falsifying, altering or concealing of evidence material to an administrative proceedings or investigation or making false statements to investigators in order to materially impede an administrative proceedings or investigation of the Procuring Entity or any foreign government/foreign or international financing institution into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the administrative proceedings or investigation or from pursuing such proceedings or investigation; or

(bb) acts intended to materially impede the exercise of the inspection and audit rights of the Procuring Entity or any foreign government/foreign or international financing institution herein.

(b) will reject a proposal for award if it determines that the Bidder recommended for award has engaged in any of the practices mentioned in this Clause for purposes of competing for the contract.

3.2. Further, the Procuring Entity will seek to impose the maximum civil, administrative, and/or criminal penalties available under applicable laws on individuals and organizations deemed to be involved in any of the practices mentioned in ITB Clause 3.1(a).

3.3. Furthermore, the Funding Source and the Procuring Entity reserve the right to inspect and audit records and accounts of a bidder or supplier in the bidding for and performance of a contract themselves or through independent auditors as reflected in the GCC Clause 3.

4. Conflict of Interest

4.1. All Bidders found to have conflicting interests shall be disqualified to participate in the procurement at hand, without prejudice to the imposition of appropriate administrative, civil, and criminal sanctions. A Bidder may be considered to have conflicting interests with another

Bidder in any of the events described in paragraphs (a) through (c) below and a general conflict of interest in any of the circumstances set out in paragraphs (d) through (f) below:

(a) A Bidder has controlling shareholders in common with another Bidder;

(b) A Bidder receives or has received any direct or indirect subsidy from any other Bidder;

(c) A Bidder has the same legal representative as that of another Bidder for purposes of this bid;

(d) A Bidder has a relationship, directly or through third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder or influence the decisions of the Procuring Entity regarding this bidding process. This will include a firm or an organization who lends, or temporarily seconds, its personnel to firms or organizations which are engaged in consulting services for the preparation related to procurement for or implementation of the project if the personnel would be involved in any capacity on the same project;

(e) A Bidder submits more than one bid in this bidding process. However, this does not limit the participation of subSuppliers in more than one bid; or

(f) A Bidder who participated as a consultant in the preparation of the design or technical specifications of the Goods and related services that are the subject of the bid.

4.2. In accordance with Section 47 of the IRR of RA 9184, all Bidding Documents shall be accompanied by a sworn affidavit of the Bidder that it is not related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), members of the Technical Working Group (TWG), members of the BAC Secretariat, the head of the Project Management Office (PMO) or the end-user unit, and the project consultants, by consanguinity or affinity up to the third civil degree. On the part of the Bidder, this Clause shall apply to the following persons:

(a) If the Bidder is an individual or a sole proprietorship, to the Bidder himself;

(b) If the Bidder is a partnership, to all its officers and members;

(c) If the Bidder is a corporation, to all its officers, directors, and controlling stockholders; and

(d) If the Bidder is a joint venture (JV), the provisions of items (a), (b), or (c) of this Clause shall correspondingly apply to each of the members of the said JV, as may be appropriate.

Relationship of the nature described above or failure to comply with this Clause will result in the automatic disqualification of a Bidder.

5. Eligible Bidders

5.1. Unless otherwise provided in the **BDS**, the following persons shall be eligible to participate in this bidding:

(a) Duly licensed Filipino citizens/sole proprietorships;

(b) Partnerships duly organized under the laws of the Philippines and of which at least sixty percent (60%) of the interest belongs to citizens of the Philippines;

(c) Corporations duly organized under the laws of the Philippines, and of which at least sixty percent (60%) of the outstanding capital stock belongs to citizens of the Philippines;

(d) Cooperatives duly organized under the laws of the Philippines, and of which at least sixty percent (60%) of the interest belongs to citizens of the Philippines; and

(e) Unless otherwise provided in the **BDS**, persons/entities forming themselves into a JV, *i.e.*, a group of two (2) or more persons/entities that intend to be jointly and severally responsible or liable for a particular contract: Provided, however, that Filipino ownership or interest of the joint venture concerned shall be at least sixty percent (60%).

5.2. Foreign bidders may be eligible to participate when any of the following circumstances exist, as specified in the **BDS**:

(a) When a Treaty or International or Executive Agreement as provided in Section 4 of the RA 9184 and its IRR allow foreign bidders to participate;

(b) Citizens, corporations, or associations of a country, included in the list issued by the GPPB, the laws or regulations of which grant reciprocal rights or privileges to citizens, corporations, or associations of the Philippines;

(c) When the Goods sought to be procured are not available from local suppliers; or

(d) When there is a need to prevent situations that defeat competition or restrain trade.

5.3. Government corporate entities may be eligible to participate only if they can establish that they (a) are legally and financially autonomous, (b) operate under commercial law, and (c) are not dependent agencies of the GOP or the Procuring Entity.

5.4. Unless otherwise provided in the **BDS**, the Bidder must have completed at least one contract similar to the Project the value of which, adjusted to current prices using the National Statistics Office consumer price index, must be at least equivalent to a percentage of the ABC stated in the **BDS**.

For this purpose, contracts similar to the Project shall be those described in the **BDS**, and completed within the relevant period stated in the Invitation to Bid and **ITB** Clause 12.1(a)(iii).

5.5. The Bidder must submit a computation of its Net Financial Contracting Capacity (NFCC) or a commitment from a Universal or Commercial Bank to extend a credit line in its favor if awarded the contract for this Project (CLC).

The NFCC, computed using the following formula, must be at least equal to the ABC to be bid:

NFCC = [(Current assets minus current liabilities) (K)] minus the value of all outstanding or uncompleted portions of the projects under ongoing contracts, including awarded contracts yet to be started coinciding with the contract for this Project.

Where:

K = 10 for a contract duration of one year or less, 15 for a contract duration of more than one year up to two years, and 20 for a contract duration of more than two years.

The CLC must be at least equal to ten percent (10%) of the ABC for this Project. If issued by a foreign bank, it shall be confirmed or authenticated by a Universal or Commercial Bank. In the case of local government units (LGUs), the Bidder may also submit CLC from other banks certified by the *Bangko Sentral ng Pilipinas* (BSP) as authorized to issue such financial instrument.

6. Bidder's Responsibilities

a. The Bidder or its duly authorized representative shall submit a sworn statement in the form prescribed in Section VIII. Bidding Forms as required in **ITB** Clause 12.1(b)(iii).

6.1. The Bidder is responsible for the following:

(a) Having taken steps to carefully examine all of the Bidding Documents;

(b) Having acknowledged all conditions, local or otherwise, affecting the implementation of the contract;

(c) Having made an estimate of the facilities available and needed for the contract to be bid, if any;

(d) Having complied with its responsibility to inquire or secure Supplemental/Bid Bulletin(s) as provided under **ITB** Clause 10.3.

(e) Ensuring that it is not "blacklisted" or barred from bidding by the GOP or any of its agencies, offices, corporations, or LGUs, including foreign government/foreign or international financing institution whose blacklisting rules have been recognized by the GPPB;

(f) Ensuring that each of the documents submitted in satisfaction of the bidding requirements is an authentic copy of the original, complete, and all statements and information provided therein are true and correct;

(g) Authorizing the Head of the Procuring Entity or its duly authorized representative/s to verify all the documents submitted;

(h) Ensuring that the signatory is the duly authorized representative of the Bidder, and granted full power and authority to do, execute and perform any and all acts necessary and/or to represent the Bidder in the bidding, with the duly notarized Secretary's Certificate attesting to such fact, if the Bidder is a corporation, partnership, cooperative, or joint venture;

(i) Complying with the disclosure provision under Section 47 of RA 9184 in relation to other provisions of RA 3019; and

(j) Complying with existing labor laws and standards, in the case of procurement of services.

Failure to observe any of the above responsibilities shall be at the risk of the Bidder concerned.

6.2. The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Documents.

6.3. It shall be the sole responsibility of the Bidder to determine and to satisfy itself by such means as it considers necessary or desirable as to all matters pertaining to the contract to be bid, including: (a) the location and the nature of this Project; (b) climatic conditions; (c) transportation facilities; and (d) other factors that may affect the cost, duration, and execution or implementation of this Project.

6.4. The Procuring Entity shall not assume any responsibility regarding erroneous interpretations or conclusions by the prospective or eligible bidder out of the data furnished by the procuring entity.

6.5. The Bidder shall bear all costs associated with the preparation and submission of his bid, and the Procuring Entity will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

6.6. Before submitting their bids, the Bidder is deemed to have become familiar with all existing laws, decrees, ordinances, acts and regulations of the Philippines which may affect this Project in any way.

6.7. The Bidder should note that the Procuring Entity will accept bids only from those that have paid the nonrefundable fee for the Bidding Documents at the office indicated in the Invitation to Bid.

7. Origin of Goods

Unless otherwise indicated in the **BDS**, there is no restriction on the origin of goods other than those prohibited by a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, subject to **ITB** Clause 27.1.

8. Subcontracts

8.1. Unless otherwise specified in the **BDS**, the Bidder may subcontract portions of the Goods to an extent as may be approved by the Procuring Entity and stated in the **BDS**. However, subcontracting of any portion shall not relieve the Bidder from any liability or obligation that may arise from the contract for this Project.

8.2. SubSuppliers must comply with the eligibility criteria and the documentary requirements specified in the **BDS**. In the event that any subSupplier is found by the Procuring Entity to be ineligible, the subcontracting of such portion of the Goods shall be disallowed.

8.3. The Bidder may identify the subSupplier to whom a portion of the Goods will be subcontracted at any stage of the bidding process or during contract implementation. If the Bidder opts to disclose the name of the subSupplier during bid submission, the Bidder shall include the required documents as part of the technical component of its bid.

B. Contents of Bidding Documents

9. Pre-Bid Conference

9.1. (a) If so specified in the **BDS**, a pre-bid conference shall be held at the venue and on the date indicated therein, to clarify and address the Bidders' questions on the technical and financial components of this Project.

(b) *The pre-bid conference shall be held at least twelve (12) calendar days before the deadline for the submission and receipt of bids. If the Procuring Entity determines that, by reason of the method, nature, or complexity of the contract to be bid, or when international participation will be more advantageous to the GOP, a longer period for the preparation of bids is necessary, the pre-bid conference shall be held at least thirty (30) calendar days before the deadline for the submission and receipt of bids, as specified in the* **BDS**.

9.2. Bidders are encouraged to attend the pre-bid conference to ensure that they fully understand the Procuring Entity's requirements. Non-attendance of the Bidder will in no way prejudice its bid; however, the Bidder is expected to know the changes and/or amendments to the Bidding Documents discussed during the pre-bid conference.

9.3. Any statement made at the pre-bid conference shall not modify the terms of the Bidding Documents unless such statement is specifically identified in writing as an amendment thereto and issued as a Supplemental/Bid Bulletin.

10. Clarification and Amendment of Bidding Documents

10.1. Bidders who have purchased the Bidding Documents may request for clarification on any part of the Bidding Documents for an interpretation. Such request must be in writing and submitted to the Procuring Entity at the address indicated in the **BDS** at least ten (10) calendar days before the deadline set for the submission and receipt of bids.

10.2. Supplemental/Bid Bulletins may be issued upon the Procuring Entity's initiative for purposes of clarifying or modifying any provision of the Bidding Documents not later than seven (7) calendar days before the deadline for the submission and receipt of bids. Any modification to the Bidding Documents shall be identified as an amendment.

10.3. Any Supplemental/Bid Bulletin issued by the BAC shall also be posted on the Philippine Government Electronic Procurement System (PhilGEPS) and the website of the Procuring Entity concerned, if available. It shall be the responsibility of all Bidders who secure the Bidding Documents to inquire and secure Supplemental/Bid Bulletins that may be issued by the BAC. However, Bidders who have submitted bids before the issuance of the Supplemental/Bid Bulletin must be informed and allowed to modify or withdraw their bids in accordance with **ITB** Clause 23.

C. Preparation of Bids

11. Language of Bid

The bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Procuring Entity, shall be written in English. Supporting documents and printed literature furnished by the Bidder may be in another language provided they are accompanied by an accurate translation in English certified by the appropriate embassy or consulate in the Philippines, in which case the English translation shall govern for purposes of interpretation of the bid.

12. Documents Comprising the Bid: Eligibility and Technical Components

12.1. Unless otherwise indicated in the **BDS**, the first envelope shall contain the following eligibility and technical documents:

(a) Eligibility Documents –

Class "A" Documents:

(i) Registration certificate from the Securities and Exchange Commission (SEC), Department of Trade and Industry (DTI) for sole proprietorship, or Cooperative Development Authority (CDA) for cooperatives, or any proof of such registration as stated in the **BDS**;

(ii) Mayor's permit issued by the city or municipality where the principal place of business of the prospective bidder is located;

(iii) Statement of all its ongoing and completed government and private contracts within the period stated in the **BDS**, including contracts awarded but not yet started, if any. The statement shall include, for each contract, the following:

(iii.1) name of the contract;

(iii.2) date of the contract;

(iii.3) kinds of Goods;

(iii.4) amount of contract and value of outstanding contracts;

(iii.5) date of delivery; and

(iii.6) end user's acceptance or official receipt(s) issued for the contract, if completed.

(iv) Audited financial statements, stamped "received" by the Bureau of Internal Revenue (BIR) or its duly accredited and authorized institutions, for the preceding calendar year, which should not be earlier than two (2) years from bid submission;

(v) NFCC computation or CLC in accordance with **ITB** Clause 5.5; and

Class "B" Document:

(vi) If applicable, the JVA in case the joint venture is already in existence, or duly notarized statements from all the potential joint venture partners stating that they will enter into and abide by the provisions of the JVA in the instance that the bid is successful.

(b) Technical Documents –

(i) Bid security in accordance with **ITB** Clause 18. If the Bidder opts to submit the bid security in the form of:

(i.1) a bank draft/guarantee or an irrevocable letter of credit issued by a foreign bank, it shall be accompanied by a confirmation from a Universal or Commercial Bank; or

(i.2) a surety bond, it shall be accompanied by a certification by the Insurance Commission that the surety or insurance company is authorized to issue such instruments;

(ii) Conformity with technical specifications, as enumerated and specified in Sections VI and VII of the Bidding Documents; and

(iii) Sworn statement in accordance with Section 25.2(a)(iv) of the IRR of RA 9184 and using the form prescribed in Section VIII. Bidding Forms

13. Documents Comprising the Bid: Financial Component

13.1. Unless otherwise stated in the **BDS**, the financial component of the bid shall contain the following:

(a) Financial Bid Form, which includes bid prices and the bill of quantities and the applicable Price Schedules, in accordance with **ITB** Clauses 15.1 and 15.4;

(b) If the Bidder claims preference as a Domestic Bidder or Domestic Entity, a certification from the DTI, SEC, or CDA issued in accordance with **ITB** Clause 27, unless otherwise provided in the **BDS**; and

(c) Any other document related to the financial component of the bid as stated in the **BDS**.

13.2. (a) Unless otherwise stated in the **BDS,** all bids that exceed the ABC shall not be accepted.

(b) Unless otherwise indicated in the **BDS**, for foreign-funded procurement, a ceiling may be applied to bid prices provided the following conditions are met:

(i) Bidding Documents are obtainable free of charge on a freely accessible website. If payment of Bidding Documents is required by the procuring entity, payment could be made upon the submission of bids.

(ii) The procuring entity has procedures in place to ensure that the ABC is based on recent estimates made by the responsible unit of the procuring entity and that the estimates reflect the quality, supervision and risk and inflationary factors, as well as prevailing

market prices, associated with the types of works or goods to be procured.

(iii) The procuring entity has trained cost estimators on estimating prices and analyzing bid variances.

(iv) The procuring entity has established a system to monitor and report bid prices relative to ABC and DOTC-MRT3 Engineer's/procuring entity's estimate.

(v) The procuring entity has established a system to monitor and report bid prices relative to ABC and procuring entity's estimate. The procuring entity has established a monitoring and evaluation system for contract implementation to provide a feedback on actual total costs of goods and works.

14. Alternative Bids

Alternative Bids shall be rejected. For this purpose, alternative bid is an offer made by a Bidder in addition or as a substitute to its original bid which may be included as part of its original bid or submitted separately therewith for purposes of bidding. A bid with options is considered an alternative bid regardless of whether said bid proposal is contained in a single envelope or submitted in two (2) or more separate bid envelopes.

15. Bid Prices

15.1. The Bidder shall complete the appropriate Price Schedules included herein, stating the unit prices, total price per item, the total amount and the expected countries of origin of the Goods to be supplied under this Project.

15.2. The Bidder shall fill in rates and prices for all items of the Goods described in the Bill of Quantities. Bids not addressing or providing all of the required items in the Bidding Documents including, where applicable, Bill of Quantities, shall be considered non-responsive and, thus, automatically disqualified. In this regard, where a required item is provided, but no price is indicated, the same shall be considered as non-responsive, but specifying a "0" (zero) for the said item would mean that it is being offered for free to the Government.

15.3. The terms Ex Works (EXW), Cost, Insurance and Freight (CIF), Cost and Insurance Paid to (CIP), Delivered Duty Paid (DDP), and other trade terms used to describe the obligations of the parties, shall be governed by the rules prescribed in the current edition of the International Commercial Terms (INCOTERMS) published by the International Chamber of Commerce, Paris.

15.4. Prices indicated on the Price Schedule shall be entered separately in the following manner:

(a) For Goods offered from within the Procuring Entity's country:

(i) The price of the Goods quoted EXW (ex works, ex factory, ex warehouse, ex showroom, or off-the-shelf, as applicable), including all customs duties and sales and other taxes already paid or payable:

(i.1) on the components and raw material used in the manufacture or assembly of Goods quoted ex works or ex factory; or

(i.2) on the previously imported Goods of foreign origin quoted ex warehouse, ex showroom, or off-the-shelf and any Procuring Entity country sales and other taxes which will be payable on the Goods if the contract is awarded.

(ii) The price for inland transportation, insurance, and other local costs incidental to delivery of the Goods to their final destination.

(iii) The price of other (incidental) services, if any, listed in the **BDS**.

(b) For Goods offered from abroad:

(i) Unless otherwise stated in the **BDS**, the price of the Goods shall be quoted DDP with the place of destination in the Philippines as specified in the **BDS**. In quoting the price, the Bidder shall be free to use transportation through carriers registered in any eligible country. Similarly, the Bidder may obtain insurance services from any eligible source country.

(ii) The price of other (incidental) services, if any, listed in the **BDS**.

15.5. Prices quoted by the Bidder shall be fixed during the Bidder's performance of the contract and not subject to variation or price escalation on any account. A bid submitted with an adjustable price quotation shall be treated as non-responsive and shall be rejected, pursuant to **ITB** Clause 24.

All bid prices shall be considered as fixed prices, and therefore not subject to price escalation during contract implementation, except under extraordinary circumstances. Extraordinary circumstances refer to events that may be determined by the National Economic and Development Authority in accordance with the Civil Code of the Philippines, and upon the recommendation of the Procuring Entity. Nevertheless, in cases where the cost of the awarded contract is affected by any applicable new laws, ordinances, regulations, or other acts of the GOP, promulgated after the date of bid opening, a contract price adjustment shall be made or appropriate relief shall be applied on a no loss-no gain basis.

16. Bid Currencies

16.1. Prices shall be quoted in the following currencies:

(a) For Goods that the Bidder will supply from within the Philippines, the prices shall be quoted in Philippine Pesos.

(b) For Goods that the Bidder will supply from outside the Philippines, the prices may be quoted in the currency(ies) stated in the **BDS**. However, for purposes of bid evaluation, bids denominated in foreign currencies shall be converted to Philippine currency based on the exchange rate as published in the BSP reference rate bulletin on the day of the bid opening.

16.2. If so allowed in accordance with **ITB** Clause 16.1, the Procuring Entity for purposes of bid evaluation and comparing the bid prices will convert the amounts in various currencies in which the bid price is expressed to Philippine Pesos at the foregoing exchange rates.

16.3. Unless otherwise specified in the BDS, payment of the contract price shall be made in Philippine Pesos.

17. Bid Validity

17.1. Bids shall remain valid for the period specified in the **BDS** which shall not exceed one hundred twenty (120) calendar days from the date of the opening of bids.

17.2. In exceptional circumstances, prior to the expiration of the Bid validity period, the Procuring Entity may request Bidders to extend the period of validity of their bids. The request and the responses shall be made in writing. The bid security described in **ITB** Clause 18 should also be extended corresponding to the extension of the bid validity period at the least. A Bidder may refuse the request without forfeiting its bid security, but his bid shall no longer be considered for further evaluation and award. A Bidder granting the request shall not be required or permitted to modify its bid.

18. Bid Security

18.1. The bid security in the amount stated in the **BDS** shall be equal to the percentage of the ABC in accordance with the following schedule:

Form of Bid Security	Amount of Bid Security (Equal to Percentage of the ABC)
(a) Cash or cashier's/manager's check issued by a Universal or Commercial Bank.	Two percent (2%)

(b) Bank draft/guarantee or irrevocable letter of credit issued by a Universal or Commercial Bank: Provided, however, that it shall be confirmed or authenticated by a Universal or Commercial Bank, if issued by a foreign bank.	
(c) Surety bond callable upon demand issued by a surety or insurance company duly certified by the Insurance Commission as authorized to issue such security.	Five percent (5%)
(d) Any combination of the foregoing.	Proportionate to share of form with respect to total amount of security

For biddings conducted by LGUs, the Bidder may also submit bid securities in the form of cashier's/manager's check, bank draft/guarantee, or irrevocable letter of credit from other banks certified by the BSP as authorized to issue such financial statement.

18.2. The bid security should be valid for the period specified in the **BDS**. Any bid not accompanied by an acceptable bid security shall be rejected by the Procuring Entity as non-responsive.

18.3. No bid securities shall be returned to bidders after the opening of bids and before contract signing, except to those that failed or declared as post-disqualified, upon submission of a written waiver of their right to file a motion for reconsideration and/or protest. Without prejudice on its forfeiture, bid securities shall be returned only after the bidder with the Lowest Calculated and Responsive Bid has signed the contract and furnished the performance security, but in no case later than the expiration of the bid security validity period indicated in **ITB** Clause 18.2.

18.4. Upon signing and execution of the contract pursuant to **ITB** Clause 32, and the posting of the performance security pursuant to **ITB** Clause 33, the successful Bidder's bid security will be discharged, but in no case later than the bid security validity period as indicated in the **ITB** Clause 18.2.

18.5. The bid security may be forfeited:

(a) if a Bidder:

(i) withdraws its bid during the period of bid validity specified in **ITB** Clause 17;

(ii) does not accept the correction of errors pursuant to **ITB** Clause 28.3(b);

(iii) fails to submit the requirements within the prescribed period or a finding against their veracity as stated in **ITB** Clause 29.2;

(iv) submission of eligibility requirements containing false information or falsified documents;

(v) submission of bids that contain false information or falsified documents, or the concealment of such information in the bids in order to influence the outcome of eligibility screening or any other stage of the public bidding;

(vi) allowing the use of one's name, or using the name of another for purposes of public bidding;

(vii) withdrawal of a bid, or refusal to accept an award, or enter into contract with the Government without justifiable cause, after the Bidder had been adjudged as having submitted the Lowest Calculated and Responsive Bid;

(viii) refusal or failure to post the required performance security within the prescribed time;

(ix) refusal to clarify or validate in writing its bid during post-qualification within a period of seven (7) calendar days from receipt of the request for clarification;

(x) any documented attempt by a bidder to unduly influence the outcome of the bidding in his favor;

(xi) failure of the potential joint venture partners to enter into the joint venture after the bid is declared successful; or

(xii) all other acts that tend to defeat the purpose of the competitive bidding, such as habitually withdrawing from bidding, submitting late Bids or patently insufficient bid, for at least three (3) times within a year, except for valid reasons.

(b) if the successful Bidder:

(i) fails to sign the contract in accordance with **ITB** Clause 32; or

(ii) fails to furnish performance security in accordance with **ITB** Clause 33.

19. Format and Signing of Bids

19.1. Bidders shall submit their bids through their duly authorized representative using the appropriate forms provided in Section VIII. Bidding Forms on or before the deadline specified in the **ITB** Clauses 21 in two (2) separate sealed bid envelopes, and which shall be submitted simultaneously. The first shall contain the technical component of the bid, including the eligibility requirements under **ITB**

Clause 12.1, and the second shall contain the financial component of the bid.

19.2. Forms as mentioned in **ITB** Clause 19.1 must be completed without any alterations to their format, and no substitute form shall be accepted. All blank spaces shall be filled in with the information requested.

19.3. The Bidder shall prepare and submit an original of the first and second envelopes as described in **ITB** Clauses 12 and 13. In the event of any discrepancy between the original and the copies, the original shall prevail.

19.4. The bid, except for unamended printed literature, shall be signed, and each and every page thereof shall be initialed, by the duly authorized representative/s of the Bidder.

19.5. Any interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the duly authorized representative/s of the Bidder.

20. Sealing and Marking of Bids

20.1. Bidders shall enclose their original eligibility and technical documents described in **ITB** Clause 12 in one sealed envelope marked "ORIGINAL - TECHNICAL COMPONENT", and the original of their financial component in another sealed envelope marked "ORIGINAL - FINANCIAL COMPONENT", sealing them all in an outer envelope marked "ORIGINAL BID".

20.2. Each copy of the first and second envelopes shall be similarly sealed duly marking the inner envelopes as "COPY NO. ___ - TECHNICAL COMPONENT" and "COPY NO. ___ – FINANCIAL COMPONENT" and the outer envelope as "COPY NO. ___", respectively. These envelopes containing the original and the copies shall then be enclosed in one single envelope.

20.3. The original and the number of copies of the Bid as indicated in the **BDS** shall be typed or written in indelible ink and shall be signed by the bidder or its duly authorized representative/s.

20.4. All envelopes shall:

(a) contain the name of the contract to be bid in capital letters;

(b) bear the name and address of the Bidder in capital letters;

(c) be addressed to the Procuring Entity's BAC in accordance with **ITB** Clause 1.1;

(d) bear the specific identification of this bidding process indicated in the **ITB** Clause 1.2; and

(e) bear a warning "DO NOT OPEN BEFORE…" the date and time for the opening of bids, in accordance with **ITB** Clause 21.

20.5. If bids are not sealed and marked as required, the Procuring Entity will assume no responsibility for the misplacement or premature opening of the bid.

D. Submission and Opening of Bids

21. Deadline for Submission of Bids

Bids must be received by the Procuring Entity's BAC at the address and on or before the date and time indicated in the **BDS**.

22. Late Bids

Any bid submitted after the deadline for submission and receipt of bids prescribed by the Procuring Entity, pursuant to **ITB** Clause 21, shall be declared "Late" and shall not be accepted by the Procuring Entity.

23. Modification and Withdrawal of Bids

23.1. The Bidder may modify its bid after it has been submitted; provided that the modification is received by the Procuring Entity prior to the deadline prescribed for submission and receipt of bids. The Bidder shall not be allowed to retrieve its original bid, but shall be allowed to submit another bid equally sealed, properly identified, linked to its original bid marked as "TECHNICAL MODIFICATION" or "FINANCIAL MODIFICATION" and stamped "received" by the BAC. Bid modifications received after the applicable deadline shall not be considered and shall be returned to the Bidder unopened.

23.2. A Bidder may, through a Letter of Withdrawal, withdraw its bid after it has been submitted, for valid and justifiable reason; provided that the Letter of Withdrawal is received by the Procuring Entity prior to the deadline prescribed for submission and receipt of bids.

23.3. Bids requested to be withdrawn in accordance with **ITB** Clause 23.1 shall be returned unopened to the Bidders. A Bidder may also express its intention not to participate in the bidding through a letter which should reach and be stamped by the BAC before the deadline for submission and receipt of bids. A Bidder that withdraws its bid shall not be permitted to submit another bid, directly or indirectly, for the same contract.

23.4. No bid may be modified after the deadline for submission of bids. No bid may be withdrawn in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Financial Bid Form. Withdrawal of a bid during this interval shall result in the forfeiture of the Bidder's bid

security, pursuant to **ITB** Clause 18.5, and the imposition of administrative, civil and criminal sanctions as prescribed by RA 9184 and its IRR.

24. Opening and Preliminary Examination of Bids

24.1. The BAC shall open the first bid envelopes of Bidders in public as specified in the **BDS** to determine each Bidder's compliance with the documents prescribed in **ITB** Clause 12. For this purpose, the BAC shall check the submitted documents of each bidder against a checklist of required documents to ascertain if they are all present, using a non-discretionary "pass/fail" criterion. If a bidder submits the required document, it shall be rated "passed" for that particular requirement. In this regard, bids that fail to include any requirement or are incomplete or patently insufficient shall be considered as "failed". Otherwise, the BAC shall rate the said first bid envelope as "passed".

24.2. Unless otherwise specified in the BDS, immediately after determining compliance with the requirements in the first envelope, the BAC shall forthwith open the second bid envelope of each remaining eligible bidder whose first bid envelope was rated "passed". The second envelope of each complying bidder shall be opened within the same day. In case one or more of the requirements in the second envelope of a particular bid is missing, incomplete or patently insufficient, and/or if the submitted total bid price exceeds the ABC unless otherwise provided in **ITB** Clause 13.2, the BAC shall rate the bid concerned as "failed". Only bids that are determined to contain all the bid requirements for both components shall be rated "passed" and shall immediately be considered for evaluation and comparison.

24.3. Letters of withdrawal shall be read out and recorded during bid opening, and the envelope containing the corresponding withdrawn bid shall be returned to the Bidder unopened. If the withdrawing Bidder's representative is in attendance, the original bid and all copies thereof shall be returned to the representative during the bid opening. If the representative is not in attendance, the bid shall be returned unopened by registered mail. The Bidder may withdraw its bid prior to the deadline for the submission and receipt of bids, provided that the corresponding Letter of Withdrawal contains a valid authorization requesting for such withdrawal, subject to appropriate administrative sanctions.

24.4. If a Bidder has previously secured a certification from the Procuring Entity to the effect that it has previously submitted the above-enumerated Class "A" Documents, the said certification may be submitted in lieu of the requirements enumerated in **ITB** Clause 12.1(a), items (i) to (v).

24.5. In the case of an eligible foreign Bidder as described in **ITB** Clause 5, the Class "A" Documents described in **ITB** Clause 12.1(a) may be

substituted with the appropriate equivalent documents, if any, issued by the country of the foreign Bidder concerned.

24.6. Each partner of a joint venture agreement shall likewise submit the requirements in **ITB** Clauses 12.1(a)(i) and 12.1(a)(ii). Submission of documents required under **ITB** Clauses 12.1(a)(iii) to 12.1(a)(v) by any of the joint venture partners constitutes compliance.

24.7. A Bidder determined as "failed" has three (3) calendar days upon written notice or, if present at the time of bid opening, upon verbal notification, within which to file a request or motion for reconsideration with the BAC: Provided, however, that the motion for reconsideration shall not be granted if it is established that the finding of failure is due to the fault of the Bidder concerned: Provided, further, that the BAC shall decide on the request for reconsideration within seven (7) calendar days from receipt thereof. If a failed Bidder signifies his intent to file a motion for reconsideration, the BAC shall keep the bid envelopes of the said failed Bidder unopened and/or duly sealed until such time that the motion for reconsideration or protest has been resolved.

24.8. The Procuring Entity shall prepare the minutes of the proceedings of the bid opening that shall include, as a minimum: (a) names of Bidders, their bid price, bid security, findings of preliminary examination; and (b) attendance sheet. The BAC members shall sign the abstract of bids as read.

E. Evaluation and Comparison of Bids

25. Process to be Confidential

25.1. Members of the BAC, including its staff and personnel, as well as its Secretariat and TWG, are prohibited from making or accepting any kind of communication with any bidder regarding the evaluation of their bids until the issuance of the Notice of Award, unless otherwise allowed in the case of **ITB** Clause 26.

25.2. Any effort by a bidder to influence the Procuring Entity in the Procuring Entity's decision in respect of bid evaluation, bid comparison or contract award will result in the rejection of the Bidder's bid.

26. Clarification of Bids

To assist in the evaluation, comparison, and post-qualification of the bids, the Procuring Entity may ask in writing any Bidder for a clarification of its bid. All responses to requests for clarification shall be in writing. Any clarification submitted by a Bidder in respect to its bid and that is not in response to a request by the Procuring Entity shall not be considered.

27. Domestic Preference

27.1. Unless otherwise stated in the **BDS**, the Procuring Entity will grant a margin of preference for the purpose of comparison of bids in accordance with the following:

(a) The preference shall be applied when (i) the lowest Foreign Bid is lower than the lowest bid offered by a Domestic Bidder, or (ii) the lowest bid offered by a non-Philippine national is lower than the lowest bid offered by a Domestic Entity.

(b) For evaluation purposes, the lowest Foreign Bid or the bid offered by a non-Philippine national shall be increased by fifteen percent (15%).

(c) In the event that (i) the lowest bid offered by a Domestic Entity does not exceed the lowest Foreign Bid as increased, or (ii) the lowest bid offered by a non-Philippine national as increased, then the Procuring Entity shall award the contract to the Domestic Bidder/Entity at the amount of the lowest Foreign Bid or the bid offered by a non-Philippine national, as the case may be.

(d) If the Domestic Entity/Bidder refuses to accept the award of contract at the amount of the Foreign Bid or bid offered by a non-Philippine national within two (2) calendar days from receipt of written advice from the BAC, the Procuring Entity shall award to the bidder offering the Foreign Bid or the non-Philippine national, as the case may be, subject to post-qualification and submission of all the documentary requirements under these Bidding Documents.

27.2. A Bidder may be granted preference as a Domestic Entity subject to the certification from the DTI (in case of sole proprietorships), SEC (in case of partnerships and corporations), or CDA (in case of cooperatives) that the (a) sole proprietor is a citizen of the Philippines or the partnership, corporation, cooperative, or association is duly organized under the laws of the Philippines with at least seventy five percent (75%) of its interest or outstanding capital stock belonging to citizens of the Philippines, (b) habitually established in business and habitually engaged in the manufacture or sale of the merchandise covered by his bid, and (c) the business has been in existence for at least five (5) consecutive years prior to the advertisement and/or posting of the Invitation to Bid for this Project.

27.3. A Bidder may be granted preference as a Domestic Bidder subject to the certification from the DTI that the Bidder is offering unmanufactured articles, materials or supplies of the growth or production of the Philippines, or manufactured articles, materials, or supplies manufactured or to be manufactured in the Philippines substantially from articles, materials, or supplies of the growth, production, or manufacture, as the case may be, of the Philippines.

28. Detailed Evaluation and Comparison of Bids

28.1. The Procuring Entity will undertake the detailed evaluation and comparison of bids which have passed the opening and preliminary examination of bids, pursuant to **ITB** Clause 24, in order to determine the Lowest Calculated Bid.

28.2. The Lowest Calculated Bid shall be determined in two steps:

(a) The detailed evaluation of the financial component of the bids, to establish the correct calculated prices of the bids; and

(b) The ranking of the total bid prices as so calculated from the lowest to the highest. The bid with the lowest price shall be identified as the Lowest Calculated Bid.

28.3. The Procuring Entity's BAC shall immediately conduct a detailed evaluation of all bids rated "passed," using non-discretionary pass/fail criteria. Unless otherwise specified in the **BDS**, the BAC shall consider the following in the evaluation of bids:

(a) Completeness of the bid. Unless the ITB specifically allows partial bids, bids not addressing or providing all of the required items in the Schedule of Requirements including, where applicable, bill of quantities, shall be considered non-responsive and, thus, automatically disqualified. In this regard, where a required item is provided, but no price is indicated, the same shall be considered as non-responsive, but specifying a "0" (zero) for the said item would mean that it is being offered for free to the Procuring Entity; and

(b) Arithmetical corrections. Consider computational errors and omissions to enable proper comparison of all eligible bids. It may also consider bid modifications, if allowed in the **BDS**. Any adjustment shall be calculated in monetary terms to determine the calculated prices.

28.4. Based on the detailed evaluation of bids, those that comply with the above-mentioned requirements shall be ranked in the ascending order of their total calculated bid prices, as evaluated and corrected for computational errors, discounts and other modifications, to identify the Lowest Calculated Bid. Total calculated bid prices, as evaluated and corrected for computational errors, discounts and other modifications, which exceed the ABC shall not be considered, unless otherwise indicated in the **BDS**.

28.5. The Procuring Entity's evaluation of bids shall only be based on the bid price quoted in the Financial Bid Form.

28.6. Bids shall be evaluated on an equal footing to ensure fair competition. For this purpose, all bidders shall be required to include in their bids the cost of all taxes, such as, but not limited to, value added tax (VAT), income tax, local taxes, and other fiscal levies and duties which shall be itemized in the bid form and reflected in the detailed estimates. Such

bids, including said taxes, shall be the basis for bid evaluation and comparison.

29. Post-Qualification

29.1. The Procuring Entity shall determine to its satisfaction whether the Bidder that is evaluated as having submitted the Lowest Calculated Bid (LCB) complies with and is responsive to all the requirements and conditions specified in **ITB** Clauses 5, 12, and 13.

29.2. Within a non-extendible period of three (3) calendar days from receipt by the bidder of the notice from the BAC that it submitted the LCB, the Bidder shall submit the following documentary requirements:

(a) Tax clearance per Executive Order 398, Series of 2005;

(b) Latest income and business tax returns in the form specified in the **BDS**;

(c) Certificate of PhilGEPS Registration; and

(d) Other appropriate licenses and permits required by law and stated in the **BDS**.

Failure of the Bidder declared as Lowest Calculated Bid to duly submit the requirements under this Clause or a finding against the veracity of such shall be ground for forfeiture of the bid security and disqualification of the Bidder for award.

29.3. The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted pursuant to **ITB** Clauses 12 and 13, as well as other information as the Procuring Entity deems necessary and appropriate, using a non-discretionary "pass/fail" criterion.

29.4. If the BAC determines that the Bidder with the Lowest Calculated Bid passes all the criteria for post-qualification, it shall declare the said bid as the Lowest Calculated Responsive Bid, and recommend to the Head of the Procuring Entity the award of contract to the said Bidder at its submitted price or its calculated bid price, whichever is lower.

29.5. A negative determination shall result in rejection of the Bidder's Bid, in which event the Procuring Entity shall proceed to the next Lowest Calculated Bid to make a similar determination of that Bidder's capabilities to perform satisfactorily. If the second Bidder, however, fails the post qualification, the procedure for post qualification shall be repeated for the Bidder with the next Lowest Calculated Bid, and so on until the Lowest Calculated Responsive Bid is determined for contract award.

29.6. Within a period not exceeding seven (7) calendar days from the date of receipt of the recommendation of the BAC, the Head of the Procuring Entity shall approve or disapprove the said recommendation. In the case of GOCCs and GFIs, the period provided herein shall be fifteen (15) calendar days.

30. Reservation Clause

30.1. Notwithstanding the eligibility or post-qualification of a Bidder, the Procuring Entity concerned reserves the right to review its qualifications at any stage of the procurement process if it has reasonable grounds to believe that a misrepresentation has been made by the said Bidder, or that there has been a change in the Bidder's capability to undertake the project from the time it submitted its eligibility requirements. Should such review uncover any misrepresentation made in the eligibility and bidding requirements, statements or documents, or any changes in the situation of the Bidder which will affect its capability to undertake the project so that it fails the preset eligibility or bid evaluation criteria, the Procuring Entity shall consider the said Bidder as ineligible and shall disqualify it from submitting a bid or from obtaining an award or contract.

30.2. Based on the following grounds, the Procuring Entity reserves the right to reject any and all bids, declare a failure of bidding at any time prior to the contract award, or not to award the contract, without thereby incurring any liability, and make no assurance that a contract shall be entered into as a result of the bidding:

(a) If there is *prima facie* evidence of collusion between appropriate public officers or employees of the Procuring Entity, or between the BAC and any of the Bidders, or if the collusion is between or among the bidders themselves, or between a Bidder and a third party, including any act which restricts, suppresses or nullifies or tends to restrict, suppress or nullify competition;

(b) If the Procuring Entity's BAC is found to have failed in following the prescribed bidding procedures; or

(c) For any justifiable and reasonable ground where the award of the contract will not redound to the benefit of the GOP as follows:

(i) If the physical and economic conditions have significantly changed so as to render the project no longer economically, financially or technically feasible as determined by the head of the procuring entity;

(ii) If the project is no longer necessary as determined by the head of the procuring entity; and

(iii) If the source of funds for the project has been withheld or reduced through no fault of the Procuring Entity.

30.3. In addition, the Procuring Entity may likewise declare a failure of bidding when:

(a) No bids are received;

(b) All prospective Bidders are declared ineligible;

(c) All bids fail to comply with all the bid requirements or fail post-qualification; or

(d) The Bidder with the Lowest Calculated Responsive Bid (LCRB) refuses, without justifiable cause to accept the award of contract, and no award is made.

F. Award of Contract

31. Contract Award

31.1. Subject to **ITB** Clause 29, the Procuring Entity shall award the contract to the Bidder whose bid has been determined to be the LCRB.

31.2. Prior to the expiration of the period of bid validity, the Procuring Entity shall notify the successful Bidder in writing that its bid has been accepted, through a Notice of Award received personally or sent by registered mail or electronically, receipt of which must be confirmed in writing within two (2) days by the Bidder with the LCRB and submitted personally or sent by registered mail or electronically to the Procuring Entity.

31.3. Notwithstanding the issuance of the Notice of Award, award of contract shall be subject to the following conditions:

(a) Submission of the valid JVA, if applicable, within ten (10) calendar days from receipt by the Bidder of the notice from the BAC that the Bidder has the LCRB;

(b) Posting of the performance security in accordance with **ITB** Clause 33;

(c) Signing of the contract as provided in **ITB** Clause 32; and

(d) Approval by higher authority, if required.

31.4. At the time of contract award, the Procuring Entity shall not increase or decrease the quantity of goods originally specified in Section VI. Schedule of Requirements.

32. Signing of the Contract

32.1. At the same time as the Procuring Entity notifies the successful Bidder that its bid has been accepted, the Procuring Entity shall send the Contract Form to the Bidder, which contract has been provided in the

Bidding Documents, incorporating therein all agreements between the parties.

32.2. Within ten (10) calendar days from receipt of the Notice of Award, the successful Bidder shall post the required performance security and sign and date the contract and return it to the Procuring Entity.

32.3. The Procuring Entity shall enter into contract with the successful Bidder within the same ten (10) calendar day period provided that all the documentary requirements are complied with.

32.4. The following documents shall form part of the contract:

(a) Contract Agreement;

(b) Bidding Documents;

(c) Winning bidder's bid, including the Technical and Financial Proposals, and all other documents/statements submitted;

(d) Performance Security;

(e) Credit line in accordance with **ITB** Clause 5.5, if applicable;

(f) Notice of Award of Contract; and

(g) Other contract documents that may be required by existing laws and/or specified in the **BDS**.

33. Performance Security

33.1. To guarantee the faithful performance by the winning Bidder of its obligations under the contract, it shall post a performance security within a maximum period of ten (10) calendar days from the receipt of the Notice of Award from the Procuring Entity and in no case later than the signing of the contract.

33.2. The performance security shall be denominated in Philippine Pesos and posted in favor of the Procuring Entity in an amount equal to the percentage of the total contract price in accordance with the following schedule:

Form of Performance Security	Amount of Performance Security (Equal to Percentage of the Total Contract Price)
(a) Cash or cashier's/manager's check issued by a Universal or Commercial Bank.	Five percent (5%)

(b) Bank draft/guarantee or irrevocable letter of credit issued by a Universal or Commercial Bank: Provided, however, that it shall be confirmed or authenticated by a Universal or Commercial Bank, if issued by a foreign bank.	
(c) Surety bond callable upon demand issued by a surety or insurance company duly certified by the Insurance Commission as authorized to issue such security; and/or	Thirty percent (30%)
(d) Any combination of the foregoing.	Proportionate to share of form with respect to total amount of security

33.3. Failure of the successful Bidder to comply with the above-mentioned requirement shall constitute sufficient ground for the annulment of the award and forfeiture of the bid security, in which event the Procuring Entity shall initiate and complete the post qualification of the second Lowest Calculated Bid. The procedure shall be repeated until the LCRB is identified and selected for contract award. However if no Bidder passed post-qualification, the BAC shall declare the bidding a failure and conduct a re-bidding with re-advertisement.

34. Notice to Proceed

34.1. Within three (3) calendar days from the date of approval of the contract by the appropriate government approving authority, the Procuring Entity shall issue its Notice to Proceed to the Bidder.

34.2. The contract effectivity date shall be provided in the Notice to Proceed by the Procuring Entity, which date shall not be later than seven (7) calendar days from the issuance of the Notice to Proceed.

Section III. Bid Data Sheet

ITB Clause	
1.1	The PROCURING ENTITY is the Department of Transportation and Communications (DOTC). The name of the Project is "Design and/or Supply and Delivery of Forty-Eight (48) Light Rail Vehicles (LRVs) with On-board Communication System (Radio, Public Address, Intercom), On-board ATP System and One (1) Unit Train Simulator"
2	The Funding Source is: The Government of the Philippines (GOP) through the General Appropriations Act in the amount of Three Billion Seven Hundred Sixty Nine Million Three Hundred Eighty Two Thousand Four Hundred Pesos (Php3,769,382,400.00).
3.1	No further instructions.
5.2	Bidding is restricted to eligible bidders as defined in ITB Clause 5.2
5.4	The Bidder must have completed, within ten (10) years from the submission of bids, a single contract that is similar to this Project, equivalent to at least fifty percent (50%) of the Approved Budget for the Contract (ABC). For this purpose, similar contracts shall refer to any contract involving the manufacture and/or supply and delivery of LRVs.
7	No further instructions.
8.1	Subcontracting is not allowed
8.2	Not applicable
9.1	The Procuring Entity will hold a pre-bid conference for this Project on *07 March 2013, 8:00 A.M.* at Unit 167, 16th Flr., The Columbia Tower, Brgy. Wack wack, Ortigas Ave., Mandaluyong City.
10.1	The Procuring Entity's address is: *Department of Transportation and Communications* *Usec. Jose Perpetuo M. Lotilla* *Chairman* *Bids and Awards Committee* *Unit 165 16th Floor, The Columbia Tower, Brgy. Wack-Wack, Ortigas Avenue, 1555 Mandaluyong City* *Fax No. (+632) 723-5004* *Website: www.dotc.gov.ph*
12	The first envelope shall contain the eligibility and technical documents stated in the **ITB** Clause. However, if the Bidder maintains a current and updated file of its Class "A" Documents with the Procuring Entity, a certification to that effect issued by its BAC may be submitted in lieu of the Class "A" Documents.
12.1(a)&(b)	No other acceptable proof of registration is recognized.
12(a)(iii)	No further instructions.
12(a)(iv)	No further instructions.
13.1	No additional requirements
13.1 (b)	No further instructions.
13.2	The ABC is Php 3,769,382,400.00. Any bid with a financial component

	exceeding this amount shall not be accepted.
15.4 (a)(iii)	No incidental services are required.
16.1 (b)	The bid prices shall be quoted in Philippine Pesos.
16.3	Not applicable
17.1	Bids will be valid until *One Hundred Twenty (120) calendar days from Bid Opening*.
18.1	The bid security shall be in the following amount: 1. *2% of ABC, or Seventy Five Million Three Hundred Eighty Seven Thousand Six Hundred Forty Eight (Php75,387,648.00)* if bid security is in cash, cashier's/manager's check, bank draft/guarantee or irrevocable letter of credit; 2. *5% of ABC, or One Hundred Eighty Eight Million Four Hundred Sixty Nine Thousand One Hundred Twenty (Php188,469,120.00)* if bid security is in Surety Bond; 3. Any combination of the foregoing proportionate to the share of form with respect to total amount of security; or 4. Bid Securing Declaration (GPPB Resolution No. 03.2012)
18.2	The bid security shall be valid until *120 days from date of opening of bids.*
20.3	Each Bidder shall submit One (1) original and two (2) copies of the first and second components of its bid.
21	The address for submission of bids is Unit 165, 16th Flr., Columbia Tower, Brgy. Wack-Wack, Ortigas Ave. 1555 Mandaluyong City, Philippines. The deadline for submission of bids is *22 March 2013, 9:00 A.M.*
24.1	The place of bid opening is Unit 165, 16th Flr., Columbia Tower, Brgy. Wack-Wack, Ortigas Ave. 1555 Mandaluyong City, Philippines. The date and time of bid opening is *22 March 2013, 9:00 A.M.*
24.2	No further instructions.
27.1	No further instructions.
28.3	No further instructions.
28.3 (b)	Bid Modification is not allowed.
29.2 (b)	*Bidders have the option to submit manually filed tax returns or tax returns filed through the Electronic Filling and Payments System (EFPS).* *NOTE: The latest income and business tax returns are those within the last six (6) months preceding the date of bid submission.*
29.2 (d)	No further instructions.
32.4 (g)	*The following documents should be submitted:* 1. *Bidder's Technical Information;* 2. *Outline Quality Plan;* 3. *Outline System Safety Assurance Plan and Outline Site Safety Plan;*

	4. *Outline Environmental Plan;* 5. *Outline Project Management Plan, Project Implementation, Program (Works Program), Design Submission Program, Proposals for use of Site (Land) and Site Management Plan;* 6. *Structure of the Bidder and Providers of Guarantees and Warranties;* 7. *Information on Eligibility Criteria and Post Qualification;* 8. *Pricing Document (included in Financial Proposal only); and* 9. *Bid Index*
34.2	The effective date of the Contract is *Seven (7) days from receipt by the winning bidder of the Notice to Proceed (NTP) or the date provided in the NTP*.

Section IV. General Conditions of Contract

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1. Definitions

1.1. In this Contract, the following terms shall be interpreted as indicated:

(a) "The Contract" means the agreement entered into between the Procuring Entity and the Supplier, as recorded in the Contract Form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.

(b) "The Contract Price" means the price payable to the Supplier under the Contract for the full and proper performance of its contractual obligations.

(c) "The Goods" means all of the supplies, equipment, machinery, spare parts, other materials and/or general support services which the Supplier is required to provide to the Procuring Entity under the Contract.

(d) "The Services" means those services ancillary to the supply of the Goods, such as transportation and insurance, and any other incidental services, such as installation, commissioning, provision of technical assistance, training, and other such obligations of the Supplier covered under the Contract.

(e) "GCC" means the General Conditions of Contract contained in this Section.

(f) "SCC" means the Special Conditions of Contract.

(g) "The Procuring Entity" means the organization purchasing the Goods, as named in the **SCC**.

(h) "The Procuring Entity's country" is the Philippines.

(i) "The Supplier" means the individual Supplier, manufacturer distributor, or firm supplying/manufacturing the Goods and Services under this Contract and named in the **SCC**.

(j) The "Funding Source" means the organization named in the **SCC**.

(k) "The Project Site," where applicable, means the place or places named in the **SCC**.

(l) "Day" means calendar day.

(m) The "Effective Date" of the contract will be the date of receipt by the Supplier of the Notice to Proceed or the date provided in the Notice to Proceed. Performance of all obligations shall be reckoned from the Effective Date of the Contract.

(n) "Verified Report" refers to the report submitted by the Implementing Unit to the Head of the Procuring Entity setting forth its findings as to the existence of grounds or causes for termination and explicitly stating its recommendation for the issuance of a Notice to Terminate.

2. Corrupt, Fraudulent, Collusive, and Coercive Practices

2.1. Unless otherwise provided in the **SCC**, the Procuring Entity as well as the bidders, Suppliers, or suppliers shall observe the highest standard of ethics during the procurement and execution of this Contract. In pursuance of this policy, the Procuring Entity:

(a) defines, for the purposes of this provision, the terms set forth below as follows:

(i) "corrupt practice" means behavior on the part of officials in the public or private sectors by which they improperly and unlawfully enrich themselves, others, or induce others to do so, by misusing the position in which they are placed, and it includes the offering, giving, receiving, or soliciting of anything of value to influence the action of any such official in the procurement process or in contract execution; entering, on behalf of the Government, into any contract or transaction manifestly and grossly disadvantageous to the same, whether or not the public officer profited or will profit thereby, and similar acts as provided in Republic Act 3019.

(ii) "fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Procuring Entity, and includes collusive practices among Bidders (prior to or after bid submission) designed to establish bid prices at artificial, non-competitive levels and to deprive the Procuring Entity of the benefits of free and open competition.

(iii) "collusive practices" means a scheme or arrangement between two or more Bidders, with or without the knowledge of the Procuring Entity, designed to establish bid prices at artificial, non-competitive levels.

(iv) "coercive practices" means harming or threatening to harm, directly or indirectly, persons, or their property to influence their participation in a procurement process, or affect the execution of a contract;

(v) "obstructive practice" is

(aa) deliberately destroying, falsifying, altering or concealing of evidence material to an administrative proceedings or investigation or making false statements to investigators in order to materially impede an

administrative proceedings or investigation of the Procuring Entity or any foreign government/foreign or international financing institution into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the administrative proceedings or investigation or from pursuing such proceedings or investigation; or

(bb) acts intended to materially impede the exercise of the inspection and audit rights of the Procuring Entity or any foreign government/foreign or international financing institution herein.

(b) will reject a proposal for award if it determines that the Bidder recommended for award has engaged in any of the practices mentioned in this Clause for purposes of competing for the contract.

2.2. Further the Funding Source, Borrower or Procuring Entity, as appropriate, will seek to impose the maximum civil, administrative and/or criminal penalties available under the applicable law on individuals and organizations deemed to be involved with any of the practices mentioned in **GCC** Clause 2.1(a).

3. Inspection and Audit by the Funding Source

The Supplier shall permit the Funding Source to inspect the Supplier's accounts and records relating to the performance of the Supplier and to have them audited by auditors appointed by the Funding Source, if so required by the Funding Source.

4. Governing Law and Language

4.1. This Contract shall be interpreted in accordance with the laws of the Republic of the Philippines.

4.2. This Contract has been executed in the English language, which shall be the binding and controlling language for all matters relating to the meaning or interpretation of this Contract. All correspondence and other documents pertaining to this Contract exchanged by the parties shall be written in English.

5. Notices

5.1. Any notice, request, or consent required or permitted to be given or made pursuant to this Contract shall be in writing. Any such notice, request, or consent shall be deemed to have been given or made when received by the concerned party, either in person or through an authorized representative of the Party to whom the communication is addressed, or when sent by registered mail, telex, telegram, or facsimile

to such Party at the address specified in the **SCC**, which shall be effective when delivered and duly received or on the notice's effective date, whichever is later.

5.2. A Party may change its address for notice hereunder by giving the other Party notice of such change pursuant to the provisions listed in the **SCC** for **GCC** Clause 5.1.

6. Scope of Contract

6.1. The GOODS and Related Services to be provided shall be as specified in Section VI. Schedule of Requirements.

6.2. This Contract shall include all such items, although not specifically mentioned, that can be reasonably inferred as being required for its completion as if such items were expressly mentioned herein. Any additional requirements for the completion of this Contract shall be provided in the **SCC**.

7. Subcontracting

7.1. Subcontracting of any portion of the Goods, if allowed in the **BDS**, does not relieve the Supplier of any liability or obligation under this Contract. The Supplier will be responsible for the acts, defaults, and negligence of any subSupplier, its agents, servants or workmen as fully as if these were the Supplier's own acts, defaults, or negligence, or those of its agents, servants or workmen.

7.2. SubSuppliers disclosed and identified during the bidding may be changed during the implementation of this Contract, subject to compliance with the required qualifications and the approval of the Procuring Entity.

8. Procuring Entity's Responsibilities

8.1. Whenever the performance of the obligations in this Contract requires that the Supplier obtain permits, approvals, import, and other licenses from local public authorities, the Procuring Entity shall, if so needed by the Supplier, make its best effort to assist the Supplier in complying with such requirements in a timely and expeditious manner.

8.2. The Procuring Entity shall pay all costs involved in the performance of its responsibilities in accordance with **GCC** Clause 6.

9. Prices

9.1. For the given scope of work in this Contract as awarded, all bid prices are considered fixed prices, and therefore not subject to price escalation during contract implementation, except under extraordinary circumstances and upon prior approval of the GPPB in accordance with

Section 61 of R.A. 9184 and its IRR or except as provided in this Clause.

9.2. Prices charged by the Supplier for Goods delivered and/or services performed under this Contract shall not vary from the prices quoted by the Supplier in its bid, with the exception of any change in price resulting from a Change Order issued in accordance with **GCC** Clause 29.

10. Payment

10.1. Payments shall be made only upon a certification by the Head of the Procuring Entity to the effect that the Goods have been rendered or delivered in accordance with the terms of this Contract and have been duly inspected and accepted**.** Except with the prior approval of the President no payment shall be made for services not yet rendered or for supplies and materials not yet delivered under this Contract. Ten percent (10%) of the amount of each payment shall be retained by the Procuring Entity to cover the Supplier's warranty obligations under this Contract as described in **GCC** Clause 17.

10.2. The Supplier's request(s) for payment shall be made to the Procuring Entity in writing, accompanied by an invoice describing, as appropriate, the Goods delivered and/or Services performed, and by documents submitted pursuant to the **SCC** provision for **GCC** Clause 6.2, and upon fulfillment of other obligations stipulated in this Contract.

10.3. Pursuant to **GCC** Clause 10.2, payments shall be made promptly by the Procuring Entity, but in no case later than sixty (60) days after submission of an invoice or claim by the Supplier.

10.4. Unless otherwise provided in the SCC, the currency in which payment is made to the Supplier under this Contract shall be in Philippine Pesos.

11. Advance Payment and Terms of Payment

11.1. Advance payment shall be made only after prior approval of the President, and shall not exceed fifteen percent (15%) of the Contract amount, unless otherwise directed by the President or in cases allowed under Annex "D" of RA 9184.

11.2. For Goods supplied from abroad, the terms of payment shall be as follows:

(a) On Contract Signature: Ten percent (10%) of the Contract Price shall be paid within sixty (60) days from signing of the Contract and upon submission of a claim and a bank guarantee for the equivalent amount valid until the Goods are delivered and in the form provided in Section VIII. Bidding Forms.

(b) On Delivery: Seventy percent (70%) of the Contract Price shall be paid to the Supplier within sixty (60) days after the date of receipt of the

Goods and upon submission of the documents (i) through (vi) specified in the SCC provision on Delivery and Documents.

(c) On Acceptance: The remaining twenty percent (20%) of the Contract Price shall be paid to the Supplier within sixty (60) days after the date of submission of the acceptance and inspection certificate for the respective delivery issued by the Procuring Entity's authorized representative. In the event that no inspection or acceptance certificate is issued by the Procuring Entity's authorized representative within forty five (45) days of the date shown on the delivery receipt the Supplier shall have the right to claim payment of the remaining twenty percent (20%) subject to the Procuring Entity's own verification of the reason(s) for the failure to issue documents (vii) and (viii) as described in the SCC provision on Delivery and Documents.

11.3. All progress payments shall first be charged against the advance payment until the latter has been fully exhausted.

12. Taxes and Duties

The Supplier, whether local or foreign, shall be entirely responsible for all the necessary taxes, stamp duties, license fees, and other such levies imposed for the completion of this Contract.

13. Performance Security

13.1. Within ten (10) calendar days from receipt of the Notice of Award from the Procuring Entity but in no case later than the signing of the contract by both parties, the successful Bidder shall furnish the performance security in any the forms prescribed in the **ITB** Clause 33.2.

13.2. The performance security posted in favor of the Procuring Entity shall be forfeited in the event it is established that the winning bidder is in default in any of its obligations under the contract.

13.3. The performance security shall remain valid until issuance by the Procuring Entity of the Certificate of Final Acceptance.

13.4. The performance security may be released by the Procuring Entity and returned to the Supplier after the issuance of the Certificate of Final Acceptance subject to the following conditions:

(a) There are no pending claims against the Supplier or the surety company filed by the Procuring Entity;

(b) The Supplier has no pending claims for labor and materials filed against it; and

(c) Other terms specified in the **SCC**.

13.5. In case of a reduction of the contract value, the Procuring Entity shall allow a proportional reduction in the original performance security, provided that any such reduction is more than ten percent (10%) and that the aggregate of such reductions is not more than fifty percent (50%) of the original performance security.

14. Use of Contract Documents and Information

14.1. The Supplier shall not, except for purposes of performing the obligations in this Contract, without the Procuring Entity's prior written consent, disclose this Contract, or any provision thereof, or any specification, plan, drawing, pattern, sample, or information furnished by or on behalf of the Procuring Entity. Any such disclosure shall be made in confidence and shall extend only as far as may be necessary for purposes of such performance.

14.2. Any document, other than this Contract itself, enumerated in **GCC** Clause 14.1 shall remain the property of the Procuring Entity and shall be returned (all copies) to the Procuring Entity on completion of the Supplier's performance under this Contract if so required by the Procuring Entity.

15. Standards

The Goods provided under this Contract shall conform to the standards mentioned in the Section VII. Technical Specifications; and, when no applicable standard is mentioned, to the authoritative standards appropriate to the Goods' country of origin. Such standards shall be the latest issued by the institution concerned.

16. Inspection and Tests

16.1. The Procuring Entity or its representative shall have the right to inspect and/or to test the Goods to confirm their conformity to the Contract specifications at no extra cost to the Procuring Entity. The **SCC** and Section VII. Technical Specifications shall specify what inspections and/or tests the Procuring Entity requires and where they are to be conducted. The Procuring Entity shall notify the Supplier in writing, in a timely manner, of the identity of any representatives retained for these purposes.

16.2. If applicable, the inspections and tests may be conducted on the premises of the Supplier or its subSupplier(s), at point of delivery, and/or at the goods' final destination. If conducted on the premises of the Supplier or its subSupplier(s), all reasonable facilities and assistance, including access to drawings and production data, shall be furnished to the inspectors at no charge to the Procuring Entity. The Supplier shall provide the Procuring Entity with results of such inspections and tests.

16.3. The Procuring Entity or its designated representative shall be entitled to attend the tests and/or inspections referred to in this Clause provided

that the Procuring Entity shall bear all of its own costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.

16.4. The Procuring Entity may reject any Goods or any part thereof that fail to pass any test and/or inspection or do not conform to the specifications. The Supplier shall either rectify or replace such rejected Goods or parts thereof or make alterations necessary to meet the specifications at no cost to the Procuring Entity, and shall repeat the test and/or inspection, at no cost to the Procuring Entity, upon giving a notice pursuant to **GCC** Clause 5.

16.5. The Supplier agrees that neither the execution of a test and/or inspection of the Goods or any part thereof, nor the attendance by the Procuring Entity or its representative, shall release the Supplier from any warranties or other obligations under this Contract.

17. Warranty

17.1. The Supplier warrants that the Goods supplied under the Contract are new, unused, of the most recent or current models, and that they incorporate all recent improvements in design and materials, except when the technical specifications required by the Procuring Entity provides otherwise.

17.2. The Supplier further warrants that all Goods supplied under this Contract shall have no defect, arising from design, materials, or workmanship or from any act or omission of the Supplier that may develop under normal use of the supplied Goods in the conditions prevailing in the country of final destination.

17.3. In order to assure that manufacturing defects shall be corrected by the Supplier, a warranty shall be required from the Supplier for a minimum period specified in the **SCC**. The obligation for the warranty shall be covered by, at the Supplier's option, either retention money in an amount equivalent to at least ten percent (10%) of the final payment, or a special bank guarantee equivalent to at least ten percent (10%) of the Contract Price or other such amount if so specified in the **SCC**. The said amounts shall only be released after the lapse of the warranty period specified in the **SCC**; provided, however, that the Supplies delivered are free from patent and latent defects and all the conditions imposed under this Contract have been fully met.

17.4. The Procuring Entity shall promptly notify the Supplier in writing of any claims arising under this warranty. Upon receipt of such notice, the Supplier shall, within the period specified in the **SCC** and with all reasonable speed, repair or replace the defective Goods or parts thereof, without cost to the Procuring Entity.

17.5. If the Supplier, having been notified, fails to remedy the defect(s) within the period specified in **GCC** Clause 17.4, the Procuring Entity

may proceed to take such remedial action as may be necessary, at the Supplier's risk and expense and without prejudice to any other rights which the Procuring Entity may have against the Supplier under the Contract and under the applicable law.

18. Delays in the Supplier's Performance

18.1. Delivery of the Goods and/or performance of Services shall be made by the Supplier in accordance with the time schedule prescribed by the Procuring Entity in Section VI. Schedule of Requirements.

18.2. If at any time during the performance of this Contract, the Supplier or its SubSupplier(s) should encounter conditions impeding timely delivery of the Goods and/or performance of Services, the Supplier shall promptly notify the Procuring Entity in writing of the fact of the delay, its likely duration and its cause(s). As soon as practicable after receipt of the Supplier's notice, and upon causes provided for under **GCC** Clause 22, the Procuring Entity shall evaluate the situation and may extend the Supplier's time for performance, in which case the extension shall be ratified by the parties by amendment of Contract.

18.3. Except as provided under **GCC** Clause 22, a delay by the Supplier in the performance of its obligations shall render the Supplier liable to the imposition of liquidated damages pursuant to **GCC** Clause 19, unless an extension of time is agreed upon pursuant to **GCC** Clause 29 without the application of liquidated damages.

19. Liquidated Damages

Subject to **GCC** Clauses 18 and 22, if the Supplier fails to satisfactorily deliver any or all of the Goods and/or to perform the Services within the period(s) specified in this Contract inclusive of duly granted time extensions if any, the Procuring Entity shall, without prejudice to its other remedies under this Contract and under the applicable law, deduct from the Contract Price, as liquidated damages, the applicable rate of one tenth (1/10) of one (1) percent of the cost of the unperformed portion for every day of delay until actual delivery or performance. The maximum deduction shall be ten percent (10%) of the amount of contract. Once the maximum is reached, the Procuring Entity shall rescind the Contract pursuant to **GCC** Clause 23, without prejudice to other courses of action and remedies open to it.

20. Settlement of Disputes

20.1. If any dispute or difference of any kind whatsoever shall arise between the Procuring Entity and the Supplier in connection with or arising out of this Contract, the parties shall make every effort to resolve amicably such dispute or difference by mutual consultation.

20.2. If after thirty (30) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Procuring Entity or the Supplier may give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in

dispute, and no arbitration in respect of this matter may be commenced unless such notice is given.

20.3. Any dispute or difference in respect of which a notice of intention to commence arbitration has been given in accordance with this Clause shall be settled by arbitration. Arbitration may be commenced prior to or after delivery of the Goods under this Contract.

20.4. In the case of a dispute between the Procuring Entity and the Supplier, the dispute shall be resolved in accordance with Republic Act 9285 ("R.A. 9285"), otherwise known as the "Alternative Dispute Resolution Act of 2004."

20.5. Notwithstanding any reference to arbitration herein, the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree; and the Procuring Entity shall pay the Supplier any monies due the Supplier.

21. Liability of the Supplier

21.1. The Supplier's liability under this Contract shall be as provided by the laws of the Republic of the Philippines, subject to additional provisions, if any, set forth in the **SCC**.

21.2. Except in cases of criminal negligence or willful misconduct, and in the case of infringement of patent rights, if applicable, the aggregate liability of the Supplier to the Procuring Entity shall not exceed the total Contract Price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment.

22. Force Majeure

22.1. The Supplier shall not be liable for forfeiture of its performance security, liquidated damages, or termination for default if and to the extent that the Supplier's delay in performance or other failure to perform its obligations under the Contract is the result of a *force majeure*.

22.2. For purposes of this Contract the terms "*force majeure*" and "fortuitous event" may be used interchangeably. In this regard, a fortuitous event or *force majeure* shall be interpreted to mean an event which the Supplier could not have foreseen, or which though foreseen, was inevitable. It shall not include ordinary unfavorable weather conditions; and any other cause the effects of which could have been avoided with the exercise of reasonable diligence by the Supplier. Such events may include, but not limited to, acts of the Procuring Entity in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions, and freight embargoes.

22.3. If a *force majeure* situation arises, the Supplier shall promptly notify the Procuring Entity in writing of such condition and the cause thereof.

Unless otherwise directed by the Procuring Entity in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the *force majeure*.

23. Termination for Default

23.1. The Procuring Entity shall terminate this Contract for default when any of the following conditions attends its implementation:

(a) Outside of *force majeure*, the Supplier fails to deliver or perform any or all of the Goods within the period(s) specified in the contract, or within any extension thereof granted by the Procuring Entity pursuant to a request made by the Supplier prior to the delay, and such failure amounts to at least ten percent (10%) of the contact price;

(b) As a result of *force majeure*, the Supplier is unable to deliver or perform any or all of the Goods, amounting to at least ten percent (10%) of the contract price, for a period of not less than sixty (60) calendar days after receipt of the notice from the Procuring Entity stating that the circumstance of force majeure is deemed to have ceased; or

(c) The Supplier fails to perform any other obligation under the Contract.

23.2. In the event the Procuring Entity terminates this Contract in whole or in part, for any of the reasons provided under **GCC** Clauses 23 to 26, the Procuring Entity may procure, upon such terms and in such manner as it deems appropriate, Goods or Services similar to those undelivered, and the Supplier shall be liable to the Procuring Entity for any excess costs for such similar Goods or Services. However, the Supplier shall continue performance of this Contract to the extent not terminated.

23.3. In case the delay in the delivery of the Goods and/or performance of the Services exceeds a time duration equivalent to ten percent (10%) of the specified contract time plus any time extension duly granted to the Supplier, the Procuring Entity may terminate this Contract, forfeit the Supplier's performance security and award the same to a qualified Supplier.

24. Termination for Insolvency

The Procuring Entity shall terminate this Contract if the Supplier is declared bankrupt or insolvent as determined with finality by a court of competent jurisdiction. In this event, termination will be without compensation to the Supplier, provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the Procuring Entity and/or the Supplier.

25. Termination for Convenience

25.1. The Procuring Entity may terminate this Contract, in whole or in part, at any time for its convenience. The Head of the Procuring Entity may terminate a contract for the convenience of the Government if he has determined the existence of conditions that make Project Implementation economically, financially or technically impractical and/or unnecessary, such as, but not limited to, fortuitous event(s) or changes in law and national government policies.

25.2. The Goods that have been delivered and/or performed or are ready for delivery or performance within thirty (30) calendar days after the Supplier's receipt of Notice to Terminate shall be accepted by the Procuring Entity at the contract terms and prices. For Goods not yet performed and/or ready for delivery, the Procuring Entity may elect:

(a) to have any portion delivered and/or performed and paid at the contract terms and prices; and/or

(b) to cancel the remainder and pay to the Supplier an agreed amount for partially completed and/or performed goods and for materials and parts previously procured by the Supplier.

25.3. If the Supplier suffers loss in its initial performance of the terminated contract, such as purchase of raw materials for goods specially manufactured for the Procuring Entity which cannot be sold in open market, it shall be allowed to recover partially from this Contract, on a *quantum meruit* basis. Before recovery may be made, the fact of loss must be established under oath by the Supplier to the satisfaction of the Procuring Entity before recovery may be made.

26. Termination for Unlawful Acts

26.1. The Procuring Entity may terminate this Contract in case it is determined *prima facie* that the Supplier has engaged, before or during the implementation of this Contract, in unlawful deeds and behaviors relative to contract acquisition and implementation. Unlawful acts include, but are not limited to, the following:

(a) Corrupt, fraudulent, and coercive practices as defined in **ITB** Clause 3.1(a);

(b) Drawing up or using forged documents;

(c) Using adulterated materials, means or methods, or engaging in production contrary to rules of science or the trade; and

(d) Any other act analogous to the foregoing.

27. Procedures for Termination of Contracts

27.1. The following provisions shall govern the procedures for termination of this Contract:

(a) Upon receipt of a written report of acts or causes which may constitute ground(s) for termination as aforementioned, or upon its own initiative, the Implementing Unit shall, within a period of seven (7) calendar days, verify the existence of such ground(s) and cause the execution of a Verified Report, with all relevant evidence attached;

(b) Upon recommendation by the Implementing Unit, the Head of the Procuring Entity shall terminate this Contract only by a written notice to the Supplier conveying the termination of this Contract. The notice shall state:

(i) that this Contract is being terminated for any of the ground(s) afore-mentioned, and a statement of the acts that constitute the ground(s) constituting the same;

(ii) the extent of termination, whether in whole or in part;

(iii) an instruction to the Supplier to show cause as to why this Contract should not be terminated; and

(iv) special instructions of the Procuring Entity, if any.

(c) The Notice to Terminate shall be accompanied by a copy of the Verified Report;

(d) Within a period of seven (7) calendar days from receipt of the Notice of Termination, the Supplier shall submit to the Head of the Procuring Entity a verified position paper stating why this Contract should not be terminated. If the Supplier fails to show cause after the lapse of the seven (7) day period, either by inaction or by default, the Head of the Procuring Entity shall issue an order terminating this Contract;

(e) The Procuring Entity may, at any time before receipt of the Supplier's verified position paper described in item (d) above withdraw the Notice to Terminate if it is determined that certain items or works subject of the notice had been completed, delivered, or performed before the Supplier's receipt of the notice;

(f) Within a non-extendible period of ten (10) calendar days from receipt of the verified position paper, the Head of the Procuring Entity shall decide whether or not to terminate this Contract. It shall serve a written notice to the Supplier of its decision and, unless otherwise provided, this Contract is deemed terminated from receipt of the Supplier of the notice of decision. The termination shall only be based on the ground(s) stated in the Notice to Terminate;

(g) The Head of the Procuring Entity may create a Contract Termination Review Committee (CTRC) to assist him in the discharge of this function. All decisions recommended by the CTRC shall be subject to the approval of the Head of the Procuring Entity; and

(h) The Supplier must serve a written notice to the Procuring Entity of its intention to terminate the contract at least thirty (30) calendar days before its intended termination. The Contract is deemed terminated if it is not resumed in thirty (30) calendar days after the receipt of such notice by the Procuring Entity.

28. Assignment of Rights

The Supplier shall not assign his rights or obligations under this Contract, in whole or in part, except with the Procuring Entity's prior written consent.

29. Contract Amendment

Subject to applicable laws, no variation in or modification of the terms of this Contract shall be made except by written amendment signed by the parties.

30. Application

These General Conditions shall apply to the extent that they are not superseded by provisions of other parts of this Contract.

Section V. Special Conditions of Contract

Special Conditions of Contract

SCC Clause	
1.1(g)	The Procuring Entity is *the Department of Transportation and Communications with address at 16th Floor, The Columbia Tower, Brgy. Wack-Wack, Ortigas Ave. 1555 Mandaluyong City, Philippines*.
1.1(i)	The Supplier is *[to be inserted at the time of contract award]*.
1.1(j)	The Funding Source is the Government of the Philippines (GOP) through the General Appropriations Act in the amount of Three Billion Seven Hundred Sixty Nine Million Three Hundred Eighty Two Thousand Four hundred Pesos (Php3,769,382,400.00).
1.1(k)	The Project Site is *MRT3 Depot North Avenue corner EDSA Quezon City*.
5.1	The Procuring Entity's address for Notices is: *Department of Transportation and Communications* *Usec. Rene K. Limcaoco* *Chairman* *Bids and Awards Committee* *Unit 165 16th Floor, The Columbia Tower, Brgy. Wack-Wack, Ortigas Avenue, 1555 Mandaluyong City* *Fax No. (+632) 723-5004*
6.2	**Delivery and Documents –** For purposes of the Contract, "EXW," "FOB," "FCA," "CIF," "CIP," "DDP" and other trade terms used to describe the obligations of the parties shall have the meanings assigned to them by the current edition of INCOTERMS published by the International Chamber of Commerce, Paris. The Delivery terms of this Contract shall be as follows: *For Goods Supplied from Abroad, state "*The delivery terms applicable to the Contract are DDP delivered *[insert place of destination]*. In accordance with INCOTERMS." *For Goods Supplied from Within the Philippines, state "*The delivery terms applicable to this Contract are delivered *[insert place of destination]*. Risk and title will pass from the Supplier to the Procuring Entity upon receipt and final acceptance of the Goods at their final destination." Delivery of the Goods shall be made by the Supplier in accordance with the terms specified in Section VI. Schedule of Requirements. The details of shipping and/or other documents to be furnished by the Supplier are as follows:

	For Goods supplied from within the Philippines: Upon delivery of the Goods to the Project Site, the Supplier shall notify the Procuring Entity and present the following documents to the Procuring Entity: (i) Original and four copies of the Supplier's invoice showing Goods' description, quantity, unit price, and total amount; (ii) Original and four copies delivery receipt/note, railway receipt, or truck receipt; (iii) Original Supplier's factory inspection report; (iv) Original and four copies of the Manufacturer's and/or Supplier's warranty certificate; (v) Original and four copies of the certificate of origin (for imported Goods); (vi) Delivery receipt detailing number and description of items received signed by the authorized receiving personnel; (vii) Certificate of Acceptance/Inspection Report signed by the Procuring Entity's representative at the Project Site; and (viii) Four copies of the Invoice Receipt for Property signed by the Procuring Entity's representative at the Project Site. *For Goods supplied from abroad:* Upon shipment, the Supplier shall notify the Procuring Entity and the insurance company by cable the full details of the shipment, including Contract Number, description of the Goods, quantity, vessel, bill of lading number and date, port of loading, date of shipment, port of discharge etc. Upon delivery to the Project Site, the Supplier shall notify the Procuring Entity and present the following documents as applicable with the documentary requirements of any letter of credit issued taking precedence: (i) Original and four copies of the Supplier's invoice showing Goods' description, quantity, unit price, and total amount; (ii) Original and four copies of the negotiable, clean shipped on board bill of lading marked "freight pre-paid" and five copies of the non-negotiable bill of lading ; (iii) Original Supplier's factory inspection report; (iv) Original and four copies of the Manufacturer's and/or Supplier's warranty certificate; (v) Original and four copies of the certificate of origin (for imported Goods); (vi) Delivery receipt detailing number and description of items

	received signed by the Procuring Entity's representative at the Project Site; (vii) Certificate of Acceptance/Inspection Report signed by the Procuring Entity's representative at the Project Site; and (viii) Four copies of the Invoice Receipt for Property signed by the Procuring Entity's representative at the Project Site. For purposes of this Clause the Procuring Entity's Representative at the Project Site is *[insert name(s)]*. **Incidental Services –** The Supplier is required to provide all of the following services, including additional services, if any, specified in Section VI. Schedule of Requirements: *Select appropriate requirements and delete the rest.* (a) performance or supervision of on-site assembly and/or start-up of the supplied Goods; (b) furnishing of tools required for assembly and/or maintenance of the supplied Goods; (c) furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Goods; (d) performance or supervision or maintenance and/or repair of the supplied Goods, for a period of time agreed by the parties, provided that this service shall not relieve the Supplier of any warranty obligations under this Contract; and (e) training of the Procuring Entity's personnel, at the Supplier's plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied Goods. The Contract price for the Goods shall include the prices charged by the Supplier for incidental services and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services. **Spare Parts –** The Supplier is required to provide all of the following materials, notifications, and information pertaining to spare parts manufactured or distributed by the Supplier: *Select appropriate requirements and delete the rest.* (a) such spare parts as the Procuring Entity may elect to purchase from the Supplier, provided that this election shall not relieve the Supplier of any warranty obligations under this Contract;

	and (b) in the event of termination of production of the spare parts: i. advance notification to the Procuring Entity of the pending termination, in sufficient time to permit the Procuring Entity to procure needed requirements; and ii. following such termination, furnishing at no cost to the Procuring Entity, the blueprints, drawings, and specifications of the spare parts, if requested. The spare parts required are listed in Section VI. Schedule of Requirements and the cost thereof are included in the Contract Price The Supplier shall carry sufficient inventories to assure ex-stock supply of consumable spares for the Goods for a period of *[insert here the time period specified. If not used insert time period of three times the warranty period]*. Other spare parts and components shall be supplied as promptly as possible, but in any case within *[insert appropriate time period]* months of placing the order. **Packaging –** The Supplier shall provide such packaging of the Goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in this Contract. The packaging shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit, and open storage. Packaging case size and weights shall take into consideration, where appropriate, the remoteness of the GOODS' final destination and the absence of heavy handling facilities at all points in transit. The packaging, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract, including additional requirements, if any, specified below, and in any subsequent instructions ordered by the Procuring Entity. The outer packaging must be clearly marked on at least four (4) sides as follows: Name of the Procuring Entity Name of the Supplier Contract Description Final Destination

	Gross weight Any special lifting instructions Any special handling instructions Any relevant HAZCHEM classifications A packaging list identifying the contents and quantities of the package is to be placed on an accessible point of the outer packaging if practical. If not practical the packaging list is to be placed inside the outer packaging but outside the secondary packaging. **Insurance –** The Goods supplied under this Contract shall be fully insured by the Supplier in a freely convertible currency against loss or damage incidental to manufacture or acquisition, transportation, storage, and delivery. The Goods remain at the risk and title of the Supplier until their final acceptance by the Procuring Entity. **Transportation –** Where the Supplier is required under Contract to deliver the Goods CIF, CIP or DDP, transport of the Goods to the port of destination or such other named place of destination in the Philippines, as shall be specified in this Contract, shall be arranged and paid for by the Supplier, and the cost thereof shall be included in the Contract Price. Where the Supplier is required under this Contract to transport the Goods to a specified place of destination within the Philippines, defined as the Project Site, transport to such place of destination in the Philippines, including insurance and storage, as shall be specified in this Contract, shall be arranged by the Supplier, and related costs shall be included in the Contract Price. Where the Supplier is required under Contract to deliver the Goods CIF, CIP or DDP, Goods are to be transported on carriers of Philippine registry. In the event that no carrier of Philippine registry is available, Goods may be shipped by a carrier which is not of Philippine registry provided that the Supplier obtains and presents to the Procuring Entity certification to this effect from the nearest Philippine consulate to the port of dispatch. In the event that carriers of Philippine registry are available but their schedule delays the Supplier in its performance of this Contract the period from when the Goods were first ready for shipment and the actual date of shipment the period of delay will be considered *force majeure* in accordance with **GCC** Clause 22. The Procuring Entity accepts no liability for the damage of Goods during transit other than those prescribed by INCOTERMS for DDP Deliveries. In the case of Goods supplied from within the Philippines

	or supplied by domestic Suppliers risk and title will not be deemed to have passed to the Procuring Entity until their receipt and final acceptance at the final destination. **Patent Rights –** The Supplier shall indemnify the Procuring Entity against all third-party claims of infringement of patent, trademark, or industrial design rights arising from use of the Goods or any part thereof.
	Copyright over Work Products All intellectual Property Rights in materials, products, Goods, Devices, inventions, works, outputs, Services, Software, processes and procedures and other tangible or intangible property developed or prepared by the Supplier/Manufacturer pursuant to this Contract are the property of the Procuring Entity and all title and interest in them shall vest exclusively in the Procuring Entity upon their creation without need to execute any act or deed. All Intellectual Property Rights owned by the Procuring Entity shall belong to the Procuring Entity. **Software Licenses** As the owner of the Software developed by the Supplier/Manufacturer for the Project under this Contract, the Procuring Entity may cause to modify it or combine it with other programs or materials to form an updated work. The Procuring Entity will not modify Software that bears a copyright notice from any third party (other than the Supplier/Manufacturer) without the express written agreement of the copyright owner. The Procuring Entity shall have the right of perpetual use to all licensed Software included in the New System's Software. For Software owned by third parties, the Supplier/Manufacturer will transfer to the Procuring Entity the right to use the Software on the expiration or termination of the Contract. Such transfer will be covered by a license transfer agreement with the license Software owner. This Contract does not transfer to the Procuring Entity title to any Intellectual Property Rights contained in any pre-existing or licensed Software, documentation or proprietary information belonging to third parties.
10.4	Not applicable.
13.4(c)	No further instructions.
16.1	The inspections, tests and acceptance that will be conducted shall be referred to Section VII. Technical Specifications.

17.3	For warranty requirement, please refer to Section VII. Technical Specifications.
17.4	For correction requirement, please refer to Section VII. Technical Specifications.
21.1	All partners to the joint venture shall be jointly and severally liable to the Procuring Entity.

Section VI. Schedule of Requirements

The delivery schedule expressed as weeks/months stipulates hereafter a delivery date which is the date of delivery to the project site.

Item Number	Description	Quantity	Total	Delivered, Weeks/Months	Payment
Item 1	Supply and Delivery of 48 Light Rail Vehicles (LRVs)	48	48	Prototype Design, Manufacturing, Assembly, Testing, Commissioning and Acceptance Period (12 months) Delivery of LRVs (4-LRVs per month) 8 months	Payment will be made upon submission of billing statement from the winning bidder and acceptance by the procuring entity of each batch supply of LRVs

Section VII. Technical Specifications

Item	Specification	Statement of Compliance
		Bidders must state here either "Comply" or "Not Comply" against each of the individual parameters of each Specification stating the corresponding performance parameter of the equipment offered. Statements of "Comply" or "Not Comply" must be supported by evidence in a Bidders Bid and cross-referenced to that evidence. Evidence shall be in the form of manufacturer's un-amended sales literature, unconditional statements of specification and compliance issued by the manufacturer, samples, independent test data etc., as appropriate. A statement that is not supported by evidence or is subsequently found to be contradicted by the evidence presented will render the Bid under evaluation liable for rejection. A statement either in the Bidders statement of compliance or the supporting evidence that is found to be false either during Bid evaluation, post-qualification or the execution of the Contract may be regarded as fraudulent and render the Bidder or supplier liable for prosecution subject to the provisions of **ITB** Clause 3.1(a)(ii) and/or **GCC** Clause 2.1(a)(ii).

ROLLING STOCK

1.1. System Requirements

1.1.1. Introduction

At the present time in the MRT Line 3 system, the load of the fleet of 73 RT8D5M units has reached over 25,000 passengers per hour per direction at peak hour (PPHPD) since 2003. This figure is way above the designed capacity of 23,600 PPHPD using 3-car train 3 minutes headway system configuration.

Consequently, there is a necessity to increase the system's present capacity to prevent premature breakdowns due to congestion and minimize delays encountered by passengers.

The DOTC-EDSA/MRT Line 3 intends to expand the current fleet of 73 units of RT8D5M vehicles. The current 3-car train 3 minutes headway configuration is to be improved to achieve a 4-car train /3 minutes headway configuration for Phase 1 and 4-car train / 2.5 minutes headway configuration for Phase 2 and 4-car train / 2minutes headway for Phase 3.

Taking into account the necessity to address this capacity deficiency, it is believed that swift acquisition of vehicles is required to address the current system congestion.

The option being explored in the proposed Capacity Expansion Project is the procurement of brand new vehicles that are fully compatible with the EDSA/MRT Line 3 system: forty-eight (48) for Phases 1 and 2, and twenty (21) for Phase 3.

The scope of supply covered by this brand new rolling stock procurement includes the *detailed design, production, verification, delivery, testing, commissioning and technical support* of vehicles to fulfill the requirements as stipulated in this MRT3 Specification and Performance Requirements, along with the supply and delivery to Site of all related materials, spare parts, documentation and training required to operate and maintain the vehicles.

The following shall, without limitation, be included in the Works:

a. Detailed Design, manufacturing, assembling, verification, delivery, testing, commissioning and technical support of the brand new vehicles configured into 4 vehicles consists, with a driver cab at the front end and a hostler (For shunting purposes) at the rear end of each Vehicle,
b. Provision of all documentation and support materials associated with the operation and maintenance of the vehicles as specified herein,
c. Ongoing technical support and Defects Liability coverage until the completion of the Defects Liability Period,

d. Interfacing with other aspects of this contract, which includes but not limited to Telecommunications and Signaling detailed design, provision of equipment, components and materials as specified in all Interface Specifications appended to this MRT3 Specification and Performance Requirements,
e. Training for maintenance staff, DOTC-MRT3 Engineers and operators, including all necessary training materials, training kits, demonstration equipment and training venues,
f. Supply and installation of all consumables and materials required for testing and commissioning,
g. Provision of drawings, calculation and other documents as specified herein and/or as may be required,
h. Provision of design development items, studies and reports as specified herein,
i. Recommendation and supply of spares and consumables, special tools, special test equipment and special training as specified herein, and
j. Supply of any other equipment or any other service that may be required for completion of the Works.

1.1.2. Design Requirements

The requirements specified in this MRT3 specification and Performance Requirements are the minimum levels of design conformance and acceptable functionality. They are not intended to restrict innovation and flexibility within design process, but set parameters for that process which shall not be contravened where emphasized.

In addition to the requirements contained in this MRT3 specification and Performance requirements, the bidders may propose a fully compatible RS. In this case, the full compatibility would be referred to the existing EDSA/MRT line 3.

The Supplier's design process shall ensure that all systems, subsystems, assemblies and components of each consist are complementary and compatible in form and function. Other design requirements not specifically mentioned in this MRT3 specification and Performance Requirements but found and deemed necessary by the Supplier for the complete and efficient completion of the project shall be presented/ submitted to the DOTC-MRT3 Engineer for review and consideration.

1.1.2.1. Vehicle Design Constraints

1.1.2.1.1. Safety Requirements

Items, the failure of which could result in critical/catastrophic hazard, are designated "safety critical." A critical/catastrophic hazard is a situation which could result in an injury or fatality to patrons or MRT3 system personnel, or which could result in major damage to or a loss of a vehicle function or equipment.

Specific safety critical items identified for the vehicle are:

- Removing positive tractive effort during braking

- Braking and safe braking distances
- Prevention of initial motion with any brake applied
- Fire-resistance requirements
- Inhibiting motion when doors are open
- Prevention of door opening during motion
- Direction control
- Automatic train protection

The vehicle Supplier shall identify any additional safety critical items incorporated in its proposed design

1.1.2.1.2. General Design Constraints

The following general design concepts shall be incorporated, in order to increase maintainability and maximize availability and at the same time meet efficient operational and environmental requirements, at optimal cost effectiveness.

a. Use of interchangeable, modular components,
b. Use of service proven design,
c. Extensive and prominent labeling of parts and wires,
d. Use of unique serial numbers for traceability of components,
e. Focus of low cycle cost as much as possible,
f. Environment and human friendly,
g. Minimize Human error (In operation and in maintenance),
h. Cost efficient (Energy and labor),
i. Handicapped people responsive.

In addition, the specific constraints linked to the compatibility with the existing system will have to be particularly taken into consideration:

j. Full compatibility with existing infrastructures for commercial operation
k. Full compatibility with the existing signaling system at the time of vehicle delivery.
l. Full compatibility with existing maintenance workshop equipment and facilities, for carrying out of maintenance operations
m. At minimum, capability of mechanical coupling with existing Rolling stock for emergency towing.

1.1.2.2. Previous Usage

All equipment, components and materials shall have proven record of satisfactory use in other rolling stock applications and shall be demonstrated as requested, to the satisfaction of the DOTC-MRT3 Engineer.

1.1.2.3. Codes, Standards and Requirements

Codes, Standards and Requirements specified in this MRT3 specification and Performance Requirements shall be interpreted as a requirement for compliance.

Where any specified codes, standards and/or requirements are in conflict with each other or with this MRT3 specification and Performance Requirements, the more stringent requirement shall apply, unless otherwise reviewed and approved by the DOTC-MRT3 Engineer.
In the case where standards different from the required ones would be proposed by a bidder, their equivalence to the standards as required shall be demonstrated by the bidder, at its own expenses.
The proposal in this case will be reviewed and approved by the DOTC-MRT3 Engineer.

The acquisition of codes and standards are at the charge of the bidder.

1.1.2.4. Design and Manufacturing Tolerances

Where not specifically identified by statement or reference code the Supplier shall establish design and manufacturing tolerances reflective of best industry practices and standards in force and shall be submitted to the DOTC-MRT3 Engineer for review and approval.

1.1.2.5. Design Management and Control

The Supplier shall establish and maintain documented procedures to control and verify the design of the consist and all its equipment. The Supplier shall submit a design and development plan for review and approval by the DOTC-MRT3 Engineer.

The Supplier shall establish and maintain a documented systematic, comprehensive and verifiable system integration process throughout the execution of Works. These processes shall ensure that interfaces and interaction between vehicles, infrastructure, subsystems, software and operating and maintenance requirements have been identified and DOTC-MRT3 Engineered to function together as a system.

1.1.2.6. Design Review

a. At appropriate stages in the design process, formal documented reviews of the design and related issues shall be planned and conducted, which shall be in line with the Design Submission Program
b. The Supplier shall ensure that participation in design reviews includes representatives of all functions, disciplines and entities concerned with the equipment and the stage being reviewed.
c. The Supplier shall at least 15 days prior to the date of each design review submit in-progress design documents of the elements to be addressed at the meeting to the DOTC-MRT3 Engineer and all concerned. The Employer reserves the right to attend any and all design reviews.
d. The Supplier shall within 15 days after the date of each design review submit to the DOTC-MRT3 Engineer Design Review Minutes, detailing all issues raised during the review, their resolution or ongoing design status and due date for resolution.

e. The DOTC-MRT3 Engineer/Employer reserves the right to carry out design audits of the Supplier periodically throughout the Contract as may be deemed necessary for validation of the design.

1.1.2.7. Special Responsibility of the Supplier

No examination, review and approval by the DOTC-MRT3 Engineer of the design, drawings, and documents submitted by the Supplier, with or without amendment, or any approval or consent given by the DOTC-MRT3 Engineer for any equipment or part of the Works, shall absolve the Supplier from any of his obligations under the contract or any liability arising out of the designs, drawings and documents or equipment or part of Works; this being a "design and construct contract".

1.1.3. Basic Train Formation

1.1.3.1. General Vehicle Configuration

In order to maintain commonality with the existing Rolling Stock, a three-section articulated vehicle comprising of four bogies shall be as designed.

The vehicle is also designed for service as single vehicle and bi-directional operation with driver cab at front end and hostler on the rear end. Each vehicle shall have five passengers entrances on each side (total of 10), configured similarly to that of the vehicles from the existing MRT-3. The train shall be so designed to have the capability of operating as 4 vehicles trains consist.

Vehicle configuration, specially the doors, shall be similar to the existing trains from the MRT3 system. All the door-widths should be designed to minimize loading /unloading time.

It is encouraged that the flooring throughout the interior of the vehicle be of the same level.

Typical vehicle configuration is shown in Drawing No. LRT/B/220/10000 – General Arrangement of Rail Vehicle but should be in 4-vehicle configuration.

The vehicles shall respect the structural gauge as per drawing No. LRT/B/100/10001.

1.1.3.2. Power and Auxiliary Electric System Configuration

The vehicle shall be powered by a single or multiple power conversion equipment for the propulsion and a primary inverter to serve the auxiliary loads.

1.1.3.3. Vehicle Physical Characteristics

The following physical characteristics indicate fundamental vehicle dimensions that should be given careful attention, considering the existing MRT3 system.

a.	Vehicle body Length (excluding coupler)	:	30,300 mm
b.	Over all length	:	31,720 mm
c.	Train length (4-car train)	:	126,880 mm
d.	Overall Width	:	2,500 mm
e.	Internal ceiling height from floor	:	2,100 mm
f.	Height of car from top of rail	:	3,650 mm
g.	Floor height Note: station platform height = 900 mm	:	925 mm (new wheels)
h.	Pantograph lock down height	:	3,724 mm
i.	Pantograph height working range	:	3,900 – 6,000 mm
j.	Wheel Diameter (new) Wheel Diameter (worn out)	:	700 mm 595 mm
k.	Wheel base	:	1,900 mm
l.	Distance between Bogie center	:	7,500 mm
m.	Passenger Doors per LRV	:	5 per side, double sliding
n.	Doorway width	:	1,255 mm middle doors, 861 mm end doors
o.	Doorway height	:	1,900 mm

1.1.4. Track Standards

The vehicles shall be compatible with the existing track system with the following characteristics:

a.	Rail Profile	:	UIC 54 (54.43 Kg/m) The rail parent steel quality is UIC 54 grade 900A
b.	Track Gauge	:	Standard : 1,435 mm
c.	Track Type	:	Ballasted and Plinth
d.	Distance between Track center	:	3,400 mm
e.	Minimum Radius (revenue (main) / line Depot)	:	300 m in revenue (main) line, 25m at depot
f.	Max. Grade	:	5% access line; 4% in main line
g.	Max. Super elevation (line)	:	150 mm
h.	Height of platform from top of rail	:	900 mm (±10)

1.1.5. Route Data

a.	Line length	:	16.9 km, elevated, at grade and underground with maximum 4% gradient
b.	Connection line from depot to main line	:	maximum gradient of 5%
c.	Minimum radius on the main line	:	500 meter (radius of elevation) vertical curve
d.	Maximum super elevation on main line	:	150 mm

e.	Minimum radius in depot	:	25 meter with reduced speed to 15 km/h under unloaded conditions
f.	Limits of S-curve (at depot)	:	25 meter with straight line of 7 meters
g.	Stations	:	13 stations all with side platforms of 130m long
h.	Height of platform from top of rail	:	900 mm (±10)
i.	Overhead Power	:	750V DC Nominal
j.	Maximum height of overhead power line	:	6000 mm
k.	Minimum height of overhead power line	:	3900 mm
l.	Catenary	:	2 x 150 mm^2 messenger wires / 1 x 170 mm^2 contact wire at Mainline; 1 x 150 mm^2 and 1 X 170 mm^2 at Depot
m.	Structural gauge	:	See Drawing No. LRT/B/100/10001

1.1.6. Environmental Conditions

The general environmental conditions in the EDSA/MRT3 area are as follows:

Ambient temperature	:	Min. + 15 °C - Max. +40 °C
Relative humidity	:	Min. 60% - Max. 100%
Maximum rainfall	:	60 min. rating 120 mm/h 30 min. rating 180 mm/h 10 min. rating 270 mm/h
Maximum wind velocity	:	60 m/sec
Maximum wind velocity at which train operations will be stopped	:	27.8m/sec

The Supplier is reminded that the alignment in EDSA/MRT3 runs through notably polluted air environment, which may present mildly corrosive atmosphere. Also, because of the generally long dry season, the air has high dust content.

The Supplier shall ensure that all equipment will operate satisfactorily under the above conditions and in a high level of air pollution and dusty conditions.

1.1.7. Weight Limits

1.1.7.1. General

The car builder is encouraged to minimize weight. For design purposes, a Maximum allowable AW0 is stated. The car builder shall calculate actual weights for the final design.

The vehicles shall be designed on the following definitions of vehicle loading with Passenger weight taken as 65 kg per passenger.

A train consist of four (4) vehicles shall have a passenger capacity of not less than 1,576 passengers (seating and standees). Maximum axle load under W3 condition shall be between 8,500 kg and 10,000 kg.

a. W0 : tare weight	46,300 kg.
b. W1 : W0 + seated Passengers	
c. W2 : W1 + 5 p/m^2 standee	
d. W3 : W1 + 8 p/m^2 standee	
e. W4: W3 + dynamic load and safety margin	

The structural design load (W3) is defined as the limit of static weight for the Rolling Stock structure before the introduction of dynamic effects and safety margin.

Equipment installation shall be arranged such that its weight is evenly distributed to the maximum practical extent. The vehicle, complete with all necessary apparatus, shall meet the following criteria:

- The difference of static weight, as measured under each truck, shall not be greater than 2%.

1.1.8. TRAIN PERFORMANCE

1.1.8.1. General

LRV performance is defined for operations on dry level tangent track, AW3 loading for acceleration performance and AW3 loading for deceleration performance, with no significant wind.

OCS voltage shall be at the nominal 750 Vdc for propulsion. In braking, the braking system shall perform as specified at any line voltage within the specified range. Dry track conditions are defined as those conditions where the actual coefficient of adhesion is at least 25% without sanding.

For the purpose of calculating and submitting train performance figures, train configuration and weight shall be as defined in **Sub-Clauses 1.1.3-Basic Train Formation** and **1.1.7-Weight limits**, respectively..

1.1.8.2. Performance Values

The following train performance shall be achieved during revenue operations, under any conditions of wheel wear, except where noted:

a.	Maximum speed	:	65 km/h
b.	Mean Acceleration (taken as average between 0 and 65 km/h)	:	At least 1.03 m/s^2 between 0 to 40 km/h, with a residual acceleration of at least 0.2 m/s^2 up to maximum speed.

c.	Jerk limit under all acceleration and service braking conditions (Max.)	:	1.1 m/s^3
d.	Mean service deceleration (taken a average between 65 and 0 km/h on level and straight track)	:	1.01 m/s^2
e.	Emergency deceleration	:	Guaranteed at minimum 1.5 m/s^2 in any condition
f.	Severity of Service	:	Shall meet conditions of continuous 4 hours of peak operation at loads of W3 or higher

Acceleration and deceleration values must be maintained under all loading conditions. All braking requirements must be maintained under all loading conditions.

Jerk during acceleration and deceleration shall not be more than 1.1 m/s^3 (except under emergency braking condition) and in any direction. Failure of jerk limiting system shall not limit braking effort.

Indicated speed shall be within ± 2km/h of actual speed at any speed.

1.1.8.3. Performance Characteristics

Performance curves shall be drawn on a basis of kN/ton versus speed for the W3 loading condition. The corresponding traction motor characteristics, and the train mass, shall be considered in the Design Performance Curve as defined in IEC 349.

1.1.8.4. Emergency Performance

The Supplier shall confirm by calculation and by test that a 4-LRV train in the W3 loading condition, with the propulsion system on one of the 4-vehicle units inoperative is capable of completing one trip.

1.1.8.5. Towing Requirements

A fully functioning train shall be capable, with no damage to its equipment, of rescuing (Pushing or pulling) an inoperative train of the same length. An inoperative train is defined as a dead train.

Due to the reduced adhesive weight, the acceleration rate can be reduced to the limits required to operate in accordance with the track characteristics. The deceleration rate can also be reduced, but not to be less than the safe braking rate.

The Supplier shall confirm by calculation and by test that a 4-LRV train in W3 loading condition is capable of pushing/towing another 4-LRV train in W3 loading condition to the nearest station.

The Supplier shall confirm by calculation and by test that a 4-LRV train in W0 loading condition is capable of pushing/towing another 4-LRV train also in W0 loading condition, from the farthest terminal station back to Depot, including starting on a 4% gradient (Uphill) and braking on a 5% gradient (Downhill) under arrival on the depot..

1.1.8.6. Parking Brake Performance

The Supplier shall confirm by calculation and by test that the friction brakes are capable of holding a 4-vehicle train in the W3 loading condition on a 4% grade. Also, the Supplier shall confirm by calculation and by test that the friction brakes are capable of holding a 4 vehicle train coupled to a disabled 4-vehicle train (including the existing MRT3 vehicles) both trains at W0 load condition on 4% grade.

1.1.9. Noise and Vibration Requirements

1.1.9.1. Noise Requirements

The trains shall be designed and tested to meet the following noise levels:

The average interior noise level at any point in any vehicle (including the Driver's Cab), between 1 m and 2 m above floor level, while stationary on an open section of track, but with all auxiliary systems running, shall not exceed 65 dB(A).

The exterior noise level of any vehicle, measured 7.5 m from the center and 1.5 m above rail level, while stationary on an open section of track with all auxiliary systems running, shall not exceed 69 dB (A).

The average interior noise level at any point in any vehicle (including the Driver's Cab) between 1 m and 2 m above floor level, with the train running at 65 km/h on an open section of track, with all auxiliary systems running, shall not exceed 70 dB(A). Test to be conducted at the Suppliers' facility.

The exterior noise level of any vehicle, measured 7.5 m from the center and 1.5 m above rail level, with the train running at 65 km/h on an open section of track with all auxiliary systems running, shall not exceed 80 dB(A). Test to be conducted at the Suppliers' facility.

1.1.9.2. Vibration Requirements

With the train at stationary and with all auxiliary equipment operating at rated capacity, no portion of the interior of the vehicles shall exceed the following levels of vibration: 2.5 mm peak-to-peak amplitude for frequencies less than 1.4 Hz, .01 g peak acceleration for the frequency range 1.4 Hz to 20 Hz, and .75 mm/second peak velocity for the frequency range above 20 Hz.

1.1.9.3. Noise and Vibration Control

1.1.9.3.1. Generalities

Rotating or reciprocating equipment and inductive electrical equipment (such as transformers, inductors, etc.) mounted to the rail vehicle body, which may become a source of vibration, and any equipment (bogie or vehicle body

mounted) which may become a source of noise shall be adequately provided with resilient suspension, acoustically attenuated.

The resonant frequency of the resilient suspension system shall be designed to avoid coupling with that of the vehicle structure. All suspensions are to be designed to provide maximum isolation for all modes of vibration. Also, resilient mounts must be arranged in a manner such that the equipment will be retained safely on the vehicle, and may continue operation, under all conditions stated in this and any other applicable specification, in the event of a complete failure of the elastomeric material.

It shall be the responsibility of the Supplier to take all reasonable precautions to minimize noise radiation and transmission by using up-to-date design techniques and proper acoustic attenuation materials, where required. The Supplier shall provide for review all pertinent details of the acoustic attenuation and any special noise reduction techniques used.

1.1.9.3.2. Car Body Mounted Components

These components shall be designed and mounted to withstand:

- Continuous sinusoidal vibrations of 0.4 g rms at any frequency from 1 Hz to 100 Hz in the three major axes
- Randomly oriented shock impulses of 3 g peak with duration from 4 milliseconds to 10 milliseconds

1.1.9.3.3. Bogie Frame Mounted Components

These components shall be designed and mounted to withstand, without fatigue or deterioration for a vehicle life of 30 years, the normally occurring random shock and vibration magnitudes at the support points on the bogie frame.

These magnitudes shall be considered to be 1.0 g rms with a crest factor (ratio of peak to rms acceleration level) of 5, within the frequency range from 20 Hz to 10 kHz in all directions, and shocks occurring up to 100 times per operating day to 20 g peak in the vertical axis and 6 g peak in the lateral axis with pulse durations from 4 milliseconds to 10 milliseconds.

1.1.9.3.4. Axle-Mounted Components

Components shall be designed to withstand, as a minimum:

- Continuous random vibrations of 10 g rms within the frequency range of 10 Hz to 10 kHz in all directions
- Shock pulses of 100 g in each major axis, with durations from 0.5 milliseconds to 2 milliseconds occurring approximately 100 times per day

1.1.10. Ride Quality

1.1.10.1. General

The vehicle shall be designed to be free from objectionable vibration and shock. All mounted equipment shall be free from resonance to avoid undue audible and visual annoyance.

The ride quality shall be evaluated according to ISO 2631.

The rms acceleration values shall not exceed the "1 hour reduced comfort level" boundaries of ISO 2631-1978 (E).

The roll stiffness of the vehicle body, when subjected to lateral accelerations, shall not exceed 20 dpg (degrees per g).

The Supplier shall provide a vibration analysis for the DOTC-MRT3 Engineer's review and acceptance, which shall demonstrate compliance to these ride quality requirements.

1.1.10.2. Jerk Limit

Under all normal operating conditions, the rate of change of vehicle acceleration or deceleration shall not be less than 0.89 m/s/s/s or greater than 1.1 m/s/s/s

Failure of the jerk limiting system shall not limit the braking effort.

Emergency brake applications and any associated ramp out of propulsion shall not be jerk-limited.

Reduction of propulsion effort due to power interruption does not need to be jerk-limited.

Reapplication of propulsion effort following a power interruption shall be jerk-limited.

1.1.11. Load Weight System

A load weight system shall be provided. The load weight system shall provide the vehicle load information to the propulsion and braking systems, in order for the propulsion system to achieve the required acceleration from AW0 to AW3 loading conditions, and for the braking system to achieve the required deceleration from AW0 to AW3 loading conditions,.

1.1.12. Maintainability Requirements

In addition to the requirements specified elsewhere herein, the vehicles shall be designed to meet the following criteria:

a. No item of equipment shall require general overhaul until it has accumulated at least 900,000 km of operational service.
b. No routine inspection work shall be required on any component at more frequent intervals than 7,000 km, and no maintenance more frequently than at least 25,000 km intervals.
c. All units or sub-assemblies requiring replacement or off-train adjustment shall be arranged for easy unit exchange.
d. Equipment and systems shall be accessible for inspection, maintenance and repair with minimum strain to people involved and within the limitation of the existing maintenance facilities, including the Light Maintenance Pit. Any danger to persons caused by crushing, lifting of heavy items, etc. should be avoided.
e. The Supplier shall submit a detailed work process chart illustrating how the maintenance requirement shall be achieved. The work process shall indicate work tasks, labor and material/component requirements, supplemented by a critical path analysis. The complete work process shall be subjected to a type test proposed by the Supplier, to confirm validity of work process model.
f. For purposes of defining the maintenance requirement of each consist, the yearly-accumulated kilometer run shall be 120,000 km.
g. The design of the vehicles shall be suitable for cleaning in the existing washing plant of EDSA/MRT3 system at Depot.
   The list of recommended products and processes for the interior and exterior cleaning must be proposed by the bidder ,subject to the acceptance of the client.

1.1.13. Train Management System

1.1.13.1. General

In normal operation, with no equipment failures, the Train Management System (TMS) shall be the primary command and control system for each consist. The TMS shall not be critical to the safety of each consist and shall not be essential to the basic operation of each consist.

Hardwired train lines in addition to the TMS shall be provided for the basic train operation functionality for the following critical systems as a minimum. The arrangement shall allow for basic consist operation in the event of a TMS failure.

a. Propulsion control,
b. Service brake control,
c. Emergency brake control,
d. Door enable,
e. Door open/close,
f. Air-conditioning system,
g. Radio/Public address system,
h. Battery Control, and
i. Pantograph control.

The TMS shall be connected to a Digital Diagnostic System (DDS) mounted in the train operator's cab console for alarm monitoring, control initiation and data entry.

1.1.13.2. Fault Indication System

The Train Management System (TMS) shall include a DDS, which shall enunciate faults and abnormal conditions to the Driver's Cab. The DDS shall have active interface for system diagnostic capabilities and basic troubleshooting intervention. The DDS shall have battery backup and self-test capabilities.

1.1.13.3. Design Requirements

a. The TMS shall perform control initiation, data acquisition, data processing, data communication and data presentation functions. The TMS shall be able to automatically identify and update train consist configuration.
b. Interfacing capability shall be provided with twenty percent (20%) spare unallocated vehicle system Input/Output capacity for future expansion and when utilized it shall not produce any adverse performance impact on data throughout performance.
c. The transmission mode and protocol of the TMS shall maintain reliable operation and shall be immune to interference or performance degradation in the environment influenced by Electro-Magnetic Interference (EMI) and harmonics generated from the traction power converters, Variable Voltage Variable Frequency (VVVF) inverters and static inverters.
d. A single point failure of any individual part shall not cause any adverse performance impact or cause loss of data.
e. The TMS shall perform fault analysis, event log fault occurrence, determine the health of the vehicle systems, perform failure management actions and present alarm and condition status to the train operator. The fault logger shall be configured to sum repetitive faults, and when the memory is full, the next fault shall result in the oldest fault being dropped and the newest added.
f. The memory shall cover at least 1 week of operation.
g. The TMS shall also allow data recording, which shall include, but not limited to, the following:

    - Speed (Actual speed, ATP authorized speed)
    - Odometer reading
    - Status of driving mode (manual- forward/reverse / ATP),
    - Power controller position and power equipment response,
    - Brake controller position and brake equipment response,
    - Emergency brake status,
    - ATP equipment status,
    - Driver safety devices status,
    - Status of doors and control,
    - Wheel spin /slide,
    - Operation of safety related cut-out switches,
    - Date and Time,

- Battery Voltage, and
- Overhead line Voltage.

h. Fault analysis algorithms, data acquisition routines and data storage logic shall be programmed and presented using a Windows type user interface.
i. On-board fault occurrences logging, and degraded performance condition monitoring logging, shall be provided as an integral part of the TMS. The Supplier shall nominate the key indicators of degraded performance of the principal vehicle systems for review by the DOTC-MRT3 Engineer.
j. A bi-directional data port shall be provided at the Main Processor Unit for connection of a Portable Test Unit (PTU). The plug-in point shall be easily accessible in the train operator's console. The Supplier shall provide the software required for the data exchange between the PTU and the TMS. The software shall become the property of the Employer, with no licensing restriction in the use of the same.
k. The TMS shall always display a warning message on a per vehicle system overview basis for any consist system detected with an active fault alarm condition. Train operator selectable screen page listing of active fault alarms for the total consists shall be provided.
l. The TMS programming shall allow easy data entry and function changing and upgrading throughout the life of the system.
m. The DDS shall use back lit color Liquid Crystal Display (LCD) technology and shall be software driven by the TMS. Commands shall be entered by the train operator using either soft keys or via touch screen.
n. The DDS shall provide the train operator with information regarding the operating status of the consist, vehicle/system's health and failure management actions performed by the TMS. The Display shall provide the facility for train operator to input railway operations information (E.g. staff number, train run number).
o. TMS and DDS configurations and options shall be reviewed by the DOTC-MRT3 Engineer.

1.1.14. General Electric Requirements

1.1.14.1. EMI/RFI

Conducted and radiated Electro-Magnetic Interference/Radio Frequency Interference (EMI/RFI) shall be held to a minimum commensurate with good design practices and railways standards in force, and in no case shall signal levels be permitted which interfere with, or compromise, the operation of on-board or wayside signal equipment, on-board or wayside automatic train control equipment, intercom equipment or Ultra High Frequency (UHF) radio equipment.

EMI/RFI or any other form of interference shall not affect the proper and safe operation of the existing MRT3 vehicles, wayside equipment, substation, Signaling System, Automatic Fare Collection System (AFCS) or any other local facilities.

Electrostatic and magnetic electrical shielding methods shall be employed to minimize the effect of stray signals and transient voltage on low level interconnecting cables.

Components and functional circuits shall be grouped according to their similar sensitivities to electrical interference and power supply needs, and grouped to reduce the effects of voltage drops in the ground circuits, power and return leads, and shall be routed in raceway or harness.

The Supplier shall carry out measurement of ensuing Electromagnetic environment to validate compliance to the above requirements. Measurement shall be in accordance to IEC 1000-4-8, IEC 6100-4-8, IEC 62236-2, EN 50121 or equivalent and shall be reviewed and approved by the DOTC-MRT3 Engineer.

1.1.14.2. Voltage DC Control Power

The nominal system voltage shall be 750 VDC. Rated performance shall be provided at nominal voltage, and all equipment connected to the voltage power supply shall not be damaged by continuous operation within the specified minimum and maximum voltage range. In addition, continuous voltages at the upper threshold shall not damage any equipment. Variation of voltage outside the limits specified in **Sub-Clause 1.1.14.3** shall result to system shutdown without damage.

1.1.14.3. Operating Voltage Range

Unless otherwise specified, equipment connected to the low voltage power supply shall operate over a power supply (line) voltage range from 0.7 x (nom V DC) to 1.30 x (nom V DC).

Peak-to-peak ripple voltage from a static power supply shall not exceed three percent of the nominal specified power supply output voltage, unless otherwise allowed. It is recognized that if a transformer-rectifier unit is used to generate the low voltage DC, the ripple voltage will be substantially greater than the three percent limit. In this case, the allowable ripple voltage will be as agreed upon.

1.1.14.4. Transient Voltage Requirements

Equipment connected to the low voltage power system shall be capable of withstanding non-repetitive, transient, peak voltages with the following characteristics:

7000 V_{pk} with a duration, D = 0.1 μs
4000 V_{pk} with a duration, D = 1 μs
3000 V_{pk} with a duration, D = 5 μs
1500 V_{pk} with a duration, D = 45 μs
800 V_{pk} with a duration, D = 100 μs

Where D is the time for the transient to rise to the peak value and then fall to 50 percent of the peak value. The rise time of the transient shall be 0.1 μs.

Low voltage power supplied equipment shall not be damaged by under voltage of any magnitude or duration. Recovery of connected equipment from the under voltage condition shall be automatic or by train line reset. Train line and battery supplied relays shall not drop out for under voltages as low as 0.5 x (V_{nom}), with a duration of up to 50 μs.

1.1.14.5. Reverse Voltage

Equipment, which may be powered from the battery bus, shall not be damaged by reverse polarity voltage of the same magnitude and duration as the specified positive voltage conditions.

1.1.14.6. Transients Generated by Equipment

Equipment connected to the low voltage power supply, including battery and train lines, shall not generate transient voltages in excess of $\pm$ 200 V_{pk}, with an energy content not to exceed 0.3 joules.

The equipment shall be designed such that the rate of change in voltage in any transient conducted from the equipment to the electrical interface shall not exceed 10 VI m sec.

1.1.14.7. Overhead Line Supply System

At a minimum, equipment powered directly from the overhead line power network shall withstand transient voltages with a peak of not less than five times the maximum continuous voltage rating of the overhead line supply. The rise time from 10 to 90 percent of the peak voltage shall be assumed at 1 m sec and the fall time from 90 to 50 percent shall be 40 m sec. The energy content shall not be less than 1000 joules.

1.1.15. General Installation and Maintenance Requirements of Electric Works

1.1.15.1. Printed Circuit Boards

All electronic printed circuit boards shall be of the plug-in type unless specifically approved by the DOTC-MRT3 Engineer. The type of connector and contact material shall be identified by the Supplier. The board material shall be suitable to rail application. Components shall not be installed using sockets unless specifically approved by the DOTC-MRT3 Engineer. Use of surface mount devices must be approved by the DOTC-MRT3 Engineer. Semiconductor operating temperature rating shall meet or exceed +85°C.
Printed Circuit Boards shall be mechanically retained to prevent loosening in service. Circuit boards shall not be hard wired to the equipment, and shall be mechanically keyed to prevent insertion into the wrong rack location.

1.1.15.2. Equipment Accessibility

All gauges, adjustment points, switches, etc., shall be easily accessible and clearly identified with permanent identification markings.

1.1.15.3. Device Reference Designators

All electrical devices on panels shall be identified with their alphanumeric designation corresponding to that used on the schematic diagrams.

1.1.15.4. Grounding

Safety grounding points shall be provided on all electrical equipment, unless otherwise approved by the DOTC-MRT3 Engineer. Grounding points shall be of tinned copper, clean, free from paint, and of a sufficient surface area to ensure proper electrical contact for the grounding cable fasteners. Un-tinned bronze grounding points and austenitic grade stainless steel grounding points are also considered acceptable. The area of any weld joining the grounding pad to a surface shall be at least equal to the cross sectional area of the grounding cable.

Grounding points will have either a tapped hole or, preferably, a clearance hole (with access to both sides) suitably sized for the lug attachment fasteners.

Minimum grounding cable size will be 6 mm^2, unless otherwise approved, and the size will be equal to, or larger than, that of the largest power wire connected to that equipment. All grounding wires and cables shall utilize longitudinally striped green and yellow insulation, or heat shrinkable tubing applied over the conductor insulation.

1.1.15.5. Electrical Interface

Wiring interface connections shall be made by quick coupling (1/4-turn) waterproof, fuel proof connectors, with positive locking and visual indication of mating. These shall be subject to review and approval by the DOTC-MRT3 Engineer.

Terminal blocks, where used, shall be of a high quality, plated stud type wherever possible, with proper creepage and clearance provisions for the voltage used. Terminal blocks shall each be given a unique identification number, and each "point" on the block shall be numbered.

1.1.15.6. Wire Identification

All equipment wires shall be marked with a unique wire identification number by means of marker sleeves located within 50 mm of each end of each wire. The identification numbering system will correspond to the wire identification numbering system used on the schematic drawings and wiring diagrams.

The wire markings shall include the corresponding terminal block number where it is connected, placed distinctly at the far end of each wire marking.

1.1.15.7. Connectors

A single family of connectors shall be used for functionally similar connections on the consist. Separate family of connectors may be used for power connections and control connections. The number of different connectors in the family shall be minimized.

1.1.15.8. Suppression

All relay coils, contactor coils, solenoid valve coils and other inductive devices shall be furnished with coil suppression. Contact suppression shall be provided where necessary or specified.

1.1.15.9. Wire and Cable Installation

Electrical wires and cables shall be run in cleats, conduits, ducts or wire trays, as the application permits, but all shall be protected from physical damage, such as chafing, ballast impact, etc. Wires and cables feeding equipment subject to the elements shall incorporate drip loops to prevent moisture from collecting around fittings.

The Supplier's attention is drawn to the requirements of **Sub-Clause 1.16.4.8** regarding voltage segregation.

All wire and cable installation shall be subject to the approval of the DOTC-MRT3 Engineer.

1.1.16. Fail Safe Design

All equipment and systems affecting train safety and the safety of train crew and passengers, and/or identified as being "vital", "safe", or "fail safe", shall be designed according to the following principles. (Systems such as, but not limited to: Couplers, door system, ATP system, wheel spin/slide system, service brake, emergency brakes, propulsion power shut off and propulsion/braking interlocking shall be included as a minimum.)

a. Only components having a high reliability and predictable failure modes and that have operated in similar service conditions to those in EDSA/MRT3 shall be used.
b. Components must be utilized in such a manner ensuring that a more restrictive, rather than a more permissive condition will result from a component failure. (For example: brakes will apply, rather than release; train will decelerate, rather than accelerate.)
c. Circuits shall be designed such that when a normally energized electric circuit is interrupted or de-energized, it will cause the controlled function to assume its most restrictive condition. (Broken wires, damaged or dirty contacts, a relay failing to respond when energized, etc., shall not result in an unsafe condition.)

d. Component or system failures shall cause the train to stop or to run at a more restrictive speed than that permitted with no failure.
e. System safety equipment design must be such that any single independent, component or subsystem failure results in a restrictive condition. Failures that are not independent, (those failures, which, in turn always cause others) must be considered in combination as a single failure and must not cause a permissive condition.
f. Any component or wire becoming grounded, or any combination of such grounds, shall not cause a permissive condition. Safety circuits shall be kept free of any combination of grounds that will permit a flow of current equal to, or greater than, 75% of the release value of any device in the circuit.
g. Alternatively, redundancies may be included, which shall include not less than two entirely independent, parallel channels to perform each function. If only two channels are provided, a permissive decision shall be required from both for the system not to enter a more restrictive mode of operation. If more than two channels are provided, a more permissive decision shall be required from the majority for the system not to enter a more restrictive mode of operation.
h. During the Design Review process, the Supplier shall submit analyses for review and approval, which demonstrate compliance with these safety principles. These analyses shall address the following issues:

    i. Circuit design,
    ii. Hardware design (Failure Modes, Effect and Criticality Analysis),
    iii. Electrical interference,
    iv. Software errors,
    v. Short circuit analysis (ground, other conductors, etc.),
    vi. Open circuits, and
    vii. System failures.

1.1.17. Standards

All materials and works shall meet the following standards or its recognized and approved equivalent, as stated in sub-clause **1.1.2.3 Codes, Standards and Requirements**

British Standards (BS) – UK

1	BS 3100 (592) - Steel Castings
2	BS 4360 – Steel in Welded Structures
3	BS 1470 – Aluminum Panels
4	BS 1472 – Aluminum Forging
5	BS 1490 – Aluminum Casting
6	BS 4300 – Aluminum Sections
Deutsches Institut fur Normung (DIN) – Germany	
1	DIN 53504 – Testing of Rubber; determination of tensile strength at break, tensile strength at yield, elongation at break and stress values in a tensile test.

Australian Standards (AS) – Australia	
1	AS/NZS 3661 - Slip Resistance of Pedestrian Surfaces - Requirements
International Organization for Standardization (ISO)	
1	ISO 2631 – Evaluation of Human Exposure to Whole-body Vibration
International Electrotechnical Commission (IEC)	
1	IEC 1287-1 – Power Converters Installed on board Rolling Stock
2	IEC 1377 – Electric Traction / Rolling Stock – Combined Testing of Inverter fed alternating current motors and their control
3	IEC 1133 – Electric Traction / Rolling Stock – Test methods for electric and thermal/electric rolling stock on completion of construction before entry into service.
4	IEC 1000-4-8 – Electromagnetic Compatibility (EMC), Part 4: Testing and Measurement Techniques, Section 8: Power Frequency Magnetic Field Immunity Test, Basic EMC Publication
5	IEC 349 – Electric Traction – Rotating Electrical Machines for Rail and Road Cars

American Society for Testing and Materials (ASTM) – USA	
1	ASTM B633 – Standard Specification for Testing for Electrodeposited Coatings of Zinc on Iron and Steel
OTHER STANDARDS	
1	Philippine National Standards (PNS) – Philippines
2	National Fire Protection Association (NFPA 130) – USA
3	Association of American Railroads (AAR) – USA
4	American Iron and Steel Institute (AISI) – USA
5	American Railway Engineering Association (AREA) – USA
6	Bureau of Product Standards, Department of Trade and Industry (BPS) – Philippines
7	MIL STD 1629 – Failure Modes Effects and Criticality Analysis
8	MIL STD 882 – Systems Safety Program Requirements
9	MIL-W-22759/6 – Wire Specifications

IEC Standards

IEC 310	Traction transformers and inductors.
IEC 494	Rules for pantograph of electric rolling stock.
IEC 1133	Electric traction-rolling stock test method on completion of Construction and before entry of service.
IEC 60077-3	Railway applications – Electric equipment for rolling stock – Part 3: Electro technical components – Rules for DC circuit breakers
IEC 60077-4	Railway applications – Electric equipment for rolling stock – Part 4: Electro technical components – Rules for AC circuit breakers
IEC 60077-5	Railway applications – Electric equipment for rolling stock – Part 5: Electro technical components – Rules for HV fuses
IEC 60310	Railway applications – Traction transformers and indicators on board rolling stock
IEC 60322	Railway applications – Electric equipment for rolling stock – Rules for power resistors of open construction
IEC 60349-2	Electric Traction – Rotating electrical machines for rail and road vehicles – part 2: Electronic converter-fed alternating current motors
IEC 60494-2	Railway applications – Rolling stock – Pantographs – Characteristics and tests – Part 2: Pantographs for Light Rail Vehicles
IEC 60529	Degrees of protection provided by enclosures (IP Code)
IEC 60571	Electronic equipment used on rail vehicles
IEC 60631	Characteristics and tests for electro dynamic and electromagnetic braking systems
IEC 60850	Railway applications – Supply voltages of traction systems
IEC 61287-1	Railway applications – Power converters installed on board rolling stock – Part 1: Characteristics and test methods
IEC 61287-2	Power converters installed on board railway rolling stock – Part 2:

	Additional technical information
IEC 61373	Railway applications – Rolling stock equipment – Shock and vibrations tests
IEC 61375-1	Electric railway equipment – Train bus – Part 1: Train communication network
IEC 61375-2	Electric railway equipment – Train bus – Part 2: Train communication network conformance testing
IEC 61377-1	Railway applications – Rolling stock – Part 1: Combined testing of inverter-fed alternating current motors and their control system
IEC 61881	Railway applications – Rolling stock equipment – Capacitors for power electronics
IEC 61991	Railway applications – Rolling stock – Protective provisions against electrical hazards
IEC 62236-1	Railway applications – Electromagnetic compatibility – Part 1: General
IEC 62236-3-1	Railway applications – Electromagnetic compatibility – Part 3-1: Rolling stock – Train and complete vehicle
IEC 62236-3-2	Railway applications – Electromagnetic compatibility – Part 3-2: Rolling stock – Apparatus
IEC 62278	Railway applications – Specification and demonstration of reliability, availability, maintainability and safety (RAMS)
IEC 62279	Railway applications – Communications, signaling and processing systems – Software for railway control and protection systems
IEC 62280-2	Railway applications – Communications, signaling and processing systems – Part 2: Safety-related communication in open transmission systems

ISO Standards

ISO 9000	Quality management systems – Fundamentals and vocabulary (ISO 9000:2005)
ISO 3095	Acoustics – Measurement of noise emitted by rail vehicles.
ISO 3381	Acoustics – Measurement of noise inside rail vehicles.
ISO 2631	Ride Quality

ORE Standards

ORE B55	Circulation of rolling stock on super elevated track.

UIC Standards

UIC 505-1	Car outline –Manufacturing, static and kinematic/dynamic gauge
UIC 505-4	Effects of the application of the kinematics' gauges defined in the 505 series of leaflets on the positioning of structures in relation to the tracks and of the tracks in relation to each other
UIC 513	Guidelines for evaluating passenger comfort in relation to vibration in railway vehicles
UIC 515_5	Powered and trailing stock – Bogies – Running gear – Tests for axle-boxes
UIC 518	Testing and approval of railway vehicles from the point of view of their dynamic behavior – Safety – track fatigue – ride quality
UIC 519	Method for determining the equivalent conicity
UIC 533	Protection by the earthling of metal parts of vehicles
UIC 541_05	Specifications for the construction of various brake parts – wheel slide protection device (WSP)
UIC 541_3	Brakes – Disc brakes and their application – General conditions for the approval of brake pads

UIC 552	Electrical power supply for trains – Standards technical characteristics of the train line
UIC 553	Heating, ventilation and air-conditioning in coaches
UIC 553-1	Heating, ventilation and air-conditioning in coaches – standard tests
UIC 555	Intensity of lighting on passengers compartment
UIC 555_1	Transistorized inverters for supplying fluorescent lamps
UIC 560	Doors, footboards, windows, steps, handles and handrails of coaches and luggage vans
UIC 564_1	Coaches – Windows made from safety glass
UIC 564_2	Regulations relating to fire protection and fire fighting measure in passenger carrying railway vehicles or assimilated vehicles used on international services.
UIC 564-2	Car flooring
UIC 60 494-2	Operational of current collector (pantograph)
UIC 610	Rail vehicles shall be manufactured, assembles, quality controlled and tested (IEC 61133).
UIC 615	Tractive units – Bogies and running gear – General provisions
UIC 615-4	Test of bogie frame structures.
UIC 616	Rules for electric traction equipment (IEC 60077)
UIC 617_4	Position of front and side windows and of other windows situated in the driving compartments of electric powered stock
UIC 651	Layout of the driver's cab
UIC 803_35	Selective list of rigid pipe connections for steel pipes (screw type pipe couplings)
UIC 810_1	Technical specification for the supply of rough rolled non-alloy steel tyres for tractive and trailing stock

UIC 810_2	Technical specification for the supply of rough tyres for tractive and trailing stock - tolerances
UIC 810_3	Technical specification for the supply of non-alloy flat and sectional steel for tyre retention spring rings
UIC 812_1	Technical specifications for the supply of rolled or forged wheel centers for tyre wheels for trailing stock. Quality requirements
UIC 812_4	Technical specification for the supply of tire wheels for tractive and trailing stock. Type fitting and tolerances
UIC 822	Technical specification for the supply of helical compression springs, hot or cold coiled for tractive and trailing stock
UIC 827_1	Technical specification for the supply of elastomer components for buffers
UIC 829_1	Technical specification for the supply of heads for the UIC type automatic coupler with center buffer for tractive and trailing stock
UIC 829_2	Technical specification for the supply of castings in Gray iron, malleable cast iron or spheroid graphite cast iron for the UIC type automatic coupler with a center buffer for tractive and trailing stock
UIC 829_3	Provisional technical specification for the supply of parts in forged or rolled steel intended for the UIC type automatic coupler with a center buffer for tractive and trailing stock
UIC 830_3	Technical specification for the supply of coupler heads
UIC 840_2	Technical specification for the supply of steel castings for tractive and trailing stock
UIC 842_1	Technical specification for the supply of paint products for the protection of railway vehicles and containers
UIC 842_3	Technical specification for the surface preparation of metallic and non-metallic materials used in the construction of railway vehicles and containers
UIC 842_4	Technical specification for methods for testing paint products
UIC 842_5	Technical specification for the protection against corrosion and painting of coaches and tractive units

UIC 842_6	Technical specification for the quality inspection of railway vehicle paint systems
UIC 844_4	Technical specification for the supply of layered panels, with decorative surface, with a base of heat-hardening resins
UIC 845	Technical specification for the supply of elastomer flange connections for intercommunicating gangways
UIC 895	Technical specification for the supply of insulated electric cables for railway vehicles
UIC 896_2	Recommendations for the protection of steel structures against corrosion
UIC 897_13	Technical specification for the quality control of welded joints on steel rolling stock
European Standards	
EN 12080	Railway applications – Axle boxes – rolling bearings
EN 12081	Railway applications – Axles boxes – lubricating greases
EN 12082	Railway applications – Axle boxes – performance testing
EN 12663	Structural requirements of railway vehicle body
EN 13104	Railway applications – Wheel sets and bogies – powered axles – design method
EN 13261	Railway applications – Wheel sets and bogies – axles – product requirements
EN 13272	Railway applications – Electrical lighting for rolling stock in public transport systems
EN 13452-1/-2	Railway applications – Braking – mass transit brake systems.
EN 13715	Railway applications – Wheel sets and bogies – wheels –tread profile
EN 13749	Railway applications – Wheel sets and bogies – methods of specifying

	structural requirements of bogie frames
EN 14363	Railway applications – Testing for the acceptance of running characteristics of railway vehicles – testing of running behavior and stationary tests
EN 15016-1	Technical drawings – Railway applications – part 1: General Principles
EN 15016-2	Technical drawings – Railway applications – part 2: Parts lists
EN 15016-3	Technical drawings – Railway applications – part 3: Handling of modifications of technical documents
EN 287-1 A1	Approval testing of welders-fusion welding-part 1: steel.
EN 287-2 A1	Approval testing of welders-fusion welding-part 1: aluminum and aluminum alloys.
EN 15227	"Railway applications Crashworthiness requirements for railway vehicle bodies"
EN 50121-1	Railway applications – Electromagnetic compatibility – part 1: General
EN 50121-2-1	Railway applications – Electromagnetic compatibility – part 3-1: Rolling stock – train and complete vehicle
EN 50121-3-2	Railway applications – Electromagnetic compatibility –part 3-2: Rolling stock - Apparatus
EN 50124-1	Railway applications- Insulation coordination – part 1: Basic requirements – clearances and creep age distances for all electrical and electronic equipment
EN 50124-2	Railway applications – Insulation coordination – part 2: Over voltages and related protection
EN50125-1	Railway applications – Environment conditions for equipment – part 1: equipment on board rolling stock
EN 50126	Railway applications –The specification and demonstration of reliability, availability, maintainability and safety (RAMS).

EN 50128	Railway applications – Communication, signaling and processing systems – Software for railway control and protection systems
EN 50153	Railway applications – Rolling stock – protective measures relating to electrical hazard.
EN 50155	Railway applications – Electronic equipment used on the rolling stock.
EN 50159-2	Railway applications – Communication, signaling and processing systems – part 2: Safety related communication in open transmission systems
EN 50163	Railway applications - Supply voltages of traction systems.
EN 50215	Railway applications – Testing of rolling stock after completion of construction and before entry into service.
EN 50-264-1	Railway applications – Railway rolling stock cables having special fire performance –standard wall – part 1:
EN 50305	Railway applications – Railway rolling stock cables having special fire performance – test methods
EN 50306-1	Railway applications – Railway rolling stock cables having fire performance – thin wall – part 1: general requirements
EN 50306-2	Railway applications – Railway rolling stock cables having special fire performance – thin wall – part 2: single core cables
EN 50306-3	Railway applications – Railway rolling stock cables having special fire performance – thin wall – part 3: single core and multi core cables (pairs, triples and quads) screened and thin sheathed.
EN 50306-4	Railway applications – Railway rolling stock cables having special fire performance – thin wall – part 4: multi core and multi pair cables standard wall sheathed.
EN 50343	Railway applications – Rolling stock – rules for installing of cabling.
EN 50367	Railway applications – Current collection systems – technical criteria for the interaction between pantograph and overhead line (to achieve free access).

EN 50 355	Railway applications – Railway rolling stock cables having special fire performance – Thin wall and standard wall
EN 60529	Degrees of protection provided by enclosures.
EN 61377	Combined testing of inverter.
EN 60077-1	Railway applications – Electric equipment for rolling stock – part 1: General service conditions and general rules (IEC 60077-1:1999, modified)
EN 60077-2	Railway applications – Electric equipment for rolling stock – part 2: electro technical components – general rules (IEC 60077-2:1999,modified)
EN 14535-1	Railway applications – Brake discs for railway rolling stock – part 1: Brake dics pressed or shunk onto the axle or drive shaft, dimensions and quality requirements
EN 14750-2	Railway applications. Air-conditioning for rolling stock. Mass transit and Light rail vehicle: type tests
EN ISO 15609	Specification and qualification of welding procedures for metallic materials – Qualification based on pre-production welding test (ISO 15613:2004)
EN ISO 15613	Specification and qualification of welding procedures for metallic materials – Qualification based on pre-production welding test (ISO 15613:2004)
EN ISO 3095	Railway applications – Acoustics – Measurement of noise emitted by railbound vehicles (ISO 3095:2005)
EN ISO 3381	Railway applications – Acoustics – Measurement of noise inside rail bound vehicles (ISO 3381:2005)
EN ISO 5817	Welding – Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) – Quality levels for imperfections (ISO 5817:2003)
EN ISO 9000	Quality management systems – Fundamental and vocabulary (ISO 9000:2005)

ASTM 119	Fire tests of buildings construction and material.

1.1.18. Under Floor Wheel Lathe Compatibility

The vehicle shall be completely compatible and workable with the existing under floor wheel truing machine: ATLAS Engineering Company for mechanical machine with Order No. HP5225; Serial No. 5225; date supply 1997 and SIEMENS for controls; SINUMERIK 840C (T) and SIMODRIVE 611D.

The Bogie and wheel & axle design shall allow machining of wheels down to the minimum wheel diameter of 595 mm without any restriction or special attachment whether mounted or dismounted from the vehicle.

In case a different wheel profile is proposed and used, the Supplier shall supply the corresponding cutting tool head and all other attachment deemed necessary at his own cost, including the corresponding program, its implementation inside the PLC control system, and its actual putting into production conditions.

The Supplier shall submit details of the design showing the adaptability of the vehicles to the existing wheel-truing machine for review and approval by the DOTC-MRT3 Engineer.

1.2. VEHICLE BODY

1.2.1. General

The design of each type of vehicle body shell shall be as identical as possible, and shall be designed to withstand the rigors of a railroad environment for a period of 30 years, without major overhaul or rehabilitation. Vehicle bodies shall be as smooth in appearance as possible, with no untoward protrusions in evidence. It is preferred that the sides of the vehicle body are flat.

The vehicle body, including doors and windows, shall be water tight under all operating conditions, including passage through a train washing facility. Water deflecting gutters shall be installed on the roof along the entire side of the vehicle and over the end doors and provided with suitable down spouts. The gutter shall be continuous to ensure controlled drainage at the corners of the vehicle. The gutter design shall ensure that water will not spill over the gutter onto the vehicle body side or onto the platform when braking into station. Water drain shall not directly fall/splash to under body equipment or articulation section.

The Supplier shall provide suitable repair procedures for light damage in case of accident, which shall be approved by the DOTC-MRT3 Engineer.

The external decoration will be kept insofar as possible consistent with the existing fleet.

1.2.2. Materials and Construction

The vehicle body shell shall be of integral construction and shall be manufactured of suitable materials, including but not limited to stainless steel, aluminum alloy, and other high grade materials. All grades used shall be approved by the DOTC-MRT3 Engineer.

The sole bars and cant rails shall be continuous members. All assemblies and sub-assemblies shall be assembled in fixtures to ensure built uniformity and component interchangeability.

Care shall be taken to avoid sections being produced which might retain dirt and moisture, and which might become a source of corrosion. If applicable, carbon steel construction shall be configured to allow all portions to be readily painted (by spray gun or brush) and protected from corrosion: All exterior surfaces shall be primed and painted. All interior metal surfaces shall be coated with a primer for corrosion protection

The vehicle body shall be designed and tested to be watertight, including the requirement to pass through the Systems' vehicle washing facility without allowing the entry of water. The water test procedure shall be approved by the DOTC-MRT3 Engineer/Employer.

All body panels shall be free from wrinkles and other imperfections, and shall be flat within 2 mm in any 1 m span.

No materials used in the construction of the vehicles shall give rise to health hazards for passengers or staff. Materials shall be suitable for normal repair operations (cutting, welding, etc.) without the need for the staff to be protected by other than normal means. Materials shall be in accordance with the relevant standards, appropriate for the application. Particular attention shall be paid to fatigue limit, corrosion and material degradation with elements and time.

1.2.3. STRUCTURAL REQUIREMENTS

1.2.3.1. General

The vehicle body shells shall be of integral construction and shall be designed and tested to withstand the loading conditions described herein. The Supplier shall submit a stress analysis for the review and acceptance of the DOTC-MRT3 Engineer. The stress analysis shall include the use of a suitable Finite Element Model (FEM), supported by classical hand analysis for detailed components. The FEM analysis and all results shall be approved by the DOTC-MRT3 Engineer.

1.2.3.2. End Loading and Deflection Requirements

The yield strength of all structural members shall withstand a uniform vertical load of AW3 minus AW0 with at least a 50% margin.

The vehicle body shell shall be designed and tested to withstand a compressive end load of 400 kN applied through the head stock, in combination with the most

adverse vertical loading associated with the W0, W1, W2, and W 3 loading conditions.

The combined stresses from the above vertical load and the above static compression end load shall not cause any residual deformation in any part of the car body and shall not exceed 90% of the yield value of the material used.

The vehicle body shell shall be designed and tested to withstand a compressive and tensile end load of 400 kN applied through the draft gear attachment points, in combination with the most adverse vertical loading associated with the W0, W1, W2, and W3 loading conditions.

For all load cases, all vehicle body members shall remain elastic, with no evidence of buckling. The test pass/fail criteria shall be as approved by the DOTC-MRT3 Engineer.

The vehicle body shell shall be designed and tested to ensure that under W3 loading conditions positive camber exists between bogie centers. The Supplier must ensure, and must demonstrate by test, that all doors operate freely under all vehicle body loading conditions, and will not disengage from their guide ways under the lateral loading conditions exerted by crush-loaded passengers.

The Supplier shall also design and test the door posts, the corner posts and the Driver's cab end structure in accordance with the latest industry practices.

1.2.4. CRASH WORTHINESS REQUIREMENTS

The vehicle body structure shall be designed and constructed as a relatively "rigid" compartment housing the passengers, incorporating specific features at each end of the vehicle to absorb impact energy. The vehicle body design shall also incorporate anti-climbers on both ends of the vehicle, to prevent one vehicle from climbing over another in the event of a major collision. Each anti-climber shall have at least three ribs.

The impact energy shall first be absorbed by the coupler draft gear. The vehicle body anti-climbers will engage and excess impact energy shall next be absorbed by elastic deformation of the vehicle structure. Should the impact energy still not have been absorbed by the vehicle, and accelerations experienced by the passengers be approaching levels which might cause injury, the ends of the vehicles (No-passengers areas) shall plastically deform in a controlled manner to limit the rise of vehicle acceleration and to minimize passenger injury.

The philosophy of the entire vehicle crash energy management system and its detailed design will comply with standard EN 15227 –**"**Railway applications Crashworthiness requirements for railway vehicle bodies" , and shall be submitted to the DOTC-MRT3 Engineer for review and approval.

1.2.5. JACKING AND LIFTING REQUIREMENTS

Jacking and lifting points/pads shall be provided for normal maintenance operation, sized and positioned to readily accept existing lifting equipment.

In addition to these jacking and lifting points, emergency jacking and lifting points shall be provided to allow jacking/ lifting under emergency situation, including derailment.

The locations of all jacking and lifting points shall be clearly accessible and marked on the vehicle body. The emergency jacking and lifting points shall be identified in a specific way.

The re-railing operating procedures following emergency situations (Including derailment), as well as the special tackles and accessories needed for carrying out this kind of operations, will be part of the supplying.

The vehicle body shell shall be designed and tested to allow an empty vehicle, with bogies attached, to be lifted at the extreme ends at the bolster jacking pads, or any combination thereof (particularly during re-railing operations), without exceeding the yield strength of any portion of the vehicle body.

1.2.6. ARTICULATION

The articulation section, mounted on the middle bogies shall provide attachment and support for the two vehicle body sections. An outer shield shall be provided on both sides and on the roof to protect the articulation. The side shield shall use the same material and design as the vehicle body sidewall. The roof shield shall be designed to avoid direct water flow into the articulation.

The articulation shall be designed for ease of passenger movement from one vehicle body section to the other without the use of doors. The width of the articulation section shall be as near to the two adjacent vehicles body sections as possible and shall ensure the safety of passengers. The floor of the articulation section shall be at the same height as the vehicle floor. The headroom in the articulation section area shall be at least 2,000 mm.

The swivel plate of the articulation section shall be equipped with rolling support and designed to allow W3 loading condition. The close-off panels shall be arranged to prevent any injuries to passengers and crew.

1.2.7. VEHICLE ROOF

Roof construction shall be sufficiently robust as to allow several maintenance personnel to walk over the roof at one time, without causing undue deflection or permanent deformation. Rain gutters shall run for the full length of the vehicles to prevent the spillage of rainwater over passengers when train is entering or leaving stations. Both ends of the vehicle shall have catch gutter provided with adequate water drainpipe that runs to the lowest possible point under the vehicle.

A roof mat under and around the pantograph area shall be installed to provide electrical insulation and anti-slip surface. In addition, anti-slip surface shall also be provided along the roof covering the whole length of the vehicle.

1.2.8. FLOOR

The floor structure shall be designed to minimize the life cycle cost of the floor over 30 years, especially considering the need or otherwise to replace the floor at mid life of the vehicles. The floor and its mounting structure shall be designed to withstand any loading condition specified herein, that may be applied over 30 years in normal operation of the train. The floor design shall allow the floor covering to be removed without damage to the floor sub-structure.

Transverse joints shall be located over vehicle body structural members and away from doorways.

All exposed edges of the panels, including openings for ducts and conduits, and joints between panels, shall be waterproofed and adequately sealed.

Floor panels shall be insulated from the metallic structure by adapted materials. At all door openings, the floor shall have a weather tight connection with the threshold plates. Rubber flooring materials and installation shall be in accordance to the provision of **Sub-Clause 1.5.4** of this MRT3 specification and Performance Requirements.

1.2.9. EQUIPMENT MOUNTING

1.2.9.1. General

Equipment arrangement on all vehicles shall be such that under W0 loading conditions, the weight distribution is as even as possible. The weight distribution will follow the general rules as stated in sub clause **1.1.7.1**

All equipment mounts shall meet the requirements of **Sub-Clauses 1.1.9** and **1.1.12** of this MRT3 specification and Performance Requirements and shall have a fatigue life of not less than 30 years.

Equipment shall be logically grouped into enclosures, which shall meet the requirements of **Clause 1.16** of this MRT3 specification and Performance Requirements. Care shall be taken to ensure that the equipment within the enclosures is readily maintainable, taking into consideration the required maintenance interval. Mounting of equipment enclosures/boxes shall as much as possible be made to allow easy access and opening given the constraints of the existing maintenance pit/facility.

All equipment and equipment cases shall be mounted such that removal and replacement of each is possible without requiring the removal of other major equipment or cases. Similar but non-interchangeable parts shall have different mounting arrangements, to ensure against mistakes in fitting.

All fasteners of the same material used to attach components to the vehicle body shall be of the same grade.

1.2.9.2. Grab Rails and Steps

To allow the Driver to board and exit the vehicle when not at platform level, one set of steps shall be provided under each door near the Drivers Cab and suitable grab rails shall be provided. The grab rails shall be manufactured from stainless steel, at least 35 mm in diameter.

Also, one set of steps shall be provided under the middle passenger side entrance door on both sides, positioned symmetrically, to allow passengers to exit the vehicles under emergency conditions.

The same set of steps shall also be provided under each door near the hostler panel for the use of both driver and maintenance personnel in depot operations.

The stiffness and strength of the grab rails and their connections shall be designed and tested to ensure that they will withstand the rigors of use and the environment. Specifically, they shall be designed and tested to withstand, without permanent deformation, a load of 1.3 kN applied at the midpoint of the span. The grab rails and their arrangement shall be approved by the DOTC-MRT3 Engineer.

The stiffness and strength of the steps and their connections shall be designed and tested to allow use by a person exerting a force of 1.3 kN (load applied at a 45^{o} angle), without permanent deformation, and with the maximum deflection limited to 1 mm. The steps and their arrangement shall be approved by the DOTC-MRT3 Engineer.

1.2.9.3. Exterior Lights

Head lights shall be able to provide “high” beam at a distance of 100m and “low” beam at a distance of 30m in front of the consist.

A service-proven headlight (white) shall be provided on each side of the end of each cab vehicle. Similarly, one set of service-proven red tail marker lights and white marker lights shall be provided on the end of each cab vehicle. Two red brake lights shall be provided on the end vehicle. Brake lights and tail lights may be combined. Each set of lights of each color shall be powered from individually protected separate circuits.

When both end cabs in a 4-vehicle train are inactive, all taillights shall be illuminated. When a cab is activated by the Driver, the headlights on that cab shall illuminate, and the taillights shall switch off. (The taillights on the non-active cab shall remain illuminated.) The white marker lights shall be lit when vehicles are driven in reverse direction or the shunting control (hostler) panel is activated.

There shall be two indicating lights above each door, one inside and one outside. The lights shall be illuminated when the door is open and not illuminated when

the door is closed. The lights shall be blinking together with audible warning during opening and closing cycle of the door. The light shall be illuminated together with an indication on the driver's panel when the door is faulty and/or isolated.

1.3. BOGIES

1.3.1. General

The vehicles shall be supported on two axle bogies incorporating primary and secondary suspension system.

The bogies shall be designed and manufactured to minimize the unsprung mass and provide service for a period of not less than 30 years, under normal use and maintenance.

Bogies shall be designed and manufactured such that as many components as practicable are fully interchangeable. All bogie assemblies will be fully interchangeable with each other respectively. The entire bogie shall be suitably protected against corrosion and adequately painted.

Provision shall be made in the bogie design to allow vertical mechanical adjustment to compensate for wear of other truck parts. It shall be possible to adjust vehicle body height for wheel wear without having to remove the bogie from the vehicle. The design shall allow for lifting the bogie with the vehicle body.

The Supplier will be required to provide documented evidence of the ability to meet the above requirements.

The motors shall be mounted on the bogie frame. Bogies will be as light as possible, commensurate with meeting the requirements of this MRT3 specification and Performance Requirements.

The bogies shall be compatible with the existing under floor wheel truing machine and lifting equipment now installed at EDSA/MRT3 Workshop, without the need for removal of bogies or disassembly of any major parts from the bogie or the vehicle body or to add interfacing hardware.

Lifting eyes of sufficient strength shall be provided at four points on the bogie frame to permit level lift and transport by shop crane of the fully assembled bogie.

Slewing rings shall be provided with adequate number of standard grease fittings.

The entire bogie design will be subject to the approval of the DOTC-MRT3 Engineer.

1.3.2. Suspension System

1.3.2.1. General

Bogies shall utilize the primary and secondary suspension systems, the characteristics of which shall provide optimal riding comfort, low transmissibility of vibration to the vehicle body and minimize impact and vibration noise, as per the relevant sub-clauses of the present specification.

The bogie design shall provide good curving performance to minimize wheel noise and wheel/rail wear.

The suspension system shall be such as to ensure that the vehicle remains within the static clearance diagram under all conditions of passenger loading, track super elevation, etc., and within the dynamic clearance diagram under all combinations of passenger loading, vehicle speed and track curvature, consistent with the system's track curvature / speed restrictions. The vehicles must remain within both clearance diagrams under the conditions of broken or defective primary or secondary suspension.

The rotational resistance of the bogie/vehicle body interface and the bogie suspension elements shall be such as to minimize excessive wheel flange contact and, hence, minimize wheel squeal and wheel/rail head wear, while preventing yaw instability (hunting) throughout the vehicle's speed range.

The bogies shall be designed to allow the complete vehicles to meet the ride quality requirements of **Sub-Clause 1.1.10** of this MRT3 specification and Performance Requirements.

A load weight equipment is required to provide a signal to the load weigh system to control and regulate the traction effort and braking forces under all vehicle-loading conditions.

1.3.2.2. Primary Suspension

The primary suspension shall be designed to provide the required degree of wheel set guidance and to minimize wheel flange wear. However, wheel set yaw stiffness and damping shall not be such as to allow a yaw instability condition throughout any portion of the vehicle speed range. Primary suspension vertical stiffness shall not be so great as to impart undue forces on the rail under dynamic conditions, and shall be sufficiently flexible to prevent the degree of wheel unloading that would cause a derailment, under all conditions of track irregularities, curvature, super elevation, etc., consistent with vehicle speed.

1.3.2.3. Secondary Suspension

The secondary suspension shall be designed to provide the required level of riding comfort, to insure low transmissibility of vibration to the vehicle body and to minimize impact and vibration noise. Vertical and lateral dampers are required to control bogie to vehicle body oscillations and movement.

1.3.2.4. Wheel Unloading

The bogies shall be designed to enable the safe operation of the vehicles on the most adverse track condition, with any combinations of suspensions failure. Under this condition, the maximum unloading of any wheel shall not exceed 60% of the nominal wheel load. The nominal wheel load is defined as each individual measured wheel load with the vehicle standing on a straight and leveled track.

1.3.3. Bogie Frame

The bogie frame shall be manufactured using internationally accepted methods and materials. The frame shall be of simple design requiring a minimum of machining. All frame attachment points shall be readily accessible for inspection and maintenance purposes. The bogie frame shall be suitably protected against corrosion and adequately painted (Primer anticorrosion coating, PU paint or similar, according to the best railways industry practices and standards).

The bogie frame design shall carefully take into account the fatigue phenomenon by avoiding at maximum constraints concentration due to welding process or location, sudden changes of section or shape, sharp or small radius fillets, and will offer an adequate protection against corrosion and external aggressions

Machining datum points shall be provided on the bogie frame to allow frame distortion to be readily assessed after a derailment or collision.

1.3.4. Wheels and Axles

Wheels shall be of resilient type, of proven design from reputable manufacturer. The wheels shall be compatible and accessible with the existing EDSA/MRT3 wheel removal and wheel truing system.

The preferred wheel tread profile is defined in Drawing No. LRT/B/220/10103 (Technical Description of Wheel). The profile will be such as to provide a minimal wheel flange wearing in the sharp 25m radius curves in the depot. Should a different profile be proposed, the Supplier will demonstrate its adequacy compared with the current profile, as for the characteristics of the wheel/rail contact, and its appropriateness as for the minimization of the wearing in the above mentioned conditions. The profile will be subject to the approval of the DOTC-MRT3 Engineer.

Axles shall be provided with mounting arrangement for disc brake (If applicable) and current return assemblies. Axles shall be designed to permanently withstand a maximum axle load of between 8,500 kg and 10,000 kg and have a fatigue life of not less than 30 years.

Wheels, disc brake assemblies (If applicable) and gears shall be assembled to the axles by cold pressing. Full details of the axle, wheel and gear machining details shall be provided, together with process details, including the specific type of lubricants used. The Supplier shall provide the pressing records of all wheel sets in the Vehicle History Books.

1.3.5. Axle Boxes

Axle box bearings shall be of the grease lubricated roller type.

Bearings shall be sealed by labyrinth seals and if replenishment of grease is required between overhauls, this shall be possible without removing any other equipment. Suitable standard grease fitting shall be provided for this purpose.

It is preferred that the axle boxes assemblies are fitted with embedded hot box detection sensors, which will deliver information to the TMS system.

Any design incorporating a wearing surface between the axle box and the bogie frame will not be accepted.

1.3.6. Traction Motor Installation

Attention is drawn to the requirements of **Sub-Clause 1.3.1** of this MRT3 specification and Performance Requirements. The design of the motor installation shall also be configured such that should the motor mounting hardware fail, the motor will not fall from the bogie and cause a derailment.

1.3.7. Bogie-Mounted Brake Equipment

The mechanical braking will be achieved from ventilated split type brake discs. Brake actuators of the spring-applied, electric release/modulation type, shall be mounted to the bogie frame. One actuator per disc shall be used.

The mechanical braking force shall be modular.

Parking brakes shall be installed in the Bogies. The parking brakes shall be with spring-applied park brake function, through electrically/Manually released brake actuators. By design, as electric energy is released from the brake cylinders, the spring brakes will apply.

In the emergency/safety braking mode, it is preferred that track brakes mounted on the longitudinal members lower and provide a braking force by applying on the rails. Nevertheless, a different design involving other technical solutions can be proposed, provided that the manufacturer demonstrates the appropriateness and comparable efficiency of this design. This system shall receive approbation from the DOTC-MRT3 Engineer

Suitable slack adjusters shall be provided for the brake actuators. It shall be possible to isolate the friction brake system individually in each bogie. The Supplier shall perform a performance test of the friction brake and submit the corresponding friction factor curve for review and approval by the DOTC-MRT3 Engineer.

The possible consequences of one or several brake systems isolation on the operation, if any, will be fully integrated by the constructor in the Operation Manual (Speed restriction, withdrawing from operation, etc…).

The information about brakes systems isolation will be transmitted to the driver through the TMS/DDS, together with the possible restrictions to operation

1.3.8. Miscellaneous Bogie-Mounted Equipment

The bogies shall be equipped with all pertinent equipment needed to meet the requirements of this MRT3 specification and Performance Requirements, including, but not limited to, ATP equipment, speed sensors, lifting lugs, piping, cabling, etc.

All resiliently mounted equipment on the bogie shall be designed to avoid resonance with all bogie suspension frequencies.

All fasteners of the same material used to attach components to the bogie shall be of the same grade.

All grounding shall be in accordance to the provision of **Sub-Clause 1.1.15.4** of this MRT3 specification and Performance Requirements.

1.3.9. Bogie-to-Vehicle Body Connection

Means shall be provided for the bogies to be retained by the vehicle body when the vehicle body is lifted, and the bogie-to-vehicle body connection must also retain the bogies in the event of a collision.

Bogie/vehicle body connections shall be designed to avoid the transmission of noise and vibration.

It shall be physically impossible for connections to be mismatched.

For maintenance purposes, the separation of the bogie from the body shall be made as easy, simple and fast as possible, using the existing facilities and needing no other special equipment, and minimizing as much as possible safety issues for the maintenance personnel.

1.3.10. Bogie-to-Vehicle Body Clearance

Under all conditions of movement between the bogies and the vehicle body, including damaged or defective suspensions conditions, there shall exist a minimum clearance of 50 mm between bogie-mounted and vehicle body-mounted equipment.

1.3.11. Structural Requirements

Unless otherwise specified, bogies and bogie-mounted equipment shall comply with the industry standard requirements. Should the Supplier's past experience indicate that different load cases are more appropriate, supporting data shall be submitted to the DOTC-MRT3 Engineer for consideration and approval.

A stress analysis of the entire bogie structure shall be performed using a Finite Element Model (FEM). The model, its type and number of elements, and the criteria used for the acceptability of stress levels shall be subject to the review and approval

of the DOTC-MRT3 Engineer. The results of the FEM analysis shall be presented to the DOTC-MRT3 Engineer for approval.

In addition, the Supplier shall provide Proof Load Case and Fatigue Load Case for all Bogie and Axle mounted equipment and parts for approval by the DOTC-MRT3 Engineer.

1.4. COUPLERS AND DRAFT GEAR

1.4.1. General

The LRV shall be equipped with fully automatic couplers.

These couplers shall be compatible with the couplers on the existing fleet, for purposes of towing an inoperative LRV in the conditions specified in **sub clause 1.1.8.5.**

Couplers and draft gear shall be capable of withstanding all coupling, buffing and draft loads to be expected in normal and emergency conditions. The draft gear shall be suitably damped and be designed to prevent the occurrence of unduly large dynamic deflection and associated forces under the above condition.

A shock absorption device is designed to ensure absorption of high buffing loads. It is arranged in the coupler shank between the mechanical head and the bearing bracket and protects the car under frame from being deformed .The impact load is converted into deformation energy by plastic deformation of a tube. The force and stroke curve is rectangular without peak load .Both the release load and the stroke of the shock absorption device are synchronized with the compressive strength of the car.

When the permitted impact load is exceeded, a so-called overload protection device will allow for movement of the coupler while anti-climbers become engaged and transmit forces to the structure fuses. The overload protection device will either form part of the coupler or part of the connection coupler bracket to car body.

The coupling/uncoupling of vehicles shall be made easy in all configurations of wheel diameters, track alignment, grade conditions.

1.4.2. Fully Automatic Couplers

The car is provided with fully-automatic couplers. Height of the coupler head axis above Top of Rail (TOR) equals to 545 mm with unloaded car and new wheel diameter of 700 mm.

Connection of electric circuits of both the coupled cars is made possible through contact blocks. Coupler contact pins for use by the approved communicating equipment shall be provided.

In all cases, care shall be taken to ensure that strain relief is provided for all cables leaving the junction boxes, and that all cables are properly supported in suitable

cleats, and that no chafing of the cabling takes place under all possible movements of the coupler.

The arrangement shall prevent damage from coupling with misaligned couplers, and shall minimize damage to the vehicle body wiring, should excessive tension be applied to the cables in the event of an accident.

The couplers shall be designed to prevent the coupler swinging transversely when it is not coupled.

The entire design of the fully automatic coupler arrangement shall be approved by the DOTC-MRT3 Engineer.

1.4.3. Draft Gear

Each coupler type shall utilize rubber, double acting draft gear capable of withstanding all of the loads described in this MRT3 specification and Performance Requirements, and which will not transmit undue vibrations into the vehicle body.

1.5. VEHICLE INTERIOR

1.5.1. General

The interior of the vehicles shall be aesthetically pleasing and the arrangement and materials used shall reflect the current industry standards.

The interior arrangement will in so far as possible show no major inconsistency with the one of the existing fleet.

All materials used must meet the fire safety requirements of **Clause 1.17** of this MRT3 specification and Performance Requirements. The interior arrangement shall allow for easy maintenance, and all edges shall be rounded to the possible extent to preclude passenger injury and to facilitate cleaning. The entire interior arrangement, including choice of hardware, shall be approved by the DOTC-MRT3 Engineer.

The Supplier shall provide a selection of colored artist's renderings for review by the DOTC-MRT3 Engineer. Using these as a foundation, the Supplier will work with the DOTC-MRT3 Engineer to supply a final set, which will be used as the basis for the color and configuration of the interior arrangements of each type of vehicle.

Visible fasteners in the passenger compartments and the Driver’s cabs shall be held to the absolute minimum, and will only be allowed with the approval of the DOTC-MRT3 Engineer. When allowed, fasteners must be of the tamper-resistant type, manufactured from stainless steel.

The Supplier shall also provide design drawings and passenger seating and flow analyses of a floor plan incorporating the use of longitudinal seats.

1.5.2. Insulation

1.5.2.1. Thermal Insulation

The vehicle body side walls and roof shall be insulated with a suitable grade of fiberglass insulation, which shall have been treated to resist fungus and mildew. The fiberglass insulation shall be installed so as to prevent dispersion of fibers, shakedown in service and where accessible shall be suitably protected/covered.

1.5.2.2. Acoustic Insulation

Where found necessary by the Supplier's noise analysis, visco-elastic sound damping material shall be installed in the vehicle to damp noise-generated vibrations.

1.5.3. Interior Finish

Interior finish panels shall be lightweight, of balanced construction to minimize warping under differing temperature conditions, shall be vandal resistant (impact, graffiti, etc.), and shall have a proven record in rail transit service. The panels shall not fade nor discolor over time.

The edges of interior finish panels shall be rounded to the possible extent to preclude passenger injury and to facilitate cleaning. Likewise, the surfaces of interior finish panels shall be smooth, and no edges shall be created which will cause dust traps. Joints between panels shall be covered by aluminum extrusion, stainless steel strips or other approved means.

The interior close off panels on the side of the vehicle shall be designed to accept information/advertisement cards similar in size and thickness to those presently used by the existing vehicles.

1.5.4. Flooring

The interior flooring shall be supported by the vehicle body under frame structure, which shall be constructed to minimize floor deflection under full passenger loading (8 passengers/m^2).

The interior flooring shall cover the entire passenger compartment area, and shall consist of plywood, ply metal or composite sheets securely fastened to the vehicle body under frame structure, covered with transit grade rubber sheeting.

To prevent noise due to vehicle deflections, the sheets shall be insulated from the metallic structure by a suitable material. The rubber flooring of non-slip material will be required to continue up the side walls by approximately 200 mm, to provide a sanitary cove. Should it not be feasible to utilize a single width of rubber flooring, three lengths of flooring shall be utilized, with one of the lengths being installed in the center of the vehicles. The seams of all joints shall be welded and made water tight.

The rubber flooring material shall meet the following performance requirements:

a. Slip resistance of 0.75 dry and 0.62 wet in accordance with AS/NZS 3661 or equivalent international standard,
b. Hardness of Shore A Hardness >90,
c. Resistance to chemicals in accordance with DIN 51958 6h/80^{o}C with no noticeable variation, and
d. Tensile strength in accordance with DIN 53504/B.S. 903 Part 42 to 80Kg/cm^{2}/8min/MPa.

The entire floor construction shall be required to pass a fire resistance test in accordance to the requirements of NFPA (130).

All floor penetrations (for piping, conduit, etc.) shall be suitably sealed against the elements, and samples of such floor penetrations must be included in the fire barrier test piece.

The entire floor design shall be approved by the DOTC-MRT3 Engineer.

1.5.5. Ceiling

The vehicle ceiling shall present an aesthetically pleasing smooth appearance, and shall incorporate lighting fixtures, conditioned air outlet grilles, public address speakers, etc. The ceiling panels and fixtures shall not vibrate, rattle or squeak during normal service conditions.

The vehicle ceiling shall be of a design avoiding the creation of dust traps, the materials being soiling resistant and allowing an easy cleaning when needed.

1.5.6. Passenger Seats

The Supplier shall propose a longitudinal seating arrangement.

The seats shall be manufactured from Glass Fiber Reinforced Polyester or other approved material. Lengths of single unit of seat shall not exceed the length enough for two persons and shall be suitable and ready to be assembled to form various lengths without ridge on joints. The seat design shall eliminate gaps that will trap dirt or liquids.

All seats shall be installed in a cantilevered manner, with no floor supports, to facilitate the cleaning of floors. The Supplier's attention is drawn to the need to substantially increase the section modulus of the vehicle body sidewall posts to which the seats are attached in order to limit seat/sidewall deflection.

Each seat module (On a 2 persons basis) is required to support at least 200 Kgs.

The Supplier will be required to perform structural tests on the seats in accordance with industry standards.

The Supplier will be required to supply documented evidence that the seats proposed have provided trouble-free service in a similar operating environment.

The seats will be easily and quickly replaceable.

1.5.7. Accommodation for the Elderly, Persons with Disabilities (PWD) and Pregnant Passengers

Three (3) seats on each extremity of the vehicle shall be designated for persons with disability, elderly, pregnant passengers, adjacent to the doors on both sides. The PWD and elderly passenger seats shall be clearly labeled by a decal which represents the international symbol of access above the seats on the interior side wall and two (2) wheelchair spaces should be provided for each vehicle.

1.5.8. Stanchions and Handholds

Suitable grab rails and stanchions shall be provided to allow passengers to stand comfortably at all times. Suitable stanchions/grab rails shall be provided in the articulation section. Grab rails and stanchions shall be manufactured from stainless steel of diameter large enough to be easily and comfortably gripped. The stiffness and strength of the grab rails and stanchions, and their connections, shall be designed and tested to ensure that they will withstand the rigors of service and environment.

Vertical stanchions shall be designed and tested to withstand without permanent deformation, a horizontal load of 1.5 kN applied in any direction at the midpoint. Horizontal handholds shall be designed and tested to withstand, without permanent deformation, a vertical load of 1.5kN applied at the midpoint of the span.

All attachments shall be made by means of stainless steel fittings properly cushioned to prevent rattling and shall be such that unauthorized removal or vandalism will be impossible (Tamper-resistant type), while creating no risk of injury for passengers.

All fittings shall permit easy removal and installation for maintenance purposes.

1.5.9. Strap Hangers

The Supplier shall formally review the need for strap hangers as a supplement to the handrails and grab poles. The Supplier shall submit a report on the result of this review and a recommendation on the viability of the inclusion of the strap hangers for the review of the DOTC-MRT3 Engineer. The Supplier shall provide the strap hangers as determined and approved by the DOTC-MRT3 Engineer.

1.5.10. Windows and Glazing

All side windows (including windows in the doors) shall be single glazed with toughened/tempered glass to current railway industry standards.

Windows shall be tinted neutral gray, with approximately 28% visible light transmission, subject to approval by the DOTC-MRT3 Engineer.

Window assemblies shall be watertight sealed, free from rattles, and the window and mountings shall be capable of withstanding the pressure differentials associated with

head-on pressure, passing trains, prevailing winds, etc. The windows and mountings shall also be able to withstand the loads imposed by passengers leaning on them under crush loaded conditions.

The side windows shall consist of two sections, with an upper section which can be opened inwards in case of air conditioned failure, and a fixed lower section.

The window assembly shall be removable in no more than 30 minutes from the interior of the car.

1.5.11. Passenger Compartment Lighting

The passenger compartment of each vehicle shall be illuminated by two continuous rows of fluorescent fixtures, one on each side of the car. Fluorescent tubes and fittings shall be covered by diffusers, which shall seal against dirt and dust ingress and moisture. Lighting diffusers shall be easily cleaned in situ and shall be hinged on one side for easy access to the fluorescent tubes. Diffusers shall be secured in position with tamper-resistant fasteners. Fluorescent tubes shall be standard, commercially/locally available units, with bi-pin connectors, having a minimum declared life of at least 5,000 hours.

The lighting arrangement shall be configured to provide uniform lighting, to eliminate glare and to minimize the creation of shadows. The lighting intensity at passenger reading level shall be no less than 400 lux, and no less than 250 lux at floor level.

Emergency lighting will be provided by the fluorescent tubes in the doorway areas, which shall be powered from the battery. Under emergency conditions, the lighting at floor level shall be no less than 30 lux.

The lighting shall not be interrupted when the consist passes through a neutral section of the overhead line. Care shall be taken to ensure that flickering does not occur during train starting or normal running.

1.5.12. Signs and Decals

The following signs, as a minimum, shall be provided in both Filipino and English languages. All decals shall be vandal and graffiti resistant, and shall be edge-sealed.

The decals for the vehicle exterior shall be weather resistant (Water, dust, pollution, ozone, UV).

The art work shall be approved by the DOTC-MRT3 Engineer prior to manufacturing. The number and location of the decals and the materials used shall be as approved by the DOTC-MRT3 Engineer.

1.5.12.1. Passenger Compartments

Decals for, but not limited to the following, shall be installed inside the passenger compartments.

a. International symbol of access to disabled, elderly, pregnant women decals
b. No Smoking decals,
c. No Eating decals,
d. No Animals decals,
e. System route maps,
f. Door warning notices,
g. Door numbers
h. Emergency notices,
i. Vehicle body Number,
j. "No Littering" Notices,
k. Hold to Handrail/Hand Grip Notices, and
l. Fire Extinguisher Marker.
m. Door emergency release
n. Passenger Emergency Interphone

System route maps shall be printed on thick paper and mounted in stainless steel or aluminum frames over each doorway. The frames shall allow the easy installation and removal of the maps. The arrangement shall be as approved by the DOTC-MRT3 Engineer.

Emergency and Door Warning Notices shall be covered with clear hard plastic for approval by the DOTC-MRT3 Engineer.

1.5.12.2. Vehicle Exterior

Decals or markings for, but not limited to the following, shall be installed on the vehicle exterior.

a. The Service logo,
b. Vehicle number,
c. Identification of lifting and jacking points,
d. Batteries
e. Electric equipment
f. Indication of hatches and lids
g. Identification of other maintenance requirements,
h. Door Gap and height reminders,
i. Safety Reminders.
j. Marking on bogies

1.5.13. Miscellaneous Equipment

Fire extinguishers of the 3kg dry powder type, or equivalent, shall be provided. One shall be fitted in the Driver's Cab and two shall be fitted in the passenger's area, one in each extreme passenger section. Those in the passenger compartment shall be recessed in a break glass cabinet, but shall be readily accessible.

1.5.14. Driver's Cab

1.5.14.1. General

A Driver's cab shall be provided at each Car. Particular attention must be given to the ergonomic design of the cab and its controls to achieve efficient and comfortable working conditions. Notably, all controls and accessories commonly used during the driving process will be naturally reachable from the normal driving position (Operator seated in his driving seat).

1.5.14.2. Windshields and Wiper

Windshields shall be of neutral tinted toughened/tempered safety glass, meeting current railways industry standards for impact resistance, and shall provide maximum vision for driving.

A sun visor shall be installed to provide protection from direct and reflected sunlight over as large an area as possible.

Windshields shall be provided with external electric wiper/washer units and defogger units. At least 80% of the width and 60% of the height of the windshield shall be swept over a complete cycle. The drive units shall provide adjustable speeds of operation with intermittent function and "park" position. The washer unit shall be provided with at least 12 liters of water reservoir, with visual water level gauge, located for easy filling from ground level outside the car.

1.5.14.3. Driver's Seat

Service-proven Driver's seat shall be provided, which shall be adjustable both vertically and horizontally to allow the Drivers to sit and perform their duties in the optimal comfort conditions. The seat shall be upholstered in air permeable material.

The seat shall have as a minimum the following adjustments:

a. Vertical seat height,
b. Horizontal distance from console (forward/backward),
c. Backrest angle,
d. Lumbar support,
e. Head rest, and
f. Revolving movement with locking system.

Insofar as possible, a leg rest will be provided for the driver's use, as well as a folding seat for possible extra operation officers.

1.5.14.4. Cab Air Conditioning System

The driver's cab shall be provided with cooled air supply in order to maintain the desired interior temperature, air flows direction and quantity, in the same temperature conditions as stipulated in **sub-clause 1.7.4.1.**
The controls for air temperature, air flow direction and quantity, shall be easily reachable and adjustable by the driver.

The Supplier's attention is drawn about the increased solar load through the cab's windshield and the heat load produced by the equipment inside the driver's cab, which the air supply arrangement must account for.

1.5.14.5. Destination Signs

An electronic destination sign shall be installed in the driver's cab above the windshield. The destination sign shall also indicate the train running number. A hinged panel shall be installed in the Driver's cab to provide ready access to the destination sign unit. The destination signs shall be programmable by the Driver from his/her console. After the Driver has activated a cab and programmed the destination signs for a terminus station, it shall automatically indicate the return terminus station after the train has stopped and the opposing cab has been activated. The destination sign in the non-active cab shall automatically indicate the same destination as in the active cab. Destination signs shall also be capable of indicating that a train is not in service.

The design of the destination sign shall allow manual override in case of defect in the electronics system.

1.5.14.6. Cab door

Insofar as possible, more than the interior lockable door allowing communication between the driver's cab and the passengers' area, a lateral cab door of the sliding type will be provided, allowing the driver to leave/access the cabin from outside, manually operable and lockable.

1.5.15. Cab Controls of Driver's Cab

1.5.15.1. General

The majority of the Driver's controls shall be incorporated into a modern console design between the Driver's seat and the cab front end structure. All controls shall be within easy reach of the Driver and shall be logically located for optimal usage. The console arrangement will present no major inconsistency with the one on the existing fleet of MRT3 cars.

Any control operation (Untoward or incorrect selection of a switch position, etc.) shall be recorded in the Digital Diagnostic System and in the vehicle level computer (Event recorder). This memory shall be physically located in a position on the train such that it will be extremely unlikely to receive damage during a train collision. The intent is that this memory shall be readily available to support any accident investigation.

The following minimum Driver's controls shall be provided on the console:

a. **OCC Communications Cluster**, consisting of radio with microphone, voice synthesizer,
b. **Door Controls Cluster,**

c. **Digital Diagnostic System Panel**, with the following information, such as: Depiction of data on LCD with adjustable brightness; recording of data to back-up memory together with time indication; depiction of recorded data on display; communication between different diagnostic system of trainset cars; information to driver of failure origin; service information; recording and following up of time table and information of date and time and kilometer run.
d. **Driver's Controls Cluster**, consisting of the Master Controller (Incorporating DMS-dead man system), Driving Mode switch, Reverse Lock switch, Master Key switch,
e. **ATP Cluster,** consisting of ATP panel, Speedometer, Odometer
f. **Emergency Brake Push Button**, for the application of emergency brake, automatic lowering of pantograph and opening of line circuit breakers,
g. **P.A. Cluster**, consisting of Passenger Alarm lighted push button, with clear identification of the location of the alarm triggered from the passengers' area , Public Address lighted push button, microphone,
h. **Windshield Washer/Wiper Cluster**, with wiper speed control (High Speed, Low Speed, Intermittent-infinitely variable),
i. **Destination Sign display/control panel**,
j. **Loud Speakers**,
k. **ATP Buzzer**,
l. **Fault Buzzers**,
m. **Circuit Breaker Panels**,
n. **Miscellaneous Switches:** Horn, headlight (high/low beam),
o. **ACU control Cluster,**
p. **Voltmeter** – for 750 Vdc line voltage,
q. **Other Gauges , if applicable**

Comment [.1]:

Comment [.2]:

1.5.15.2. Master Controller

The master controller shall control motoring and braking in an adjustable, linear manner, as follows:

	Handle Position	Function
1.	Vertically upright	OFF position
2.	Press handle forward from the vertical position until the handle reaches its end position.	Propulsion, with acceleration increasing linearly with handle movement.
3.	Press backwards from the vertical position until the handle engages a spring loaded detent.	Normal Braking, with the effort increasing linearly with handle movement.
	Press backwards from the spring	Emergency braking.

4.	loaded detent in 3, until the handle reaches its end position.	

The master controller shall be interlocked with the Mode Switch described in **Sub-Clause 1.5.15.3**.

The Master Controller shall be ergonomically designed to minimize unnecessary physical strain and fatigue to the operator.

1.5.15.3. Mode Switch

The mode switch shall be locked/unlocked by the Driver's key, which shall be captive in all positions except for OFF. The mode switch shall have the following positions:

a. AUTOMATIC TRAIN PROTECTION (ATP),
b. OFF,
c. MANUAL FORWARD,
d. MANUAL REVERSE, and
e. EMERGENCY/COUPLING MODE.

The mode switch shall be positively interlocked with the master controller. When the Driver's key is in the OFF position, both the mode switch and master controller handles shall be locked in the OFF position. When the Driver's key is turned to the ON position, the mode switch handle may be moved to any chosen position, but only if the master controller handle is in the OFF position. The mode switch can only be moved into the Manual Reverse position after having turned the Reverse Lock switch. When moving the mode switch forward into one of the other positions, the Reverse Lock switch shall automatically move to its original position, providing the required interlocking.

Moving the mode switch position from ATP to Manual Forward shall only be possible at zero speed. At speeds higher than zero, the safety loop shall be opened and the emergency brakes applied. At zero speed, this function is bypassed. Each time the Manual Forward or Manual Reverse positions are chosen the train speed shall be limited to a maximum of 15 km/h, details of the event shall be registered in the vehicle level computer.

The mode switch should be interlocked and may only be moved from the Manual Forward position to the Manual Reverse position, and vice versa, at zero speed. The mode switch may only be moved from the Manual Forward position to the ATP position at zero speed. Should the lever be moved at speeds greater than zero, the safety loop shall be opened and the emergency brakes applied

In the ATP mode, permission to proceed, at maximum allowed speed are controlled by the signaling system.

In the manual modes, none of the signaling safety control functions are operative, but train speed is limited to 15 km/h.

Maximum speed at emergency/coupling mode shall be limited to 3 km/h. This mode can also be used as manual driving mode for processing in the washing plant.

1.5.15.4. Driver's Vigilance (Dead man) Button

The Master Controller handle shall incorporate a button which must be pressed and released on a regular, predetermined basis, to prevent the application of emergency braking.

The features shall be coordinated such that either driving action prevents brake application.

1.5.15.5. Miscellaneous Cab Equipment

The cab shall incorporate a locker for storing the Driver's personal belongings (baggage, etc.) and for storing emergency equipment (First aid kit, flashlight, etc.). All emergency equipment shall be indelibly marked with the name of the Employer.

Crew keys and equipment box keys shall be identical and preferably exchangeable to those currently used.

Comment [.3]:

The cab door (Communication with passengers' area) shall be equipped with a lockable opening system.

1.5.15.6. Hostler (Shunting) Control Equipment

A hostler control panel shall be provided in a secure locker at the rear of each Car, to allow the Driver to slowly move the unit while standing at the rear of the vehicle. Access to the locker shall be by a Driver's master key. When using the panel, the Driver shall be able to look through the window in the end and operate the Car.

The Supplier shall provide a safety analysis of the manual-driving device including the necessary functions and the associated circuitry.

Nevertheless, the panel shall contain at least 8 control buttons/switches and intercom, as follows:

	Button Function	Action
a.	Horn	Push to sound
b.	Shunt (3 km/h)	Push to energize
c.	Speed - 10 km/h maximum	Push to energize
d.	Brake	Push to apply 25% braking effort
e.	Emergency Brake (100%	Push to energize

	service brake)	
f.	Coupler	Push to release
g.	Intercom	Hold to activate
h.	Parking brake	Select position to activate/deactivate

1.6. PASSENGERS DOORS AND DOOR CONTROL

1.6.1. Passenger Side Entrance Doors

Five electrically operated bi-parting doors shall be provided on each side of every car. All the door-widths should be designed to minimize loading /unloading time.

The doors shall preferably be of the sliding plug type. Sliding pocket doors may be considered provided door construction is guaranteed to prevent hands/finger pinning at the pocket section during opening.

The doors shall be constructed to withstand the loads imposed by passengers leaning on them under crush loading conditions. Also, the doors shall be designed and tested such that when normally installed, one leaf can sustain a concentrated load of 1500 N applied to the plane of the door, at the center of the front edge, with a maximum deflection of 5 mm, but with no permanent deformation.

The door operator system at each doorway shall be capable of being isolated. When isolated, the doors shall be possible to be kept closed by a mechanical locking. The door operator system shall include damping, to smoothly arrest door leaf motion, at the end of the open and close cycle.

All doors shall open and close simultaneously. Doors shall fully open within 2.0 to 2.5 s of the door open command, and shall fully close within 2.5 to 3.0 s of the door close command. During door operation, the maximum velocity of each door leaf shall in no case exceed 1.5 m/s.

When closed, all passenger side entrance doors shall be automatically mechanically locked in the fully closed position.

The doors shall be manufactured from the same material used in the construction of the vehicle body shell, with a honeycomb core, and shall incorporate the same exterior finish. All joints shall be sealed against moisture ingress, and drain holes shall be provided in the bottom of the doors to allow the escape of condensation. Internal metal reinforcement shall be provided for the attachment of door hardware. The doors shall be appropriately insulated to meet the noise requirements. Each door leaf shall be equipped with a full length male/female rubber nosing, which shall provide a weather tight seal, be capable of withstanding the rigors of service, and prevent injury to passengers being trapped between closing doors.

The bottom of the doors shall be provided with easily replaceable door guides, which shall be adjustable in the vertical direction, and shall be manufactured from a wear-resistant, low friction material such as high-density high molecular weight polyethylene.

The doors shall be glazed with a fixed single glazed window of toughened glass to current railway transport standards. The glass shall be tinted neutral gray, with approximately 28% visible light transmission.

The window pane assembly shall be removable in no more than 20 minutes from the interior of the car. The window pane assembly shall be watertight sealed, and the mounting shall be capable of withstanding the pressure differentials associated with head-on pressure, passing trains, prevailing winds, etc. The windows and mountings shall also be able to withstand the loads imposed by passengers leaning on them under crush loaded conditions.

All door mounting hardware and door actuation hardware must be readily accessible for adjustment and removal through the aforementioned access panels. A door leaf shall be capable of being removed and replaced from the vehicle within 60 minutes.

The design and manufacturing of the doors will guarantee the highest possible level of reliability, so as to avoid as most any problem due to doors malfunctioning during revenue service. Notably, the components and materials used shall be of high quality and high reliability level, able to stand a very high number of cycles (Rated for 1 opening/closing cycle every 2 minutes) with an extremely low failure probability. (Maximum 4 breakdowns/month in operation for the whole fleet of 21 LRVs).

The Supplier shall provide reliability data in the form of the number of failures per one million operating hours or kilometers. The method of data presentation shall be as agreed upon with the DOTC-MRT3 Engineer.

For minimizing at most the disruption time in the case where a problem would still happen, the design and manufacturing of the doors will guarantee a fast breakdown diagnosis and troubleshooting process in case of problem.

One set of passenger side entrance door production hardware (door leaves, operators, local control units, etc.) shall be subjected to an accelerated life cycle test, whereby the doors are installed in a simulated door frame and operated for a minimum of 1.5 million cycles. This test shall be completed before the first vehicle is ready for assembly, and must ensure that the specified reliability will be met.

1.6.2. Door Operators and Controls

Door operators shall be service-proven in a similar environment to that of the EDSA/MRT3 system, and shall be approved by the DOTC-MRT3 Engineer.

The door control concept shall be similar to that used on the existing fleet of MRT3 vehicles. Notably, the doors may be opened by passengers by means of push buttons mounted both inside and outside the car, but only after having been released by the driver, for the considered side of the trainset.

Should there be a blocking action during closing cycle of any door, the control shall allow a partial re-opening to free the blocked door and resume the closing cycle without going to full open condition.

The opening and closing of doors shall only be possible from an operative cab, and it shall not be possible to energize the door open circuits if train speed is greater than 0 km/h. Door closing or opening time shall be adjustable between two and five seconds.

Propulsion power shall be inhibited until all doors have closed and are locked.

It shall be possible to isolate a defective door on any vehicle from the door open command, at which time the color fault lights on that side of the exterior of the vehicle shall illuminate.

Adjacent to each doorway in the passenger compartment shall be installed an emergency door opening device, which may be used by passengers to open the pair of door leaves in the event of an emergency. Doors shall only be able to be opened at a train speed of 0 km/h. The Driver must reset the device before the train can proceed. The device shall be recessed and suitably sealed to prevent accidental actuation.

The opening of a door when the speed is above 0 km/h will automatically trigger an emergency/safety braking.

The manual emergency release shall however be shielded from unintentional use by passengers, while still being available in an emergency. Once the door is opened, it shall be indicated to the train operator as an open door.

Clear and unambiguous signage in both English and Filipino giving instruction on the use of passenger door emergency facilities shall be provided.

1.6.3. Door Isolation and Access – Interior/Exterior

The power supply to an individual doorway shall be capable of being isolated and the doors shall then be capable of being closed and locked without power.

1.7. VENTILATION AND AIR CONDITIONING

1.7.1. General

Each LRV shall be provided with Ventilation and Air-Conditioning (VAC) system complete with relative humidity control. The Air-Conditioning Units (ACU) shall be controlled independently such that if there is a failure in one unit, all other units will continue to operate normally. All system components must be service-proven, and must be tested to demonstrate compliance with the requirements of this MRT3 specification and Performance Requirements. Testing shall also be performed to determine the vehicle body heat transfer coefficient.

The Supplier shall provide test and service equipment necessary for the maintenance and repair of the Ventilation and Air-Conditioning units. This shall include but not limited to off-board test bench, refrigerant recovery/recycling equipment and portable vacuum pump.

1.7.2. Ventilation System

Blower fans supplied as part of the overhead evaporator units shall provide vehicle ventilation. Fresh air shall enter the vehicle through screened openings in the roof on each side, pass through stainless steel ducts (sloped downwards to drain), and pass through a filter into a plenum chamber adjacent to each overhead evaporator unit. The design shall prevent blown rain from entering the plenum and leaking into the vehicle interior.

Re-circulated air shall be drawn through grilles in the ceiling and mix with the fresh air. This air mixture shall then pass through another filter into the evaporator unit, from where the blower shall force the air through the evaporator coils into the main air ducts. The ventilation system shall be balanced to provide a positive vehicle pressurization, with all doors and windows closed, of 25 N/m^2.

Means shall be provided to adjust the volumes of fresh and re-circulated air. A minimum of 2,000 m^3/h of fresh air per vehicle shall be provided.

The main air distribution duct shall be manufactured from stainless steel or anodized aluminum, and shall be constructed to ensure that the exiting air velocity is constant along its length.

Air filters shall be washable/re-useable and shall be well supported to prevent passing air from dislodging them should the filters become saturated. They shall seal well at all edges. The filters shall be easily replaced, but shall be sized not to require replacement at intervals less than 10,000 km of operation.

The entire ventilation system shall be approved by the DOTC-MRT3 Engineer.

1.7.3. Cooling System

The air conditioning system shall be thermostatically controlled, shall be service-proven and shall automatically maintain the specified interior temperature conditions. Relative humidity in the vehicle shall not exceed 55% under stabilized conditions.

Air flow over the evaporator coils shall be sufficiently low to prevent any moisture in the air from entering the main air supply duct, but in no case shall exceed 2.5 m/s. Evaporator coils shall preferably be manufactured from copper, and shall have copper fins, however, aluminum elements is also acceptable provided they are sufficiently protected from the elements. A condensate pan shall be provided beneath the evaporator coil. The pan shall be made from stainless steel with suitable drain lines and shall be easily removable for cleaning. The condensate drain lines shall be insulated to prevent condensation.

The refrigerant shall be environment friendly (use of refrigerant containing fluorocarbons is not allowed).

The evaporator unit shall include all required components, such as the liquid line solenoid valve, modulating solenoid valve, thermal expansion valves, liquid line strainer, liquid line sight glass/moisture indicator, etc. Appropriate gauge ports for

troubleshooting shall be provided. Blowers shall be direct-driven by the motor, which shall be powered by the 440V AC auxiliary power supply system.

The compressor-condenser unit shall be heavy duty transportation grade, service-proven combined semi-hermetic compressor/condensing unit. The compressor motor shall be powered by the 440V AC auxiliary power supply system. Cylinder unloaders shall be easily adjusted, and shall provide at least two stages of unloading for a total of not less than two-thirds unloading. Sequential starting of compressors on a train shall be provided. Condenser coils shall preferably be manufactured from copper, and shall have copper fins, however, aluminum elements suitably protected from environment is also acceptable. The coil shall be designed with adequate capacity to provide a condensing temperature no greater than 16°C (60.8°F) above the condenser cooling air temperature under full rated load conditions.

Air-conditioning units shall be easily removed by lifting without the need to break any connections in the refrigeration circuit.

The entire air conditioning system shall be approved by the DOTC-MRT3 Engineer.

1.7.4. Operation and Control

1.7.4.1. Operation

The VAC system controls shall automatically maintain the interior temperature of the vehicle (including the Driver's Cab) at 22°C with any exterior ambient temperature ranging from 22°C) to 35°C). If the exterior ambient temperature is above 35°C, the interior temperature shall be maintained at 10°C below the exterior ambient. Temperature overshoot shall be limited to 2°C. These temperatures must be maintained with or without the heat loads from passengers, driver, motors, lights, etc., and solar gain. Relative humidity inside the vehicle shall not be more than 55%.

1.7.4.2. Controls / Testing

Standard Programmable Logic Controller of industrial grade shall be provided for the control and monitoring of the VAC system. Temperature sensors shall be located so as to ensure that they are not unduly affected by local sources of heat, such as motors or resistors, and shall be readily accessible for maintenance and replacement.

The temperature control unit shall incorporate a Light Emitting Diode (LED) display, indicating the status of the temperature control functions, (Including default indication by error code). The unit shall also indicate the fresh air temperature and the return air temperature. Indicators shall also be provided to verify normal circuit conditions.

The equipment shall also include an embedded fault indicating and fault diagnostic system. Portable Test Units (PTU)/PC, including the necessary interface programs shall also be provided to isolate temperature control problems and to allow downloading and analyzing the recorded faults.

The said programs shall be free of any copyright, and become the entire property of the employer as soon as delivered.

1.8. BRAKING SYSTEM

1.8.1. General

The trains shall be supplied with brake equipment and functions specified herein, such that a complete, fully integrated and fully functioning friction braking and electric braking system is provided. In addition, all equipment shall be specified in conjunction with the provision of **Clauses 1.3, 1.9** and **1.10** of this MRT3 specification and Performance Requirements. All equipment shall be supplied by an experienced braking equipment manufacturer with documented previous satisfactory experience with similar equipment to that specified herein.

Braking actions shall be controlled by the Master Controller in the Driver's Cab, and the Service and Emergency rates shall be achieved using the same equipment. The Emergency system shall be fail-safe (energize to release). Emergency braking shall be protected by the wheel slide protection system, but shall not be jerk limited. Propulsion power shall be inhibited when the service or Emergency brake has been commanded.

The braking equipment shall be tested to demonstrate compliance with the requirements of this MRT3 specification and Performance Requirements. The Supplier shall perform tests to confirm specified train deceleration from various speeds in all braking modes, including emergency brake and friction brake only (Degraded cars).

1.8.2. Friction Brakes

The mechanical braking will be achieved from ventilated split type brake discs and braking torque shall be applied to the discs by brake pads. Brake actuators of the spring-applied, electric release/modulation type, shall be mounted to the bogie frame. One actuator per disc shall be used.

The mechanical braking force shall be modular.

The friction brakes shall be fully capable of performing all braking duties, without the assistance of the electric brakes. The brake pads shall be retained by the brake actuator calipers, and shall be of the composite type. The pads shall not contain any asbestos or other cancer inducing materials, and the Supplier shall provide the DOTC-MRT3 Engineer with full details of the material composition to allow health hazards assessment.

Parking brakes shall be installed in the Bogies, such as they will be capable of holding a 4-vehicle train in W3 loading condition on a 4% grade. The parking brakes shall be with spring-applied park brake function, through electrically/Manually (In case of power failure) released brake actuators. By design, as electric energy is released from the brake cylinders, the spring brakes will apply.

Suitable slack adjuster shall be provided for the brake actuators.

The Supplier shall perform a performance test of the friction brake and submit the corresponding friction factor curve for review and approval by the DOTC-MRT3 Engineer.

It shall be possible to isolate the friction brake system individually in each bogie.

The possible consequences of one or several brake systems isolation on the operation, if any, will be fully integrated by the constructor in the Operation Manual (Speed restriction, withdrawing from operation, etc…).

The information about brakes systems isolation will be transmitted to the driver through the TMS/DDS, together with the possible restrictions to operation

1.8.3. Track Brakes

In the emergency/safety braking mode, it is preferred that track brakes mounted on the longitudinal members lower and provide a braking force by applying on the rails. Nevertheless, a different design involving other technical solutions can be proposed, provided that the manufacturer demonstrates the appropriateness and comparable efficiency of this design. This system shall receive approbation from the DOTC-MRT3 Engineer.
More than the automatic safety braking triggered by the safety systems, the emergency/safety braking mode is either triggered by the driver in case of emergency, or by the passengers in case of door emergency release.

1.8.4. Electric Brakes

Both regenerative and rheostatic electric braking shall be supplied, with priority being given to regenerative braking. The electric brakes shall have the capability to produce all Service braking effort. Dynamic braking shall be fully effective down to 4 km/h.

Regenerative braking shall be capable of recovering, at a minimum, 75% of the theoretically available kinetic energy of the moving train, less conversion losses, when the DC power system is 100% receptive, line voltage is within the allowable range, with the train in the W3 loading condition, and the entry speed being 65 km/h. Regeneration shall be inhibited when there is no catenary voltage present. The Supplier's scheme for accomplishing this shall be approved by the DOTC-MRT3 Engineer.

Braking energy in excess of that capable of being recovered by the regenerative braking system shall be dissipated in the braking resistors.

1.8.5. Wheel Slip / Slide Control System

Trains shall be equipped with a wheel spin/slide detection system to maximize the utilization of available wheel/rail adhesion under low adhesion conditions, to eliminate damage and unnecessary wear to wheel treads while maximizing the braking effort. Spin/slide shall be detected on per axle basis, and protection shall be provided on per bogie basis.

The system hardware and software shall be integral with the propulsion control logic, with outputs to the braking equipment. The hardware and software shall reliably detect all wheel spin or wheel slide conditions that may occur on any axle, and shall initiate actions that minimize or terminate these conditions, whether they occur randomly or synchronously.

In both motoring and braking modes, the system shall detect axle speed differential between any two of the eight axles on any car, or between any axle and the actual linear speed of the trainset (Or any axle acceleration inconsistent with the trainset acceleration). The system shall automatically compensate for wheel size differences. The detection of axle speed differences or discrepancy with the trainset actual linear speed up to 3 km/h shall initiate the required reduction of tractive effort or braking effort to eliminate this speed difference.

During friction braking, mechanical braking force shall be modulated or cancelled in proportion to the axle speed differential.

The system shall incorporate monitoring features to detect both failure of sensor input, and system performance indicative of failure of a function.

Detection of system global malfunction will disable the whole system in order to preserve the braking performances. Detection of sensor malfunction shall disable the anti-slip/slide for the considered axle only, in order to keep the advantages of the system for the non-concerned axles. All faults shall be logged in the train's Digital Diagnostic System (DDS).

The system shall be designed and manufactured to be interchangeable between vehicles without the need for calibration or adjustment.

The wheel spin and wheel slide control system shall be approved by the DOTC-MRT3 Engineer.

1.8.6. Brake Control / Brake Blending

The friction brake shall be equipped with a control box interfaced and supervised by Power Electronics Control Equipment (PECE) to allow combined application of electrical and friction braking as may be needed. Under normal braking condition, electrical braking will be in use, however, if electrical braking effort is not sufficient to meet the braking demand; friction braking shall be introduced. Proportion of brake blending shall be electronically calculated through the PECE and continuously monitored and supervised to optimize the electrical braking effort. In case of complete electrical braking failure, brake control shall allow instantaneous substitution of friction braking without loss of braking power.

1.9. PROPULSION SYSTEM

1.9.1. General

A modern three-phase alternating current propulsion system shall be provided, and each vehicle shall have the following features:

a. Fully independent DC to AC inverter packages (Power Conversion Equipment) to power the traction motors in a bogie.
b. A vehicle level microprocessor based control system (Power Electronics Control Equipment), which will perform all propulsion, service brake, vehicle weight and level monitoring functions.
c. AC squirrel cage traction motors, each driving gear units. Traction Motor insulation shall be tropicalized and shall be Class H insulation or better.
d. Individual friction brake control for each bogie.

The traction control equipment shall provide for the following modes of operation:

a. AUTOMATIC TRAIN PROTECTION (ATP),
b. MANUAL FORWARD,
c. MANUAL REVERSE
d. EMERGENCY MODE.

In the ATP mode as defined in this contract, the ATP system shall provide on time guidance to the driver on the recommended speed during the different operation phases. In the manual and emergency modes, none of the signaling safety control functions are operative, but train speed is limited to respectively 15 and 3 km/h.

Service braking shall primarily be accomplished by electric braking, supplemented by friction braking only to ensure that braking rates are met and to hold the train at zero speed. Electric braking shall be regenerative or rheostatic (Based on line receptivity). The friction holding brake at zero speed shall be coordinated with the door control system. (Also refer to **Clause 1.8**, Braking System)

Load weighing shall be provided for all vehicle weights up to crush loading condition. Electric braking shall have capacity for, and be load weighed up to crush loading conditions. The failure of electric braking to provide the requested rate shall initiate supplemental friction braking on the affected bogie.

The propulsion system design shall automatically compensate for wheel diameter variations between axles on the same bogie up to 6 mm. There shall be no restriction on wheel diameters between bogies.

The Supplier will be required to perform a Combined Propulsion System test in accordance with a procedure approved. This test will consist of installing the entire propulsion system, including the Power Conversion Equipment (PCE), traction motors, gearboxes and associated cabling, as they would be assembled on a motor car, and performing a series of simulated revenue service runs. The temperature of critical components, among other parameters, shall be monitored to gauge suitability for the intended service.

The equipment to be supplied shall require minimal maintenance, and any items requiring periodic attention, such as air filters, shall not require interventions at intervals less than 35,000 km.

The propulsion system shall be provided by a supplier having had a minimum of 10 years of demonstrable experience in supplying service-proven, reliable 3-phase AC propulsion equipment in similar operating environment to that in EDSA/MRT3.
The entire propulsion system equipment shall be approved by the DOTC-MRT3 Engineer.

1.9.2. Power Conversion Equipment

The Power Conversion Equipment (PCE), and the Power Electronics Control Equipment (PECE) shall consist of all necessary equipment to condition the power supply from the Catenary system into a fully useable power supply to drive the traction motors under fully controlled conditions, meeting the requirements with respect to speed, acceleration, rheostatic braking and regenerative braking.

The PCE and PECE shall be designed and manufactured using recent, proven and efficient technologies and components, according to the standards in force for the last railways applications.

Such equipment shall include, but not necessarily be limited to:

a. Inverter equipment – IGBT Technology,
b. Inverter cooling equipment,
c. Inverter controls,
d. Inverter protection equipment, except the main circuit breaker,
e. Input filter,
f. Braking resistors,
g. Propulsion system interface with the door control, friction brake, vehicle monitoring unit, and the ATP systems,
h. Propulsion system control interface with the train lines.

The PECE shall be equipped to detect the onset of wheel slip, and shall regulate the PCE to control the event. The PECE shall provide the dynamic brake feedback signal to the friction brake system to ensure smooth brake blending. The PECE shall also provide a wheel slide detection signal to the friction brake system for fast slide correction.

The PCE equipment shall be convection cooled, or forced ventilated provided that dust accumulation on electronic parts/equipment is absolutely avoided, and the PCE enclosure shall be integrated with the vehicle design to ensure that the motion of the vehicle produces sufficient air flow across the cooling fins to produce the required heat transfer. The Supplier will be required to demonstrate by calculation and by test that the thermal stress upon the equipment will result in a service life of not less than 30 years under normal service conditions.

The inverter power semiconductors shall be housed in watertight, dust proof enclosures meeting IP55 requirements and shall be convection cooled. The devices shall not be protected by fuses.

The output of the propulsion inverters shall incorporate ground fault protection. Upon detection of a ground fault, the affected inverter shall be shut down. Three successive detection of ground fault within a predetermined time shall cause the locking out of the inverter system which would only be reactivated by authorized personnel. A ground fault shall be enunciated in the Driver's Cab and shall be registered in the Digital Diagnostic System (DDS).

The Power Conversion Equipment shall be provided with over-temperature protection, which shall initiate a reduced level of performance from the affected unit. Upon temperatures returning to normal, the PCE shall automatically be reset. PCE over-temperature shall be enunciated in the Driver's Cab and shall be registered in the Digital Diagnostic System (DDS).

The propulsion equipment shall have a proven track record of high reliability and low maintenance in a similar operating environment to that in EDSA/MRT3.

The entire propulsion system shall be approved by the DOTC-MRT3 Engineer.

1.9.3. Propulsion and Braking Equipment

Design and construction of all AC traction motors, gear units, and power conditioning equipment will be such that an 800,000 km overhaul cycle is achieved without intermediate maintenance activity beyond routine inspection and servicing

1.9.3.1. Traction Motor

Traction motors shall be totally enclosed AC squirrel cage induction motors with a proven service history, equipped with thermal protection/sensors and shall be approved by the DOTC-MRT3 Engineer. Traction motor bearings shall be equipped with sufficient and easily accessible standard grease fittings.

The design of the motor installation shall permit the motor to be removed from, and reinstalled into the bogie from above (Using a crane, with the vehicle body removed) without the need to remove or relocate any other bogie-mounted equipment. This is a critical requirement, and the Supplier must demonstrate during the Conceptual Design phase that this requirement will be met.

Means shall be provided for the verification of the correct rotation of the axle upon termination of the traction motor replacement.

1.9.3.2. Gearbox and Coupling

Each AC traction motor shall drive the axle/s via parallel drives, reduction gearbox and coupling arrangement from a design derived from system with extensive, successful rapid transit experience. Shims shall not be required to mount the gearbox into the bogie.

The performance of the gearbox shall be fully compatible with the remainder of the propulsion equipment. The gears shall be oil lubricated, and an inspection cover shall be provided in the gear case for inspection by maintenance personnel.

The gearbox shall incorporate sufficient baffles, oil passageways, etc., to ensure adequate lubrication under all service conditions and in any rotational direction. It shall not be necessary to check the oil level at intervals less than 55,000 km, nor add oil at intervals less than 75,000 km.

The gearbox shall utilize labyrinth seals and/or lip seal of any equivalent technology between rotating components, which shall not require replacement between major overhauls. Inspection openings adequately bolted and sealed with gaskets shall be provided to enable all gears to be inspected with the vehicle body on the bogie. A magnetic drain plug shall be provided.

Gears shall have a minimum life of 1,500,000 km

Gearboxes shall contain provision for the mounting of speed sensors.

1.9.3.3. Braking Resistors

Braking resistors shall be convection cooled and may be mounted on the roof. Adequate shielding shall be provided to protect surrounding equipment from heat dissipation.

Braking resistors shall contain over-temperature protection and shall be housed in corrosion resistant casing.

The Supplier will be required to perform testing to demonstrate the adequacy of the application.

1.9.3.4. Maintenance Requirements

The equipment to be supplied shall require minimal maintenance, and any items requiring periodic attention, such as air filters, shall not require such attention at intervals less than 35,000 km. The PCE and PECE equipment shall not require maintenance more often than at 100,000 km intervals.

No component in the PCE and the PECE shall require removal or replacement for at least 200,000 km.
Any fault in the PCE or the PECE shall be enunciated in the Driver's Cab and logged into the Digital Diagnostic System (DDS).

Means shall be provided to automatically discharge capacitors whose voltage might present a hazard to a maintenance worker opening an enclosure. Discharge time shall not be more than 5 minutes.

The opening of the high voltage enclosures will be done using safety keys (Interlocked with the master key, safety keys released from the key box by the master key, which remains prisoner).

The High voltage danger and the precautions will be clearly indicated on the said enclosures, clearly visible before the opening.

1.10. AUXILIARY ELECTRIC SYSTEM

1.10.1. Current Collection

The 750V DC power will be collected from the overhead line system using electrically operated pantographs.

The pantograph shall be raised by a spring, with an appropriate damping device to minimize bouncing.

The pantograph shall be electrically lowered and latched. An electrically released lock-down mechanism shall be provided to prevent movement of a locked pantograph.

Means shall be provided to manually release the lock-down mechanism, and raise, lower, and latch the pantograph from inside the vehicle if electrical power is not available.

The pantograph assembly shall permit all necessary movement, taking into account the overhead line installation tolerances/clearances, and maintain the complete and effective collection of electrical power.

The pantograph shall be equipped with an automatic lowering device, which shall be activated if a collision damage occurs between the pantograph head and rigid elements of the overhead catenary system.

1.10.2. Input Protection

The power supply shall be protected by a heavy duty, transit proven, ultra high speed circuit breaker, which shall be capable of handling the short circuit capacity of the Power Conversion Equipment. The High Speed Circuit Breaker (HSCB) shall have a maximum fault clearing time of 5 ms, and shall be installed in a dedicated explosion-proof enclosure. The device must not be damaged with battery voltage down to zero.

Tripping of the HSCB shall be enunciated in the Driver's Cab and shall be registered in the Digital Diagnostic System. The HSCB shall be re-settable from within the Driver's Cab.

1.10.3. Current Return

The negative return current from 750V DC circuits shall run to an insulated common point located under the vehicle, approved by the DOTC-MRT3 Engineer. The insulated common point shall be connected to no less than 4 axles ground brushes through removable jumper cables.

The vehicle body grounding shall be separated from power return circuits and the vehicle structure shall not be used as normal circuits return path for any electrical equipment. Separate current return assemblies shall be provided for the 750V DC and vehicle body ground respectively.

Any dirt build-up shall not affect the insulation and performance of the current return assembly. Suitable air vent and drain shall be provided to avoid accumulation of dust and water. Carbon dust shall not in any way contaminate the axle bearing lubrication or restrict brushes movement.

The ground brush housing shall allow ready access to the brushes and electrical contacts by maintenance technicians.

The ground brush arrangement and details shall be approved by the DOTC-MRT3 Engineer.

1.10.4. Auxiliary Electrical Supply Systems

1.10.4.1. General

Each vehicle shall have independent auxiliary power feeds at each voltage. The AC output shall be sinusoidal under all conditions of load. Emergency loads shall include:

Emergency loads are defined as follows:

- Emergency lights
- Doors
- Communications
- Propulsion and braking controls
- Train line controls
- Track brake(s) if applicable
- Pantograph
- Coupler control
- Cab lighting, controls, and annunciators
- Horn(s)
- ATP

All electrical equipment on the trains, other than the Power Conversion Equipment and the supply to the Auxiliary Power Supply Equipment (APSE), shall operate using the following nominal voltages:

a. 440V AC, 3-phase, 60 Hz,
b. 220V AC, 1-phase, 60 Hz,
c. 110V DC, (if necessary) and
d. 12/24V DC.

The AC output shall be regulated within ±3% for all variations in input voltage and output load.

The DC output shall be regulated within ±1% for all variations in input voltage.

The Low Voltage Power Supply (12/24/110V DC) must operate at all times.

1.10.4.2. Auxiliary Power Supply Equipment

Each vehicle shall be equipped with Auxiliary Power Supply Equipment (APSE) capable of supplying all loads continuously. The failure of an APSE shall be enunciated in the Driver's cab and shall be recorded in the Digital Diagnostic System (DDS). Each APSE must incorporate a dead battery start feature, which, if manual, shall be located in the Driver's cab.

The APSE shall consist of an auxiliary power inverter (IGBT Technology), to supply all AC power, and a Low Voltage Power Supply (LVPS) to provide all low voltage DC power. The APSE shall also contain a battery charger.

The Auxiliary Electrical Supply System shall be designed and manufactured using recent, proven and efficient technologies and components, according to the standards in force at for the last railways applications.

When designing the auxiliary power inverter, particular care must be taken to account for the simultaneous starting of large auxiliary loads, such that rapid cycling is avoided (Particularly the VAC compressors). The inverter shall use a control scheme that contains extensive self-diagnostic logic, and receptacles shall be placed in the vehicle interior and exterior to allow the connections to any necessary test equipment.

The auxiliary power inverter output transformer shall be galvanically isolated, and the secondary windings shall incorporate a ground fault protection system. Upon detection of a ground fault, a fault message shall be transmitted to the Digital Diagnostic System (DDS).

The LVPS shall provide the power to all system controls, including the Power Conversion Equipment, friction brakes (Computer, brake control units, etc.), VAC equipment, lighting, communication equipment, doors, radio, ATP, etc. The LVPS shall be solid-state and shall contain appropriate transient suppression and protective circuitry. The LVPS shall also incorporate appropriate fault and operation indicating lights and test switches. The failure of an LVPS shall be recorded in the Digital Diagnostic System.

The output of the LVPS shall be routed to the low voltage distribution panel/cabinet inside the car. The negative return current from each subsystem shall run individually to the DOTC-MRT3 Engineer's approved insulated common point located in an enclosure under the car.

The entire Auxiliary Power Supply Equipment and controls shall be approved by the DOTC-MRT3 Engineer.

1.10.4.3. Circuit Breaker Panels and Isolating Switches

The following distribution panels shall be provided:

a. Low (12/24V DC or 110V DC) Voltage Circuit Breaker Panel,

b. 220/440V AC Circuit Breaker Panel,

All 220/440V AC circuit breakers shall be located in a separate enclosure, and shall individually protect the circuits.

c. 750V DC Circuit Breaker Panel,

All high voltage DC auxiliary equipment shall be protected by approved circuit breakers, which shall be installed in a separate enclosure, arranged for ready access. The disposition of these enclosures will follow the arrangements stated in sub clause **1.9.3.4** Circuit breakers shall be provided to individually protect the circuits and corresponding individual isolating switch at the negative side shall also be provided for complete equipment isolation.

d. Panel for Auxiliary Power Supply Equipment,

e. Spare Circuit Breakers for all panels except 750V DC.

All circuit breaker panels shall be approved by the DOTC-MRT3 Engineer.

1.10.5. Battery

The battery shall have sufficient capacity to supply all low voltage power loads during failure of the low voltage power supply for a minimum period of one hour of normal train operation. The battery rating shall be a minimum of 133% of that to meet this requirement.

Each vehicle shall be equipped with a nickel-cadmium storage battery contained in a stainless steel battery box.

All cells shall be standard size, and the battery cases shall be made of a material having good thermal stability and suitable chemical resistance, and shall be translucent.

The battery shall be designed to withstand the shock and vibration conditions associated with a rugged rail service environment.

The output of the battery shall be suitably fused. The battery shall incorporate a temperature sensor to disconnect the battery from the battery charger when the battery temperature exceeds the limit imposed by the battery supplier. Overcharging of the battery shall be prevented by means of an isolating contactor, which shall operate at a voltage specified by the battery supplier.

1.10.5.1. Battery Installation

The battery shall be installed under the vehicle and shall be accessible from the side of the vehicle. The battery box shall be ventilated by natural air convection and have drain holes. The batteries shall be mounted in a stainless steel roll-out tray, with positive stops when pulled out and a lock in the stored position.

1.11. COMMUNICATIONS SYSTEM

Each vehicle shall be equipped with communications equipment, to allow the following functions:

a. One-way audio communication from any cab to the passengers (Public Address System),
b. Two-way audio communication between the Driver and passengers (Passenger Emergency Intercom),
c. Two-way audio communication between cab and hostler (shunting) at the car rear end,
d. Two-way audio communication between Driver's cabs (Intercommunication System),

Each vehicle shall be equipped with communications equipment by the Telecommunications provider as defined in the Telecommunications Specifications, to allow the following functions:

e. Two-way audio communication between the Driver and the Control Center (Train Radio System)
f. One-way audio communication between the Control Center and the passengers via the Public Address System.

The telecommunications equipment shall conform to the specification "Trunk radio system" – LRT/C/360/00015.

In any case, the communications such as in e) above have absolute priority on any other communications, then b), which are operational critical items.

The communications equipment shall be supplied by individual circuit breakers from the low voltage power supply, backed up by the battery. The equipment shall be controllable from any driver cab, and must be fully functional over a length of 4-vehicle trains.

Because of the low signal levels involved, the low level audio train lines shall be contained in a separate, dedicated steel conduit for EMI protection. Special attention shall be given to the shielding of all communications equipment wiring.

The Supplier shall provide all necessary interfacing requirements in coordination with the Telecommunications provider.

1.12. AUTOMATIC TRAIN PROTECTION SYSTEM

1.12.1. General

All trains shall be equipped with Automatic Train Protection (ATP) and equipment through the Signaling Provider as defined in the Signaling Specification.

The Supplier shall provide all interfacing requirements in coordination with the Signaling equipment provider.

1.13. RELIABILITY, AVAILABILITY, MAINTAINABILITY, SAFETY REQUIREMENTS

The Supplier shall provide a Reliability Availability Maintainability and Safety (RAMS) file. One of the outputs of the RAMS file shall be the safety critical items list to be used during design, purchase, construction and maintenance phases including the logistic support (Documentation).

For each safety critical asset identified in the Safety Critical Item List, a specific safety file shall establish a synthesis about the RAMS data of the considered item.

1.13.1. Reliability Program Requirements

The objective of the reliability analysis is to increase the reliability and availability of the vehicles. The Supplier and all Supplier's suppliers shall provide reliability data for their equipment.

The Supplier shall provide reliability data in the form of the number of failures per one million operating hours or kilometers. The method of data presentation shall be as agreed upon with the DOTC-MRT3 Engineer.

The data shall be based on actual operating information for the equipment. If the equipment in question has no previous operating experience, operational data from a similar piece of equipment may be used, provided the equipment have approximately the same electrical and mechanical characteristics and operating under similar conditions. Under these circumstances, the use of this data must be approved by the DOTC-MRT3 Engineer.

1.13.1.1. Reliability Demonstration Program

The Supplier will be required to establish a PC-based fault monitoring system to demonstrate compliance with predicted train reliability. The system, including the software shall become the property of the Employer. There shall be no licensing restriction to the use of the software/programs.

Should reliability targets not be met, the Supplier shall be required to make the appropriate modifications to ensure compliance.

1.13.1.2. Fleet Defects (Pattern Failures)

The occurrence of independent failures of the same warranted item that exceeds more than 10 percent of the total number of identical items supplied may be declared a fleet defect or pattern failure. On this basis, the Supplier shall be required to develop and implement a corrective action program to eliminate the pattern failure. This corrective action shall be approved by the DOTC-MRT3 Engineer. It will be closed out after the result of the entire fleet modification is accepted as satisfactory by the DOTC-MRT3 Engineer.

1.13.1.3. Reliability Requirements

To enable operation at 100% service availability, the cars shall be inherently fault tolerant. Single point failures that are not safety critical shall not cause a train service to be delayed or interrupted.

The Mean Distance Between Failure (MDBF) per LRV shall be no less than 20,000 km.

The MDBF of the major systems shall be no less than the following:

System	MDBF (km/LRV)
Propulsion System, Complete	120,000
Auxiliary Electrical System (all voltages)	120,000
VAC System	120,000
Door System and Controls (including interlocks and signals)	60,000
Friction Brake Equipment	120,000
ATP System	120,000
Communications System	120,000

1.13.1.4. Reliability Validation

a. The Supplier shall substantiate that the reliability requirements as specified will be met by performing reliability modeling. A schedule shall be prepared for the train consist its sub-systems which shall show the failure modes of each sub-system, and quantitative estimates prepared of the likelihood of the failure.

b. The reliability in MDBF shall be calculated by the Supplier every month. This MDBF for each month shall be calculated by dividing the total car-kilometers traveled in the preceding three months (or a period reviewed by the DOTC-MRT3 Engineer) by the total number of failures that occurred in the same period.

c. The reliability for each Consist shall be considered as validated, if the reliability target in MDBF for corrective maintenance, after the handing over of the Consist, is achieved for three consecutive months.

1.13.2. Availability Requirements

Availability is defined as $A = t_a/t_s$

where t_a = The total number of actual train-hours per day in revenue service

and t_s = The total number of scheduled train-hours per day for revenue service (except trains being maintained or overhauled)

A train-hour is the product of one train and one hour.

Train availability shall be at least 99%.

1.13.3. Maintainability Requirements

1.13.3.1. General Requirements

Accessibility:
The equipment are conceived to facilitate access to:

- The test points,
- The terminals,
- The information recorded in the monitoring systems or regulation systems, which are intended to maintenance assistance,
- Reference points to make measures (Supervision).

Interchangeability:
The equipment is composed of parts strictly exchangeable, between the various units and/or trains.
This requirement concerns also the spares which fulfill the same functions.
Interchangeability must be physical, functional and logistic.

Reparability:
The majority of the LRU are repairable in the client's heavy maintenance workshop.

Modularity:

- Identical functions included in equipment are fulfilled with identical components.
- The electronic equipment and/or onboard computer system are designed in racks, blocks and boards.

Installation and removal:
It is possible to isolate equipment, so as to assure the exchange by limiting the number of preliminary tasks, the duration of intervention and of specific tools.

Equipment cleaning:
Technical cleaning allows preservation in the state of neatness of equipment so as to be able to assure the tasks of monitoring, avoid waste of time to reach or to identify defective equipment and to maintain the nominal performances of the

equipment.

The technical cleaning of the equipment can be performed with usual means within the maintenance sites.

The list of recommended products and processes for the technical cleaning must be proposed by the bidder, subject to the acceptance of the client.

Connections and fastenings:

- Plug-in units are designed with restraining devices to hold them in place and include a system to allow modules to be interchanged only with another of the same type.

- All electrical and electronic equipment are constructed on a modular basis with high quality connections for easy and reliable replacement of faulty modules.

- All the cabling and piping are marked at the 2 ends for a fast recognition. Joints (fixed and mobile) for fluids are identified by function and include a system to avoid any wrong connection and mixture of fluids.

Ergonomics:

Ergonomics allow the maintenance staff to do its task in conditions and with tools adapted to human possibilities.

- The tasks of maintenance are not executed "blindly".

- The Supplier shall comply with the recommendations of standards.

Testability:

The Supplier shall provide the equipment with test points, diversions (shunt) and detectors or indicators necessary for the supervision of the good operation of the production, treatment and regulation.

- The Supplier shall provide the equipment with detectors, indicators, and diversions in purposes of maintenance for the supervision of the good operation of the equipment assuring the safety of the system.

- In a general manner, complex onboard electronic equipment, include integrated tests. Manipulations to be executed by the operator, skilled or not, during the test, are limited to the strict minimum.

- Intended Man / Machine interface is submitted to the agreement of the DOTC-MRT3 Engineer.

- The portable equipment, connectable to electric or electronic equipment, for external test and software packages download has to be from unique and transportable model for the operator.

- The test equipment including components, software or material, in

obsolescence processes are not accepted.

Marking:

- A unique serial number is attributed to every LRU/LLRU of the same type.
- The fastening mode of this support is mechanical and permanent.
- Inscriptions are legible during all the life cycle of the equipment.
- The supports of marking resists to the operations of technical cleaning.

The supports of marking on the LRU are positioned so as to be visible for maintenance personnel without dismantling and without particular tools.

1.13.3.2. Maintainability Analysis

The objective of the maintainability analysis is to minimize the time and effort involved in performing both scheduled and unscheduled maintenance. To this end, all of the Supplier's suppliers shall provide information regarding the recommended maintenance procedures for their equipment, which shall be in compliance with this MRT3 specification and Performance Requirements.

In addition to the maintenance manuals, the Supplier shall provide a Maintainability Design Checklist. The content and format of this checklist shall be as agreed upon with the DOTC-MRT3 Engineer.

The Supplier shall provide information regarding Mean Time To Repair (MTTR) of the equipment, in man-hours. This should include the time required to remove and replace the item, as well as the actual repair time.

At the Final Design Review (FDR), or other mutually agreed upon time, the Supplier shall provide a listing of the Lowest Level Replaceable Units (LLRU) in the equipment supplied.

The Supplier will be required to demonstrate predicted MTTR values. Should MTTR predictions not be met, the Supplier shall make the appropriate modifications needed to ensure compliance.

1.13.4. Safety Requirements

The Supplier shall provide a Safety Plan.

The safety requirements shall be described according to the terminology defined in the latest revision of MIL-STD-882, "System Safety Program Requirements."

The Supplier shall provide a quantitative measure of the inherent hazards of the equipment, both under normal use and anticipated misuse. Interactions between the vehicle and its operating environment shall be taken into account, as well as the possible effects of vandalism and sabotage.

The Failure Mode Effects and Criticality Analysis shall be performed and provided in accordance with the latest revision of MIL-STD-1629, with the following additional requirements:

a. When the probability of specific failure is known, the criticality shall be presented in accordance with the example in paragraph 50.7 of MIL-STD-1629.

b. A separate list of all single failure points shall be provided in accordance with paragraph 4.5.2.2 of MIL-STD-1629. This list shall identify each failure mode considered for each type of component.

c. All System Hazard Analyses, and Sub-System Hazard Analyses, shall be performed in accordance with the latest revision of MIL-STD-882.

1.13.5. Failure Analysis

In the event of a failure of any component during contractually required testing or the guaranty period, the Supplier shall conduct and submit a complete failure analysis report for record and approval. The failure analysis and recommended course of action shall be submitted within 30 days of receipt of the failed part by the Supplier, unless otherwise agreed upon.

1.14. DOCUMENTATION

1.14.1. General

All documents shall be written in English language and all drawing drawn to SI/metric units. Documents shall be made in a well-structured manner relevant to the vehicle system.

1.14.1.1. Presentation

All the text documents include the following:

- A summary table showing the evolution of the versions, the approbation dates and the summary of the modifications,
- A distribution list,
- A table of contents with page numbers
- Page numbering,

1.14.1.2. Format

The documentary products shall be delivered by the Supplier, in two forms:

- Documentary modules published on paper support
- Documentary modules under computer files format.

The documents and drawings are produced exclusively in normal sizes.

For each document, the Supplier shall provide 5 sets of paper support and 5 sets of computer format support.

The Supplier shall not protect the computer files against copy, so that the client may reproduce the files as deemed necessary for its own usage, including its representative usage limited to Manila EDSA/MRT Line 3 activities.

1.14.1.3. Computer Files

Where special software is required in the use/access of the supplied documents/drawings, the corresponding software, all interface programs and hardware shall also be provided.

The DOTC-MRT3 Engineer may accept the following computer file formats:

Document type	Application type	IBM PC compatible Software
Technical Report		
	Word processing	MS WORD for Windows
	Spreadsheet	MS EXCEL for Windows
	Data base	MS ACCESS for Windows
Schedule		
	Project management	MS Project for Windows
Drawing		
	CAD	Autocad for Windows

The data support can be either CD ROM or DVD ROM.

Erasable support such as RW CD or RW DVD is not accepted.
The Supplier shall supplies to the client all the software tools specifically developed for the project (Including the supply of source code). All software/programs that were custom designed for this project shall have no licensing restrictions

All drawings furnished by the Supplier shall be in accordance with the guidelines to be provided by the DOTC-MRT3 Engineer, including but not limited to the following:

1.14.2. Main Documents and Supply Date

The Supplier shall submit the detailed rolling stock specifications

1.14.2.1. Agreed Period After Contract is Signed

The Supplier shall provide to the client the following minimum documents.

1.14.2.2. Completion of the design review before production

The Supplier shall submit the following:

a. The Justification file of the concept choices that includes:

    1. Main technical orientations retained,
    2. The general drawings,
    3. Dimensions and volumes,
    4. Global technical characteristics,
    5. Gauge,
    6. The balance of the masses, including passengers capacity by train unit,
    7. The balance of energies (electric),
    8. The kinematics studies,
    9. The electric architecture,
    10. The software / hardware architecture,

b. The maintainability plan,
c. The safety Plan,
d. The technical specifications for each product,
e. The functional files of electronic equipment,
f. The interfaces files,
g. The quality assurance plan,
h. The software quality assurance program,
i. The general characteristics manual,
j. The complete demonstrations of safety (such as emergency braking),
k. The list of product suppliers,
l. The training plan,

1.14.2.3. End of manufacturing of the first unit

The Supplier shall submit the following:

a. The documents required for the completion of the design review, updated according to the progress of the project,
b. The preliminary test files, which regroup, for each product and for the complete unit:
    - The tests plan,
    - The routine tests program,
    - The routine tests reports,
c. The preliminary maintenance file, which includes;
    - The Functional Description Manual,
    - The Spare Parts Manual,
    - The design files for maintenance specific tools and test benches,
    - The required means for software maintenance.
    - The training manual for the maintenance staff

1.14.2.4. Delivery of the First Unit in Manila, Philippines (EDSA/MRT Line 3 Site)

The Supplier shall submit the following:

a. The documents required for the end of manufacturing of first unit, updated according to the progress of the project,
b. The tests files, which regroup, for each product and for the complete unit:
   - The type tests program of products and unit,
   - The type tests report of products and unit,
c. The first article inspection reports,
d. The train configuration records.
e. The maintenance file, which includes;
   - The functional description manual,
   - The spare parts manual,
   - The design files for specific maintenance tools and test benches,
   - The required means for software maintenance,
   - The maintenance manuals (including those of specific maintenance tools and test benches),
   - The maintenance schedule,
   - All the data use for maintenance, such as:
     – Spare parts inventory,
     – Failures mode, effect and criticality analysis,
     – Failure trees,
     – Particular recommendations for maintenance and operating modes

1.14.2.5. Starting of the Trial Runs

The Supplier shall provide the definitive updated version of the above documentation at the latest for the starting of the trial runs, that is, 5000 km run test for the first unit.

1.14.3. Drawings

1.14.3.1. Drawing Submittals

a. All drawings shall conform to current industry standards. All drawings shall be supplied in electronic format, the specific format to be approved by the DOTC-MRT3 Engineer, and with the required number of prints.
b. The drawings submitted shall be of a quality capable of being reproduced clearly.
c. The drawing number and its revision level shall be clearly marked on the drawing.
d. When revisions are made to drawings resulting in re-submittal, such drawings shall be accompanied by a covering letter detailing the changes made.

1.14.3.2. Drawings to be submitted for Acceptance/Approval

a. All top-level assembly drawings of items installed on the vehicle (These drawings shall be production drawings. Dimensioned outline drawings

may be considered acceptable upon approval by the DOTC-MRT3 Engineer),

b. Wiring and interconnecting diagrams or tables for equipment, panels, assemblies and components, etc. requiring connection on the car,
c. Complete schematic diagrams for equipment and systems (electric, hydraulic, etc.),
d. Interface drawings (unless all interface information is contained on other drawings),
e. Assembly or outline drawings which show the details of mechanical attachment and electrical connection interfaces,
f. Switch logic diagrams (where appropriate),
g. Performance curves and/or tabulations of equipment, systems, components, etc., and
h. Drawing Tree, delineating all major drawings entering into the construction of the vehicles, and indicating construction and system logic.

The DOTC-MRT3 Engineer reserves the right to approve any or all drawings used in the design and manufacture of these vehicles.

1.14.3.2.1. General Format

a. All drawings shall be produced on standard sheet sizes and format as required in the General Specifications or as approved by the DOTC-MRT3 Engineer.
b. All drawings shall contain a title block containing the following minimum information:

- Supplier Company names,
- Drawing title (which should not be ambiguous),
- Revision level of drawing, and date of revision (which must be updated for change and then be resubmitted for the DOTC-MRT3 Engineer's acceptance),
- Scale, where appropriate,
- Number of sheets as "x" of "y", and
- Date of released of Drawing.

c. A table of revisions shall be provided for each drawing, which shall show each revision level, the date and the revision made.
d. A list of parts and required quantities shall be provided on each drawing, or as a separate bill of material.
e. A table of reference shall be provided for product acceptance criteria
f. The drawing shall comply with accepted drawing standards. The Supplier shall state in their proposal and quotation which standard is used.
g. Two clear areas shall be made available in the title block of the drawing for the Employer’s use.

1.14.3.3. Drawing Requirements

Drawings submitted shall conform to the following minimum requirements in relation to scope, content and format.

These requirements are not intended to restrict the presentation of information and should be applied as appropriate to the equipment concerned.

Top Level Assembly/Outline Drawing:

a. Scope - to show equipment, as supplied, in sufficient detail to determine basic specification compliance.

b. Content Information

   i. Important dimensions,
   ii. Mounting arrangements and their tolerances,
   iii. Panel, enclosure, frame, etc. construction, material, and finish,
   iv. Direction of rotation (where applicable), speed or frequency, and amount of unbalance,
   v. Location of center of gravity, mass (in full working order), and mass carried at each mounting point,
   vi. Location and size of grounding straps or grounding facility,
   vii. Location of servicing features and clearance requirements for removal of all normal service items,
   viii. Labeling and location of notices and decals,
   ix. Special mounting instructions,
   x. Equipment arrangement, including fastening hardware, and
   xi. List of parts, which must include the type number of devices as documented by the original manufacturer.

1.14.3.4. Electrical Information

a. Operating voltage, power consumption, power factor, and tolerances thereon,
b. Type of windings (for transformers and machines) and type of insulation,
c. Resistance and tolerances,
d. Contact ratings,
e. Operating parameters relevant to type of device,
f. Type and size of cables and wires used,
g. Wire codes, and marking methods of wires and devices, and
h. Indication of color-coding of wire insulation (if used).

1.14.3.5. Schematic Design

a. Scope - to show in diagrammatic form how the subsystem equipment, Printed Circuit Boards, etc. function, without regard to the physical location of the equipment or cable routing.

b. Content Information

   i. All circuits contained within the equipment concerned,

ii. Wire identification code numbers,
iii. Vehicle builder/Supplier interface terminal code numbers and connector pin numbers,
iv. Trip/rupture current values of all protective devices,
v. Settings of all pressure, temperature, vacuum float, limit switches, time delay relays, etc., with tolerances,
vi. Values and tolerance of passive components,
vii. Load power consumption,
viii. Circuit voltages (nominal),
ix. Terminal code numbers on polarity sensitive components and subsystems for which a separate schematic is provided, and
x. Control logic charts and sequence diagrams.

Electrical symbols on schematics and wiring diagrams shall comply with accepted standards. The Supplier shall state in their proposal which standard is used.

1.14.3.6. Drawings and Design Data Changes

Prior to the qualification tests, the Supplier must notify the Employer of any design change. After the First Article Configuration Inspection (FACI) is approved, any change to any part must be submitted to the Employer for approval, together with an assessment of its impact on performance, reliability, maintainability, and interchangeability.

1.14.4. Engineering Documentation

The Supplier shall furnish five copies in electronic format and all required prints of the latest revision of all necessary contract drawings and documents. Thereafter, the Supplier shall update all subsequent revisions to these documents and shall submit five (5) copies in electronic format and all required prints of all revisions of these controlled documents to the DOTC-MRT3 Engineer for approval.

The Supplier shall provide five copies in electronic format and five (sets) copies of prints of the as-built drawings.

Should microfilm copies be provided, the Supplier shall be required to supply one high quality microfilm reader/printer.

1.14.5. As-Built Vehicle Specification

The Supplier shall be required to provide an electronic copy and six (6) hard copies of this MRT3 specification and Performance Requirements, updated and modified to reflect the as-built specification of the train.

1.14.6. Maintenance Manuals

1.14.6.1. General

A fully integrated maintenance manual shall be provided, which provides step-by-step instructions on how to inspect, maintain, repair and replace all components on the vehicles, down to the Lowest Level Replaceable Unit (LLRU). It shall be

assumed that the technicians performing this work have familiarity with rail vehicles, but not a detailed working knowledge. The LLRU shall be defined as any component within an assembly that is identified in the Original Equipment Manufacturer's (OEM) illustrated parts catalog and/or is offered for sale by the original equipment manufacturer.

The maintenance manual shall provide all necessary detail to perform the work required, and shall include the judicious use of diagrams, drawings, photographs, illustrations, etc., as appropriate for the task at hand, including necessary safety precautions. Detailed maintenance and troubleshooting procedures and test and repair procedures shall be provided for all electronic assemblies and circuit boards. Manuals shall identify all tools (Special and standard) needed to perform the work. This listing of tools shall be provided in the section describing the discrete task being performed.

All manuals shall be provided in electronic format, and six (6) prints of properly bound oil and dirt resistant hard copies. The material for the hard copies shall be approved by the DOTC-MRT3 Engineer.
The maintenance manuals shall be divided into three parts:

a. Running Maintenance Manual,
b. Scheduled Maintenance Manual, and
c. Overhaul Manual.

1.14.6.2. Running Maintenance Manual

The Running Maintenance Manual shall describe all work and inspections to be performed on the trains on a routine basis, including servicing, lubrication, adjustments, problem diagnosis, etc. Recommended cleaning procedures shall be provided, including necessary cleaning solutions. A substantial troubleshooting and repair guide shall be included to streamline the process of finding the root cause of problems and providing resolution.

1.14.6.3. Scheduled Maintenance Manual

The Scheduled Maintenance Manual shall describe all work and inspections to be performed on the trains according to pre-set time periods or accumulated Km run. An appropriate troubleshooting guide and/or parts repair /replacement shall be provided.

1.14.6.4. Overhaul Manual

The Overhaul Manual shall describe all work and inspections to be performed on the trains at designated overhaul periods (Or after accumulating certain number of Km run). An appropriate troubleshooting guide and/or parts repair/replacements shall be provided.

1.14.6.5. Operation and Maintenance Manual for Special Tools

The operation and maintenance manuals for the special tools will be provided for the Employer's use. Special tools shall include but not limited to diagnostic test equipment for all electronic assemblies and circuit boards, interface hardware & software, hook-up lines/cables and to test all train lined system (As specified in **sub-clause 1.19.4**).

1.14.7. Illustrated Parts Catalogs

The Illustrated Parts Catalogs (IPC) shall enumerate and describe all assemblies and constituent components down to the LLRU.

The IPCs shall be ordered in a logical fashion, by system, and shall identify the Supplier's part number and the OEM (Original Equipment Manufacturer's) parts number. Additionally, the Supplier shall provide the pertinent information on at least two different alternative suppliers for all components.
Parts common to different assemblies shall bear the same Supplier number. The next level assembly of all parts shall be clearly identified.

The judicious use of cutaway isometric and exploded drawings, photographs, illustrations, etc., shall be used to clearly identify all components down to the LLRU.

Five (5) copies of the IPCs shall be provided in electronic format, along with six (6) properly bound oil and dirt resistant hard copies.

The Illustrated Parts Catalogs shall be approved by the DOTC-MRT3 Engineer.

1.14.8. Operator's Manuals

The Supplier shall provide six (6) sets of properly bound, oil and dirt resistant hard copies of Operator's Manuals, which shall contain all information required for the proper operation of the vehicles. This shall include general vehicle familiarization material and the location, function and operation of all controls, switches, indicators, gauges, etc.

The Operator's Manuals shall also be provided in electronic format (5 copies).

The Operator's Manuals shall be approved by the DOTC-MRT3 Engineer.

1.14.9. Training Material

The Supplier shall provide six (6) sets of all material used to train the Employer's personnel to operate and maintain the vehicles.

The training material and the entire training program shall be approved by the DOTC-MRT3 Engineer.

The training materials shall also be provided in electronic format.

1.14.9.1 Train Simulator

The Supplier shall provide a train simulator for the purpose of research and training of train drivers/operators.

The Simulator shall as much as possible perform the actual experience of train operation by fabricating an exact copy of the driver's cab.

1.14.10. Vehicle History Books

The Supplier shall provide a Vehicle History Book for each vehicle at the time of delivery and acceptance. Each Vehicle History Book shall contain but not limited to the following car-specific information

a. Certified weight (vehicle and axle loads).
b. A description of each configuration changes from the base line in sufficient detail for the DOTC-MRT3 Engineer to understand,
c. Summary of tests and certification performed where required,
d. Results of all tests performed on the complete vehicle and its systems and subsystems,
e. List of serially numbered equipment,
f. Configuration record of each assembly, sub-assemblies and major component, including revision numbers and dates, according to the configuration plan.
g. Description of modifications to the configuration and dates of completion,
h. List of defects noted and status,
i. List of "as built" drawings with revision status.
j. Axle assembly (wheels, bearings, gears) mounting records, including pressing charts,
k. Provision for the Service to record inspection, servicing, overhaul and repair activities,
l. Shipping documents.

The copies of the full history and configuration records, will be arranged by component type, assembly, sub-assembly, major component and other serially numbered components, including spares, test equipment and special tools.

The Vehicle History Books shall be provided in electronic format (2 copies), and six (6) copies of properly bound oil and dirt resistant hard copies for each car.

The Vehicle History Book format shall be approved by the DOTC-MRT3 Engineer.

1.14.11. Intervention/Modifications History Record (During Warranty Period)

The Supplier shall provide a supplemental History record for each vehicle at the time of final acceptance/after the warranty period. Each supplemental History record shall contain the following car-specific information:

a. Intervention and repairs during warranty period,
b. All modifications/revisions done during the warranty period,
c. All tests/validation tests reports and records, and
d. Component exchange and new numbers.

The Intervention/Modification History Record shall be provided in electronic format (2 copies), and six (6) copies of properly bound oil and dirt resistant hard copies.

The Intervention/Modification History Record format shall be approved by the DOTC-MRT3 Engineer.

1.15. INSPECTION, TESTING AND COMMISSIONING

1.15.1. Inspection

1.15.1.1. General

The DOTC-MRT3 Engineer shall have free access to the Supplier's premises throughout the contract, for the purpose of reviewing and inspecting the design and manufacturing processes.

The Supplier shall extend to the DOTC-MRT3 Engineer or his nominees full cooperation and provide facilities at its premises and final assembly site to enable convenient inspection of materials, work and equipment. This shall include provision of office space dedicated for the DOTC-MRT3 Engineer's use and suitable for occupation by up to four people, equipped with desks, telephones and facsimile machine with international lines, PCs with Internet access, locker facilities and filing cabinets. The office shall have adequate ventilation and air-conditioning and lighting with convenient access to comfort rooms.

From the effective date until the last vehicle unit, the Supplier shall furnish, without additional charge, suitable accommodation of the DOTC-MRT3 Engineers for the testing and inspection. The Supplier shall provide local ground transportation from local hotels to the Supplier's factory for all of the DOTC-MRT3 Engineers assigned to the Supplier's plant.

Copies of all Design Data shall be provided. Design data shall be sufficient to enable the DOTC-MRT3 Engineer to review design, construction, assembly, installation, workmanship, clearance, tolerances, and functioning of consists. The DOTC-MRT3 Engineer shall have unrestricted rights of inspection of all documents, tools, and test equipment to be delivered to the DOTC-MRT3 Engineer as part of the works.

The DOTC-MRT3 Engineer shall be at liberty to inspect the manufacturing process at any stage. Without prejudice to any other provision of the Contract, the DOTC-MRT3 Engineer reserves the right to reject all materials and workmanship, which do not fully conform to this MRT3 specification and Performance Requirements. Repetitious rejections at either a SubSuppliers' or the Suppliers' facilities shall be cause for the DOTC-MRT3 Engineer to suspend inspection. In such case, the work in question shall also be suspended until satisfactory corrective action is taken by the Supplier.

The DOTC-MRT3 Engineer shall have unrestricted rights of inspection of all documents, tools and test equipment.

1.15.1.2. Inspection Hold Points

a. The Supplier shall propose a structured set of inspection hold points. The hold points shall be structured so that a formal hold point is allowed for each significant element of the car's manufacturing process. At each hold point the DOTC-MRT3 Engineer shall hold a formal inspection, or advised that the inspection have been waived.
b. The construction of each vehicle shall not proceed until the inspection by the DOTC-MRT3 Engineer has been completed or waived.
c. The Supplier shall propose the inspection hold points within 180 days of the Date for Commencement of the Works. The inspection hold points shall be submitted for review by the DOTC-MRT3 Engineer.

1.15.1.3. Inspection Prior to Delivery

a. The DOTC-MRT3 Engineer/Employer shall be afforded the opportunity of inspecting all cars to be delivered under the Contract before leaving the Supplier's facility and prior to delivery to the Site.
b. The Supplier shall advise the DOTC-MRT3 Engineer no less than 15 days in advance of a vehicle being available for inspection.
c. Once the inspection and any required remedial actions are completed to the satisfaction of the DOTC-MRT3 Engineer, the DOTC-MRT3 Engineer shall give consent for vehicle shipment.

1.15.1.4. First Article Inspection

First Article Inspections (FAI) shall be performed as specified in **Sub-Clause 1.17.4** of this Particular Design and Performance Specifications.

1.15.2. General Testing Requirements

1.15.2.1. General

The Supplier, in addition to testing for design verification purposes, shall carry out all testing of cars to ensure and demonstrate that the consist and all its equipment is safe, functional and suitably reliable for revenue service.

The Supplier shall be responsible for all materials, consumable, test equipment, labor and facilities for the test, unless specified and approved by the DOTC-MRT3 Engineer.

1.15.2.2. Test Plan

a. The Supplier shall submit within 90 days of the Date for Commencement of the Works, for review and concurrence by the DOTC-MRT3 Engineer, a Test and Commissioning Plan outlining the categories and the general quantity of tests to be carried out, and an approximate schedule of testing.
b. The Test and Commissioning Plan shall be submitted in accordance with the requirements of this MRT3 specification and Performance

Requirements. The Test and Commissioning Plan shall be separated into two major categories: the Factory Acceptance Tests (FAT) and the On-Site Testing and Commissioning.

c. For the submission of the On-Site Testing and Commissioning Plan, the Supplier shall combine the requirements of Installation Tests, Partial Acceptance Tests, System Acceptance Tests and Tests on Completion into one single plan, if appropriate.

d. The Supplier shall submit within 180 days of the Date for Commencement of the Works, for review and concurrence by the DOTC-MRT3 Engineer, an updated version of the Commissioning Plan detailing:

   i. All tests to be carried out,
   ii. Scheduled test dates,
   iii. Location of the test,
   iv. Function to be tested and requirement to be demonstrated, and
   v. Party responsible for the testing.

e. Without prejudice to any other provisions of the Contract, the DOTC-MRT3 Engineer reserves the right to witness any or all tests, and to require submission of any or all test specifications and reports. The DOTC-MRT3 Engineer reserves the right to reasonably call for additional tests if considered necessary.

f. The Supplier shall reissue the Commissioning Plan monthly thereafter, updating all information as test scheduling is confirmed and tests are carried out, annotating which tests the DOTC-MRT3 Engineer will witness and which test reports shall be submitted. No test date shall be changed without the DOTC-MRT3 Engineer having a minimum of 15 days notice.

g. The Supplier shall submit within 90 days of the substantial completion of the Works for review a Commissioning Plan Compendium, recording all testing carried out, functions and performance demonstrated, reports produced and reviewed by the DOTC-MRT3 Engineer. This shall include all System Performance Demonstrations.

1.15.2.3. Testing Details

a. For any tests where the DOTC-MRT3 Engineer has indicated that he wishes to witness a test, no testing shall be carried out against a test specification prior to its review by the DOTC-MRT3 Engineer.
b. Test specification shall include sample test certificates, the design values and the tolerances shall be shown.
c. All materials and/or details represented by samples, which are found to be non-compliant, will be rejected.
d. The Supplier shall replace any material or detail destroyed in the process of testing.

1.15.3. Design Qualification Testing

a. As part of the design verification process, type tests shall be carried out to demonstrate that design of the train consist and its systems are fully in compliance with the requirements specified in this MRT3 specification and Performance Requirements. The tests shall be completed at the Supplier's manufacturing facility unless otherwise specified or reviewed by the DOTC-MRT3 Engineer.

b. The Supplier shall perform an endurance test in accordance to the requirements of **Sub-Clause 1.6.1** of this MRT3 specification and Performance Requirements on the proposed door design to demonstrate that the requirements specified therein are met.

   The door system shall be endurance tested on a rig in suitable climatic conditions to demonstrate that the door system will allow the consist to meet the requirements of this MRT3 specification and Performance Requirements. The rig shall test opening and closing of the door, obstacle detection and re-opening of the door in a combination to simulate likely service operation, and shall be submitted for review by the DOTC-MRT3 Engineer.

c. Design Qualification testing shall be performed of the complete braking (**Sub clause 1.8.1**), propulsion (**Sub clause 1.9.1**), and Train Management System (TMS) systems configuration, using simulated loads on the traction motors. Combined propulsion system testing shall be in accordance with IEC 1287-1 and IEC 1377 or equivalent.

d. Design Qualification testing shall be performed on the complete auxiliary power system configuration, using simulated loads. Combined auxiliary power system testing shall be in accordance with IEC 1287-1.

e. Design Qualification testing shall be performed for the TMS system to verify designed capacity of the systems, functional requirement and correct interfacing. The real interface hardware and software should be used where possible.

f. The braking system shall be tested to demonstrate its ability to satisfactorily interface with the Train Control and Signaling systems, and provide performance as specified herein.

g. The parking brake shall be tested to demonstrate its ability to hold a consist on the specified gradient. The test shall record the actual force required to overcome the parking brake in a failure recovery situation on both level track and a 4% gradient. The test shall be undertaken at the time of handing over of Rolling Stock at EDSA/MRT3 site.

h. Before transporting the Rolling Stock to Philippines, EDSA/MRT3 the Supplier shall perform a test to demonstrate that the Emergency Braking and service requirements have been met.

i. The Supplier shall prepare and conduct qualification tests to demonstrate that all other equipment to be supplied will operate properly within the limits of

the environmental and/or physical parameters listed in this Particular Design and Performance Specifications. The test shall be undertaken at the time of handing over of Rolling Stock at EDSA/MRT3 site.

Any design changes, adjustments, etc., that are required to meet the performance requirements, shall be fully re-tested and documented. All Equipment design changes shall be subject to prior approval by the DOTC-MRT3 Engineer.

For any unit previously qualified, or with a railroad proven service history, the Supplier may request a waiver from performing the Qualification Test. However, the request for a waiver must be accompanied by a duplicate test report or certification for approval in order to satisfy qualification requirements. The waiver request must include justification of the claim that the equipment and test(s) are substantially the same as those in the current qualification requirements.

Only with the written consent of the DOTC-MRT3 Engineer will Qualification Test or Certification requirements be waived.

1.15.4. Acceptance Testing

Acceptance tests, which include Type Tests and Routine Tests, shall be completed on every vehicle supplied under this Contract to prove that manufacturing and assembly of the consists have been correctly carried out. All cars, sets and consists shall undergo acceptance testing in accordance with the requirements of IEC 1133, as a minimum.
The tests shall be completed at the Supplier's manufacturing facility unless otherwise reviewed and instructed by the DOTC-MRT3 Engineer. In addition, the Supplier shall conduct Acceptance Tests on each piece of equipment to be provided to ensure that the equipment is functioning correctly.

1.15.5. On-Site Testing and Commissioning

a. During commissioning of consists at the Site, the **following inspection and tests** (On-Site Commissioning), as a minimum, shall be carried out to demonstrate functions of the systems of the consist. On-Site Commissioning shall be considered as the Completion Tests to be performed by the Supplier under the Contract. The testing shall be performed in accordance with IEC 1133 or accepted equivalent.

    i. Post Delivery inspection,
    ii. TMS operation,
    iii. Performance acceleration to set speeds,,
    iv. Parking brake integrity,
    v. Parking brake performance,
    vi. Performance of emergency brake from set speeds,
    vii. Blended mechanical and regenerative braking from set speeds,
    viii. Operation through neutral sections,
    ix. Train radio operation,
    x. Public Address system operation,
    xi. Lighting operation,

xii. Air conditioning operation,
xiii. Passenger information display operation,
xiv. Cab controls, functions and indications.
xv. Door control and functionality, per door,
xvi. Automatic Train Protection Equipment and Functionality
xvii. Safety critical functions, and
xviii. Any other routine test demonstrating fulfillment of requirements of Interface Specifications.

Commissioning shall be carried out on all consists supplied under this Contract.

b. For each consists delivered to the Site, the Supplier shall establish an Open Actions List. The Open Actions List shall record all actions to be carried out on the consist, and shall be added to as actions become known. These shall include:

i. Type, routine, integration and commissioning tests,
ii. Fault correction and equipment repairs, and
iii. Fleet modifications and defect rectification.

The Defects Liability Period shall not begin until all items are closed-out and accepted, and the Taking Over Certificate is issued.

1.15.6. Test Documentation

All documentation, procedures, reports and certifications shall be provided with a unique document number, and properly controlled.

1.15.6.1. Test Procedures

The test procedure must state the purpose of the test, and reference the relevant portion of this MRT3 specification and Performance Requirements or standard with which the procedure intends to comply.

The test procedure shall clearly define the condition of the equipment and the test set-up (test conditions), and any tests that the equipment must have previously passed. The test procedure must describe in detail the equipment needed to perform the test.

The test procedure must provide detailed, step-by-step instructions as to how the test is to be carried out. This includes results expected, and actions to be taken should the expected result not be achieved.

The test procedure shall define the data to be recorded.

1.15.6.2. Test Reports

The test report shall identify the test procedure in accordance with which the test was performed, and the reason for performing the test.

The test report shall describe the specific test conditions, highlighting differences, if any, between those required by the test procedure.

The test report shall provide a detailed description as to how the test was performed, clearly stating if any steps were different than specified, and describing the differences. The test report must provide a rational explanation for any deviations from the procedure.

The test report shall clearly detail the results obtained, and discuss the results in context with those expected.

The test report must provide a formal conclusion as to whether the test passed or failed.

1.16. MATERIALS AND WORKMANSHIP

1.16.1. General

All materials entering into the construction of this project shall be new, of first-class quality, consistent with materials commonly used in rail vehicles manufacturing. All workmanship shall be of high quality and shall conform to the best manufacturing practices in all respects.

All materials, specialties, equipment, component parts, and accessories shall be manufactured in accordance with, and shall comply with, the standards or specifications of the appropriate national technical or professional society or trade association or Government Agency.

All materials shall be marked or stored to be readily identified and shall be adequately protected during handling and storage.

All materials shall be suitably protected against corrosion. The specific means of protection chosen shall be approved by the DOTC-MRT3 Engineer.

Environmentally harmful materials shall be avoided in the design and manufacturing of the vehicle. This shall include but not limited to the following materials and chemicals.

a. Ozone depleting Freons,
b. PCB,
c. Brominated Flame retardant,
d. Formaldehyde,
e. Halon,
f. Beryllium,
g. Lead,
h. Cadmium (except in recyclable batteries),
i. Isocyanates,
j. PVC,
k. Asbestos, and
l. Urethane foam.

1.16.2. Fasteners

All screws, bolts, nuts and washers shall be in metric and conform to applicable standards and shall be preferably stainless steel, or at least zinc plated. All such fasteners exposed to the elements shall be plated in accordance with ASTM B633, with a Type II finish (Olive Drab) for Service Condition SC2.

All fasteners of 5 mm diameter or larger shall have coarse threads, except as specified. Exceptions may be permitted, but require review and consent by the DOTC-MRT3 Engineer.

All hardware used shall be of the same grade, and shall be at least one grade higher than the stress limit required. Exceptions may only be permitted after review and consent by the DOTC-MRT3 Engineer.

Bolts used with nuts shall be the shortest standard size that will provide at least two full threads through the nut.

All bolts and cap screws shall have the head marked to indicate grade. All nuts shall be marked to indicate grade.

All bolts, nuts, cap screws and machine screws shall be locked to prevent loosening in service. The locking method shall be subject to the DOTC-MRT3 Engineer's review and approval.

The threads of stainless steel fasteners shall be suitably treated to prevent galling upon installation.

All wire ties used shall be of the weather-resistant (black) variety.

1.16.3. Parts

Components, plates, shields, or other parts, which may be removed for repair or maintained, shall be interchangeable with other identical item.

Non-maintained components shall be designed for a useful life of 30 years. If, during the warranty period, it is demonstrated that the extrapolated life of any such component is less than 30 years, the component must be redesigned and replaced on every vehicle.

All parts shall be free from sharp edge and burrs that might injure persons or damage clothing.

1.16.4. Electrical Components

1.16.4.1. Terminals

Solderless terminals shall be equal to those supplied by JST, Amp, Hollingsworth, or Thomas and Betts or DOTC-MRT3 Engineer approved equivalent.

The use of quick connect ("FASTON") terminals will not be allowed, except subject to the written approval of the DOTC-MRT3 Engineer. When allowed, quick connect terminals must be of phosphor bronze.

Only ring tongue terminals shall be used, except as specifically approved by the DOTC-MRT3 Engineer.

1.16.4.2. Wire Insulation

Unless otherwise specified, wire insulation shall be one of the following types, unless specifically approved by the DOTC-MRT3 Engineer:

a. Ethylene Tetrafluoroethylene (ETFE) fluoropolymer having a continuous temperature rating of 150 ^{o}C,
b. Abrasion resistant, filled Tetrafluoroethylene (TFE) with a temperature rating of 260 ^{o}C and meeting the requirements of MIL-W-22759/6,
c. Crosslinked Polyolefin (XLPO),
d. All wire insulation, except vehicle body wiring, shall be rated at 600 V minimum, unless otherwise specified or agreed to by the DOTC-MRT3 Engineer. Vehicle body wire insulation shall be rated at 2000 V minimum.
e. Wires 6 mm^2 and smaller shall have the appropriate insulation material as defined above. Wires larger than 6 mm^2 shall be insulated only with Crosslinked Polyolefin (XLPO).

1.16.4.3. Wire Ampacity (Ampere Capacity)

The selection of wire sizes and insulation shall be based on the current carrying capacity, voltage drop, mechanical strength, temperature and flexibility requirements, in accordance with applicable Rail Industry approved standards.

Maximum wire ampacities shall conform to applicable Rail Industry approved standards. Where more than 3 conductors are routed in a raceway or cable, the ampacities shall be suitably de-rated.

1.16.4.4. Wire Stranding

Wires stranding and conductor construction shall be appropriate for the application, taking into account wire size, flexing requirements, etc., and shall comply with appropriate Rail Industry approved standards.

1.16.4.5. Wiring Prohibition

Pinch screw terminals and solid conductors are specifically forbidden.

1.16.4.6. Creepage and Clearance

Electrical creepage and clearance shall be adequate for the voltage levels and environment, and shall comply with NFPA 130 or other appropriate Rail Industry approved standards.

1.16.4.7. Insulation Resistance

The insulation resistance of all wiring shall be designed and tested in accordance with NFPA 130 or other Industry approved Insulation Resistance Test and High Potential Test procedure.

1.16.4.8. Voltage Segregation

Wires shall be segregated into separate bundles/harnesses and connectors according to the voltage ratings in the following classes and in accordance with NFPA (130) standards:

a. Line voltage DC wiring,
b. High voltage AC wiring (Above 600V-as may be applicable),
c. Low voltage AC wiring (Under 600V),
d. Battery voltage wiring (Under 125V),
e. ATP wiring, and
f. Radio, Intercom, P/A wiring.

1.16.5. Electronic Equipment

As a minimum, all electronic equipment shall comply with IEC 571: Electronic Equipment used on Rail Vehicles, for design, manufacture and testing and shall use components purchased against an internationally recognized quality assurance and reliability certification procedure.

Electronic components shall only be purchased from suppliers with a minimum ISO 9001/2 certification.

Electronic equipment shall meet the requirements for radio frequency interference and electro-magnetic compatibility as required in **Sub-Clause 1.14.1** of this MRT3 specification and Performance Requirements.

1.16.6. Mechanical Provisions

1.16.6.1. Metals

Metals shall be supplied in compliance with the following material standards or equivalent, unless otherwise specified:

a. Steel Castings - BS 3100 (592),
b. Stainless Steel - chromium content not less than 17%, carbon content not more than 0.12%,
c. Steel in welded structures - BS 4360 Grade WR50,

d. Aluminium panels - BS 1470 Grade HS30,
e. Aluminium forgings - BS 1472 Grade HS30,
f. Aluminium castings - BS 1490 Grade LM6, and
g. Auminium sections - BS 4300 Grade 15H17.

1.16.6.2. Welding

All welding procedures shall be documented by the Supplier. Approval of the welding procedures shall be as required by BS 4870 – Approval Testing of Welding Procedures or equivalent and Approval Testing of Welders Working to Approved Welding Procedures, or equivalent.

The DOTC-MRT3 Engineer reserves the right to require the quality of individual welds, particularly in critically stressed areas, to be verified by an Approved Non-destructive Testing (NDT) procedure.

1.16.7. Paints, Coating and Protection

All surfaces shall be completely free of rust, scale, grease and other foreign material immediately before painting, and shall be painted with at least two coats of primer and one finish coat of paint.

The different surface protection products (Primer, putty, finishing paint) will be of a technology (i.e., PU or equivalent) allowing a very good protection of the metallic surfaces against rust, weather, chemicals, UV, pollution, mechanical aggressions, wear and tear, friction forces (washing plant, others), while showing no color fading all over the life span.

The surface protections shall be of a quality such that no complete re-painting will not be needed before every 900,000 km.

Areas exposed to corrosive fluids or cleaning solutions shall be protected with coatings resistant to those fluids. The finish coat shall match that of the equipment in quality and color. There shall be no paint applied to hoses and electrical lines. The interior surfaces of equipment enclosures shall be primed and given one coat of clear insulating varnish or one coat of white enamel paint. There shall be no exposed, unpainted or untreated surfaces on the equipment supplied unless specifically approved by the DOTC-MRT3 Engineer.

1.16.8. Fire Safety

The Supplier shall ensure that all materials used in the construction of the equipment supplied have properties that are not conducive to the propagation of flame, nor to the generation of smoke and toxic gases, consistent with the properties required to perform the service intended. At a minimum, materials shall comply with the requirements of **NFPA 130**.

The Supplier shall provide data pertaining to all relevant tests having been performed on the materials proposed to be used.

The Employer reserves the right to prove compliance to this specification.

1.16.9. Equipment Enclosures

All equipment enclosures installed in locations exposed to outside ambient conditions shall be designed and manufactured to prevent the entry of foreign substances, such as liquids (Including water, spilled drinks, vehicle wash over spray, and wheel splash), dust and dirt, oil, or debris. Enclosures shall be made to IP 555 rating or better.

Enclosures containing equipment, which may produce gases (Such as battery boxes), shall be designed and manufactured to ensure that the gases are safely exhausted to outside the enclosure.

1.17. PROJECT MANAGEMENT REQUIREMENTS

1.17.1. General

The Supplier shall submit a Project Management Plan and the Project Management Program (Works Program) for the DOTC-MRT3 Engineer's review and acceptance/approval.

1.17.2. Engineering Schedule and Reviews

It shall be the responsibility of the Supplier to promptly advise the DOTC-MRT3 Engineer of any anticipated delays in drawing or document submittal, with the reason for such delays, so that the impact may be assessed and appropriate measures taken.

At a minimum, design reviews must be conducted on all of the following major systems:

a. Automatic Train Protection Equipment,
b. Auxiliary Power Supply Equipment,
c. Battery,
d. Bogies,
e. Braking Equipment,
f. Vehicle body Structure,
g. Articulation,
h. Vehicle Interior Arrangement,
i. Vehicle Roof Layout,
j. Vehicle Under floor Layout,
k. Couplers,
l. Destination Signs,
m. Diagnostic Test Equipment,
n. Door Actuation and Control Equipment,
o. Driver's Cab Layout,
p. Gearbox and Coupling,
q. Ventilation and Air Conditioning Equipment,
r. Lighting Equipment,
s. Power Collection Equipment,
t. Power Conversion Equipment,

u. Power Electronics Control Equipment,
v. Propulsion Control,
w. Radio and Communications Equipment,
x. Seats,
y. Traction Motor,
z. Wheel sets, and
aa. Windows and Glazing.

The following levels of Design Review shall take place:

CONCEPTUAL: The system and subsystem requirements are finalized.

PRELIMINARY: All interface requirements are identified and finalized, such as envelope dimensions, weights, electrical and requirements, and functional interactions.

FINAL: Hardware designs are finalized.

1.17.3. Design Approval Process

The Supplier shall follow the design submission and review process outlined in **Sub-Clauses 1.17.1** and 1.**17.2** of this MRT3 specification and Performance Requirements, and submit the documentation required by **Clause 1.14**. Upon approval of the manufacturing drawings and documentation, the Supplier shall begin manufacturing.

1.17.4. First Article Configuration Inspection

Prior to serial production taking place, the Supplier shall conduct a First Article Configuration Inspection (FACI), in accordance with a procedure to be approved by the DOTC-MRT3 Engineer, during which the first component produced will be subjected to a rigorous test and inspection to confirm that the hardware fully complies with the Supplier's design and manufacturing process requirements. Hardware inspections may take place prior to this point, initiated either by the Supplier or the DOTC-MRT3 Engineer, but they shall be considered as Hardware Reviews, and not FACIs.

At the FACI, the Supplier shall make available all pertinent design and manufacturing process documentation, test records, material certifications, etc. Should all the requirements of the FACI not be met, then the inspection shall be considered a Hardware Review.

Upon acceptance of the FACI by the DOTC-MRT3 Engineer, the Supplier is then free to proceed to the manufacturing of all pertinent hardware. The hardware must meet or exceed the quality standards set at the FACI, and must incorporate any comments made by the DOTC-MRT3 Engineer at the FACI.

The Supplier is reminded, however, that the installation of the components or equipment in the vehicle will likewise be subject to the FACI process.

All hardware entering into the construction of the vehicles shall be subject to the FACI process. At a minimum, the following equipment shall undergo the FACI process:

a. Axles,
b. Auxiliary Power Supply Equipment,
c. Battery and Battery Box,
d. Bogies,
e. Braking Equipment,
f. Articulation,
g. Vehicle body Structure,
h. Vehicle Interior Lining,
i. Vehicle Interior without Lining,
j. Vehicle Roof,
k. Vehicle Under floor,
l. Circuit Breaker Panels,
m. Couplers,
n. Destination Signs,
o. Diagnostic Test Equipment,
p. Doors,
q. Door Actuation and Control Equipment,
r. Driver's Cab,
s. Gearbox and Coupling,
t. Ventilation and Air Conditioning Equipment,
u. Lighting Equipment,
v. Power Collection Equipment,
w. Power Conversion Equipment,
x. Power Electronics Control Equipment,
y. Seats,
z. Signage,
aa. Traction Motor,
bb. Wheel sets, and
cc. Windows and Glazing.

1.17.5. Systems Integration

The Supplier shall submit a Systems Integration Plan for review and approval. This plan shall describe in detail the means by which the Supplier will ensure that all systems and subsystems are compatible with each other, and will work together to satisfy the requirements of this MRT3 specification and Performance Requirements.

1.17.6. Technical Support

a. The Supplier shall make available experienced Maintenance DOTC-MRT3 Engineers & maintenance staff to provide assistance throughout all Defects Liability Periods. All works carried by the Supplier during the Defects Liability Period shall be carried out within the maintenance periods of the operating schedule.
b. Assigned Maintenance DOTC-MRT3 Engineers and staff shall have good mastery of English language.

c. Access to the depot and to cars by the Supplier's staff shall be controlled by the DOTC-MRT3 Engineer. The Supplier shall adhere to all the Employer's working practices, including safety procedures of the Employer.
d. The Supplier shall provide operation and maintenance training to the Employer, as defined in **Clause 1.20** of this Particular Design and Performance Specifications.
e. Where Defects Liability maintenance or additional work is required on the cars, the procedure and documentation for the work shall be applied strictly, regardless of whether the work is carried out by the Supplier and/or the Employer.

f. The Supplier shall provide an office space at the Manufacturer's site, good for two DOTC-MRT3 Engineers, and equipped with complete facilities. As a minimum the office shall be equipped with the following essential furniture/equipment:

    i. Tables and chairs for two persons,
    ii. Secured locker cabinet (2 units),
    iii. Telephone line with International Direct Dial,
    iv. Fax machine with International Direct Dial (latest model heavy duty), and
    v. Computer with Internet connection (two sets, with Genuine Windows 7 (1 TB Hard Disk Drive & 4 GB Memory) with laser printers and peripherals).

The computers shall be transported and handed over to EDSA/MRT3 at Quezon City, Philippines, after the completion of the work at the Manufacturer's site. Other equipment shall be taken back by the Supplier.

1.17.7. Warranty / Guarantee

The Supplier shall warrant that the design, materials and workmanship incorporated and used in the production of each system and vehicle shall be free from defects and that the system and its related components and apparatus comply with their corresponding specification and/or relevant DOTC-MRT3 Engineer approved data and drawings.

1.17.7.1. Guarantee Period

Unless otherwise specified, the guaranty period for the following components shall commence from the date of issue of Taking Over Certificate, which shall be done after all action items has been closed out on the vehicle on which they are installed.

a. The vehicle body structure (including under frame and support brackets) shall be guaranteed for not less than ten (10) years.

b. The following equipment shall be guaranteed for a period of five (5) years:

    i. Major components of truck system (truck frame, axles, suspensions, Traction Motors, gearboxes, etc.),
    ii. Painting: Corrosion Protection, and

iii. Glass.

c. The vehicle batteries shall be guaranteed for not less than three (3) years.

d. All other vehicle components and system shall be guaranteed for a period of two (2) years.

1.17.7.2. Responsibility of the Supplier

Under this warranty/guaranty, the Supplier shall be responsible, at his own cost and expense (including cost of removal and installation), for the repair and/or replacement of each component or apparatus which, under normal use and maintenance becomes defective or inadequate in the performance of its function during the guaranty period, or during such period fails to comply with the MRT3 specification and Performance Requirements.

Should the removal or replacement of a failed component or apparatus cause removal or replacement of any other equipment or parts, such work and related cost shall be borne by the Supplier.
The warranty/guaranty covering any component or apparatus repaired or replaced by the Supplier shall be renewed for a period equal to the period of the original warranty/guaranty effective as of the day when such repaired/replaced part is installed. If the failure is found to affect any other component or apparatus, the renewal of the warranty/guaranty shall also be extended to cover the components or apparatus so affected, and shall start as of the date the interrelated components and apparatus function is restored.

Any occurrence of malfunction as defined in this sub clause 17.7.2 shall be taken in charge by the Supplier no more than 2 hours following the finding of the malfunction.

1.18. QUALITY ASSURANCE REQUIREMENTS

1.18.1. General

The Supplier shall submit a Quality Assurance Plan for the DOTC-MRT3 Engineer's review and acceptance. The plan shall delineate the responsibilities of the Quality Assurance organization in the Supplier's company, including personnel reporting arrangements.

This plan shall describe the Supplier's Quality Assurance organization, including the names of personnel to be assigned to this project, and shall describe the responsibilities of each separate unit and their contribution to this project. In particular, the plan should describe the Quality organization's involvement and influence at all stages of the project.

In the plan, the Supplier shall describe the means by which the Supplier will utilize the Quality Assurance organization to adequately control all in-house work, and that of major suppliers and sub-suppliers, including ensuring their adherence to the requirements of this Particular Design and Performance Specifications.

The Supplier's Quality Assurance Plan shall also describe the procedure to be used to ensure that the First Article Configuration Inspection process is controlled, and that series production does not take place until the product has been accepted by the DOTC-MRT3 Engineer, and that the series production is strictly compliant with the First Article Configuration. Also to be included is a thorough description of the means used to control Engineering changes and field changes, and to insure the integration of the vehicles in the whole system, taking into account the interfaces and interactions..

1.18.2. Configuration Control

In order to control the vehicle configuration, the following requirements shall be adhered to for all changes to any equipment following First Article Configuration Inspection (FACI).

1.18.2.1. Design Changes

The Supplier shall submit design details of the change proposed to the DOTC-MRT3 Engineer for review and determination. In some cases, at the discretion of the DOTC-MRT3 Engineer, a simple verbal explanation will be sufficient for preliminary review and acceptance. In all cases however, a written explanation will be required for final acceptance.

The written explanation will take the form of a Field Modification Instruction (FMI), together with updated Engineering drawing/s.

Before any modifications are made to vehicles, the FMI and design details must be reviewed and accepted by the DOTC-MRT3 Engineer.

The format and content of the design change notice is the responsibility of the Supplier to determine, based on the Supplier's normal method of operation.

Only with the express approval of the DOTC-MRT3 Engineer will the above procedure be waived.

The Supplier shall submit to the Employer for review a monthly listing of all active design change requests and their implementation status.

As a minimum, the design change request shall contain the following information:

a. Description of subject,
b. Reason for change,
c. List of related documents,
d. The Supplier & Manufacturer part numbers, serial numbers, quantities and location of affected parts or assemblies,
e. The parts required to make the change,
f. The effect of the change on interchangeability,
g. Special tool requirements,
h. Material disposition (rework, scrap, etc.),

i. A detailed procedure for making the change,
j. Test equipment required, and
k. Test procedure.

1.18.3. Part Numbers and Serial Numbers

The Supplier shall permanently identify all hardware components to the lowest level of repair and replacement. The hardware identification marking shall at all times coincide with the officially released Engineering data.

Major assemblies and subassemblies shall be assigned individual serial numbers. Duplicate serial numbers shall not be used within a type or model series. The serial number shall be marked on the equipment nameplate.

1.19. SPARE PARTS AND TOOLS

1.19.1. Guarantee Period of Spare Parts

The Supplier shall guarantee spare parts availability for a period of not less than 15 years from the date of issue of the Taking Over Certificate. Where parts/items were sourced from a subSupplier and/or other Manufacturer's, the Supplier shall secure and submit to the Employer a similar guarantee, equally binding to the Employer, for spare parts availability from the respective SubSupplier/Manufacturer, for all the works.

1.19.2. Spare Parts Required During Defects Liability Period

The Supplier shall provide sufficient Capital Spares, Unit Exchange Spares (Spare Parts) and Consumables to service the trains.

The Supplier shall provide a complete listing of all such parts to be supplied and the supply shall conform to the provisions:

a. Supplier part number, and
b. Part description.

The Supplier shall submit the Original Equipment Manufacturer part number at the time of supply of the spares.

An indicative list of Capital Spares that may be required is given in the table below. The minimum quantity of parts required to be provided by the Supplier is as indicated. Nevertheless, the bidder shall indicate the quantity he proposes to supply, which in no case shall be less than the minimum quantity required.

Indicative List of Capital Spares for Rolling Stock to be supplied by the Supplier

The Supplier shall provide the required number of units of the below listed major parts, assemblies/sub-assemblies for **one (1) LRV**

1. Motor Truck Assembly
2. Trailer Truck Assembly
3. Current Return Assembly
4. Pantograph Assembly
5. Door Assembly
6. Traction Motor Assembly
7. Air Conditioning Assembly
8. ACU Compressor Assembly
9. Condenser Blower Assembly
10. Evaporator Blower Assembly
11. Gearbox Assembly
12. MT Wheel Axle Assembly
13. TT Wheel Axle Assembly
14. Wheel Assembly
15. Brake Disc
16. Flexible Coupling Assembly (Link for GB&TM)
17. Motor and Trailer Bogie Frame
18. Battery Set
19. Battery Charger/Discharger
20. Auxiliary Inverter Assembly
21. Main Control Device (PCE)
22. Master Controller(Rate Controller)
23. Replaceable Circuit Boards
24. Major Sub-Assemblies of Main Control Devices
25. Jumper and Cable Assemblies
26. Main Circuit Breaker
27. Brake Resistor
28. Break Controller
29. Coupler and Draft gear Assembly
30. Secondary Suspension
31. Slewing Ring
32. Articulation Section (including center bearing, floor panels, bellows/ diaphragm, exterior and interior close off panels)
33. Destination Sign Assembly
34. Interior Panel
35. Windows
36. Cab Door
37. Grab rails and Others
38. Passenger Seats
39. Drivers Chair
40. Panels of Cab
41. Interior Lights
42. Exterior Lights (head light, brake light, etc.)
43. Wiper and Washer Assemblies
44. Horn Assembly
45. Door Drive/ Motor Assembly
46. Passenger Emergency Devices
47. Train Management System
48. Digital Diagnostic System
49. Glass of Windows and Doors (including sealing rubbers)
50. Mechanical Coupler
51. Flooring Material
52. Any other items that may deemed necessary

The final list shall be finalized after the design review has been concluded.

1.19.3. Capital Spares, Unit Exchange Spares and Consumables Required After the Defects Liability Period

The Supplier shall submit a list of recommended spare parts and consumables deemed required and needed in the course of normal train operation after the Defects Liability Period with the recommended quantities.
The recommended spare parts list shall be reviewed and finalized based on the experience of operation of the system in the first year of Defects Liability Period. The list appearing in sub-clause 19.2 is indicative for the finalization of the recommended spares list, but not limitative.

The final listed and approved spare parts and consumables shall be supplied by the Supplier immediately after they are ordered.

1.19.4. Special Tools

The Supplier shall provide a sufficient number of all special tools required, to enable the Employer to properly maintain the trains. These tools shall include but not limited to special assembly/disassembly Jigs, test benches, handling tools, equipment mounting/dismounting tools, and other tools considered particular to the vehicle and its equipment. The number of tools required to be supplied shall be as approved by the DOTC-MRT3 Engineer.

1.19.5. Diagnostic Test Equipment

The Supplier shall provide diagnostic test equipment to ascertain the functionality of all discrete pieces of specialized equipment. This equipment shall consist of embedded fault monitoring and diagnostic systems, portable test equipments and shop test equipments.

The portable test equipment shall consist of a suitable number of pre-programmed laptop computers and standard cable connectors as approved by the DOTC-MRT3 Engineer. The Portable Test Units (PTU) shall be connectable to the equipment to be tested, allowing faults to be quickly and easily diagnosed and allowing data download and analysis. Connection points shall be provided both on the inside and exterior of the cars as may be appropriate to quickly diagnose faults with associated systems, and the locations of these test points shall be approved by the DOTC-MRT3 Engineer. Portable test equipment shall be provided for each major vehicle system including all interface software and hardware. Test capability should include but not limited to measurement of major vehicle parameters, such as Line current, line voltage, traction current, traction effort, speed and others, both in static and dynamic condition.

The shop test equipment shall consist of at least one set of test benches for each major vehicle system, whereby the equipment to be tested is removed from the vehicle and loaded onto the test bench. The tester shall allow all faults to be easily and quickly diagnosed. Each test unit shall be completely wired and shall use 220 Vac, 60 Hz single phase power as may be appropriate.

The Supplier shall provide sufficient number of pieces of this equipment to allow the Employer to properly maintain and repair the trains. The number of test equipment shall be approved by the Employer/DOTC-MRT3 Engineer, based on an operational analysis to be performed by the Supplier.

The Supplier will be required to maintain the equipment software throughout the warranty period and hand over the same at the end of the warranty period. As part of the diagnostic test equipment, the Supplier shall provide the following:

a. Complete operational manual, schematic diagrams, maintenance and calibration instructions for the equipment, including printed circuit boards and microprocessors,

b. Complete schematic diagrams and maintenance and calibration instructions for the vehicle borne system and its printed circuit boards directly associated with the diagnostic test equipment,
c. Spare parts and consumable,
d. Five sets of replacement cable and connector assemblies and suitable number of interface hardware for each piece of test equipment, and
e. Software source code.

1.20. TRAINING REQUIREMENTS

1.20.1. General Requirements

a. The Supplier shall provide comprehensive training to the Employers' staff in accordance with the requirements contained in this MRT3 Performance Requirements.

b. The Supplier shall assume that there is no knowledge of the Employer's personnel about the features of the cars, and shall design the training program to bring the level of knowledge to one, fully adequate for the objective. The Supplier may assume that the designated personnel of the Employer in attendance at training are competent in their particular field.

c. Specific objectives of each course developed by the Supplier shall be discussed in conjunction with the Employer, through a process to be mutually agreed between the DOTC-MRT3 Engineer and the Supplier.

d. The Supplier shall provide all training materials and training venue, including full-time on site management and coordination of the training program to ensure continuity of classes and proper distribution of training materials and to be responsible for interfacing with instructors.

e. Manuals to be used during training shall be delivered to the DOTC-MRT3 Engineer at least one moth prior to any training class. The manuals shall be accurate, complete, and of professional quality.

f. Instructor and trainee manuals shall be provided for each course. In addition, the Supplier shall be responsible for the provision of, and where necessary for developing and manufacturing, training aids and material in support of all training conducted as part of this Contract.

g. The training program shall be made in different modules (possibly by system) that may allow independent implementation.

h. All assigned instructors for the training, including Site Manager for the training shall have good mastery of English language.

1.20.2. Training Plan

The Supplier shall submit a Training Plan, which as a minimum shall include the following:

a. Details of the Supplier's ability to carry out the necessary training,

b. Details of proposed approach to structuring and providing the courses required,

c. Course details including duration, maximum numbers of trainees, facilities required or available and prerequisites for completion of the course,

d. Recommendation for additional training or alternative means by which the Employer's training objective may be met, and

e. The Training Plan shall be submitted for review by the DOTC-MRT3 Engineer and will be implemented in a time frame such that complete and comprehensive training has been received by the designated employees of the Employer prior to or upon delivery and in advance of testing requirements for the consist.

1.20.3. Operations Staff Training

a. The Supplier shall develop a training program and train a number of operations staff of the Employer. Topics to be covered in the operations training program shall include but not limited to:
    a. Vehicle Specifications,
    b. Controls and Indicators,
    c. Vehicle System (i.e., propulsion, friction brake, electrical bogie and coupler assemblies, door control, air-conditioning, lighting and communications),
    d. Vehicle operations (i.e., actual operation of the vehicle in maintenance yard and on the revenue line), and
    e. Intervention procedures and recovery/hauling operations.

b. The Supplier's instructor will be accompanied by a qualified instructor or supervisor of the Employer to ensure that all rules and procedures of the Employer are adhered to.

c. Operation Staff Training done by means of computer based training shall include, but not limited to, the following details:

    i. General introduction of the system functionality's and objectives,
    ii. Description on the system operation principles,
    iii. An overview on the system configuration,
    iv. General description of the functions of each key component of the system/subsystem (with photographs showing the outlook of each typical equipment),
    v. List of potential hazards that may arise in operating the system, and
    vi. Specific points to note in operating the system.

1.20.4. Maintenance Staff Training

a. Maintenance training shall provide designated staff of the Employer with the skills to adequately support the level of maintenance envisaged for the consist. Topics to be covered in the maintenance-training program shall include, but not be limited to:

    i. Overview,
    ii. Vehicle body,
    iii. Vehicle logic Control,
    iv. Destination Signs,
    v. Propulsion,
    vi. Brakes,
    vii. Pneumatics,
    viii. Primary Power,
    ix. Auxiliary Power,
    x. Bogies and Suspension,
    xi. Coupler and Draft Gear,
    xii. Door and Door Control,
    xiii. Air-conditioning,
    xiv. Lighting,
    xv. Train Control and Communications,
    xvi. System interfaces, and
    xvii. Maintenance and Maintenance Schedules.

b. Employees of the Employer shall be exposed to the depth of detail that is necessary for the performance of preventive (scheduled) and corrective (unscheduled) maintenance operations.

c. Trainees shall have the opportunity to perform the more complex maintenance functions on the vehicle and in the depot, in addition to troubleshooting "bugged" system using the appropriate subsystem test devices.

d. The program shall also emphasize the details of performing heavy maintenance repair and rebuilding/reconditioning of selected components.

e. Training shall include both Computer-Based Training (CBT) and hands on experience on the cars. CBT shall be provided in a form that can be used for training of new staff and for refresher courses for existing staff.

f. If any special software is required to run the CBT courses, then sufficient copies shall be provided for simultaneous training of at least ten (10) staff.

g. Maintenance staff training by means of CBT shall include, but not be limited to the following details:

    i. A general description of the proposed maintenance strategy/plan of the system/sub-system,
    ii. The maintenance plan and procedures proposed for the system/sub-system,
    iii. A general description of the different levels of maintenance works required for the system/sub-system,

iv. An introduction to the tool(s) required for maintaining the system/sub-system,
v. A description of the symptoms of the common faults found for system-sub-system,
vi. A description of the self-diagnostic capability of the system/sub-system,
vii. Points to be noted in maintaining the systems, and
viii. Safety precautions needed when maintaining the system/sub-system.

h. Training shall include re-railing procedure and actual demonstration involving the new vehicle.

1.20.5. Engineering Staff Training

The Supplier shall carry out training on specific systems for a limited number of Engineering staff of the Employer, in order to provide them with the basis for Engineering management tasks.

1.20.6. Proficiency Verification

The Supplier shall devise a system and standards in assessing the proficiency of the trainees. The system and standards shall be subject to review by the DOTC-MRT3 Engineer.

1.20.7. Trainee Population

The number of staff to be trained shall not be less than as follows. The definitive numbers will be agreed upon between the Employer and the Supplier.

a. Operation Staff – 12
b. Maintenance Staff
   i. Supervisors – 8
   ii. Mechanical Technicians – 10
   iii. Electrical Technicians – 10
   iv. Electronic Technicians – 10
c. Engineering Staff – 5

1.21. SHIPPING AND DELIVERY

1.21.1. Shipping

a. At no time shall cars or spare parts be exposed to salt water or spray when unprotected. Loading on deck shall not be allowed.
b. The Supplier shall prepare a shipping manual to cover the shipping of all items covered under the contract, including cars and spare parts. The shipping manual shall detail the method, packaging and other details required to ensure the safe shipment to the delivery point. The shipping manual shall be submitted for review by the DOTC-MRT3 Engineer prior to the shipment of any cars.

c. The Supplier shall notify the DOTC-MRT3 Engineer ten days in advance of any expected shipment date and give further notification of the actual shipment date and routing when established. This shall complement the inspection requirements prior to delivery as specified herein.
d. Unless otherwise reviewed by the DOTC-MRT3 Engineer, no loose or boxed equipment shall be permitted to be shipped in the cars.

1.21.2. Delivery

b. The Supplier shall be responsible for delivery of all items to be supplied under this Contract to the Site as designated by the DOTC-MRT3 Engineer.
c. The Supplier shall be responsible for the loading, transport and unloading of cars and spare parts from factory site to the designated delivery point and locating them as instructed by the DOTC-MRT3 Engineer.
d. The handling and lifting devices and equipments possibly needed for the delivery and unloading on the site shall be at the charge of the Supplier.
e. Cars, parts or items damaged in transit shall not be considered as delivered until all repairs or replacements have been completed and all necessary spare parts or items have been delivered to the Site.
f. All documents, manuals, drawings and other deliverables shall be delivered to MRT3 Depot, North Avenue corner EDSA North Triangle Area, Quezon City, Philippines.
g. The Supplier shall be responsible for all storage and security of cars, spare parts and other items until the items have been inspected and are considered delivered at the designated point by the DOTC-MRT3 Engineer.
h. Removal of all temporary fittings required for shipment and re-assembly of equipment shall be the responsibility of the Supplier, and shall be completed prior to the cars or parts being inspected and considered delivered.
i. The items shall be considered delivered when all damage has been repaired and all documentation and post delivery preparation has been completed to the satisfaction of the DOTC-MRT3 Engineer.

Section VIII. Bidding Forms

TABLE OF CONTENTS

Bid Form

Date: _____
Invitation to Bid[1] N°: _____

To: [name and address of Procuring Entity]

Gentlemen and/or Ladies:

Having examined the Bidding Documents including Bid Bulletin Numbers *[insert numbers]*, the receipt of which is hereby duly acknowledged, we, the undersigned, offer to *[supply/deliver/perform] [description of the Goods]* in conformity with the said Bidding Documents for the sum of *[total Bid amount in words and figures]* or such other sums as may be ascertained in accordance with the Schedule of Prices attached herewith and made part of this Bid.

We undertake, if our Bid is accepted, to deliver the goods in accordance with the delivery schedule specified in the Schedule of Requirements.

If our Bid is accepted, we undertake to provide a performance security in the form, amounts, and within the times specified in the Bidding Documents.

We agree to abide by this Bid for the Bid Validity Period specified in **BDS** provision for **ITB** Clause 18.2 and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

Commissions or gratuities, if any, paid or to be paid by us to agents relating to this Bid, and to contract execution if we are awarded the contract, are listed below:[2]

Name and address of agent	Amount and Currency	Purpose of Commission or gratuity

(if none, state "None")

Until a formal Contract is prepared and executed, this Bid, together with your written acceptance thereof and your Notice of Award, shall be binding upon us.

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

We certify/confirm that we comply with the eligibility requirements as per **ITB** Clause 5 of the Bidding Documents.

[1] If ADB, JICA and WB funded projects, use IFB.

[2] Applicable only if the Funding Source is the ADB, JICA or WB.

Dated this _____ day of _____ 20_____.

_____ _____

[signature] *[in the capacity of]*

Duly authorized to sign Bid for and on behalf of _____

For Goods Offered From Abroad

Name of Bidder _____. Invitation to Bid[3] Number ___. Page ____ of _____.

1	2	3	4	5	6	7	8	9
Item	Description	Country of origin	Quantity	Unit price CIF port of entry (specify port) or CIP named place (specify border point or place of destination)	Total CIF or CIP price per item (col. 4 x 5)	Unit Price Delivered Duty Unpaid (DDU)	Unit price Delivered Duty Paid (DDP)	Total Price delivered DDP (col 4 x 8)

[3] If ADB, JICA and WB funded projects, use IFB.

For Goods Offered From Within the Philippines

Name of Bidder _____. Invitation to Bid[4] Number _. Page . of ____.

1	2	3	4	5	6	7	8	9	10
Item	Description	Country of origin	Quantity	Unit price EXW per item	Cost of local labor, raw material, and component[2]	Total price EXW per item (cols. 4 x 5)	Unit prices per item final destination and unit price of other incidental services	Sales and other taxes payable per item if Contract is awarded	Total Price delivered Final Destination (col 8 + 9) x 4

[4] If ADB, JICA and WB funded projects, use IFB.

Contract Agreement Form

THIS AGREEMENT made the _____ day of _____ 20_____ between *[name of PROCURING ENTITY]* of the Philippines (hereinafter called "the Entity") of the one part and *[name of Supplier]* of *[city and country of Supplier]* (hereinafter called "the Supplier") of the other part:

WHEREAS the Entity invited Bids for certain goods and ancillary services, viz., *[brief description of goods and services]* and has accepted a Bid by the Supplier for the supply of those goods and services in the sum of *[contract price in words and figures]* (hereinafter called "the Contract Price").

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract referred to.

2. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:

(a) the Bid Form and the Price Schedule submitted by the Bidder;
(b) the Schedule of Requirements;
(c) the Technical Specifications;
(d) the General Conditions of Contract;
(e) the Special Conditions of Contract; and
(f) the Entity's Notification of Award.

3. In consideration of the payments to be made by the Entity to the Supplier as hereinafter mentioned, the Supplier hereby covenants with the Entity to provide the goods and services and to remedy defects therein in conformity in all respects with the provisions of the Contract

4. The Entity hereby covenants to pay the Supplier in consideration of the provision of the goods and services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the contract at the time and in the manner prescribed by the contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of the Republic of the Philippines on the day and year first above written.

Signed, sealed, delivered by _____ the _____ (for the Entity)

Signed, sealed, delivered by _____ the _____ (for the Supplier).

Omnibus Sworn Statement

REPUBLIC OF THE PHILIPPINES)
CITY/MUNICIPALITY OF _____) S.S.

A F F I D A V I T

I, *[Name of Affiant]*, of legal age, *[Civil Status]*, *[Nationality]*, and residing at *[Address of Affiant]*, after having been duly sworn in accordance with law, do hereby depose and state that:

1. ***Select one, delete the other:***

   If a sole proprietorship: I am the sole proprietor of *[Name of Bidder]* with office address at *[address of Bidder]*;

   If a partnership, corporation, cooperative, or joint venture: I am the duly authorized and designated representative of *[Name of Bidder]* with office address at *[address of Bidder]*;

2. ***Select one, delete the other:***

   If a sole proprietorship: As the owner and sole proprietor of *[Name of Bidder]*, I have full power and authority to do, execute and perform any and all acts necessary to represent it in the bidding for *[Name of the Project]* of the *[Name of the Procuring Entity]*;

   If a partnership, corporation, cooperative, or joint venture: I am granted full power and authority to do, execute and perform any and all acts necessary and/or to represent the *[Name of Bidder]* in the bidding as shown in the attached *[state title of attached document showing proof of authorization (e.g., duly notarized Secretary's Certificate issued by the corporation or the members of the joint venture)]*;

3. *[Name of Bidder]* is not "blacklisted" or barred from bidding by the Government of the Philippines or any of its agencies, offices, corporations, or Local Government Units, foreign government/foreign or international financing institution whose blacklisting rules have been recognized by the Government Procurement Policy Board;

4. Each of the documents submitted in satisfaction of the bidding requirements is an authentic copy of the original, complete, and all statements and information provided therein are true and correct;

5. *[Name of Bidder]* is authorizing the Head of the Procuring Entity or its duly authorized representative(s) to verify all the documents submitted;

6. ***Select one, delete the rest:***

If a sole proprietorship: I am not related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

If a partnership or cooperative: None of the officers and members of *[Name of Bidder]* is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

If a corporation or joint venture: None of the officers, directors, and controlling stockholders of *[Name of Bidder]* is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

7. *[Name of Bidder]* complies with existing labor laws and standards; and

8. *[Name of Bidder]* is aware of and has undertaken the following responsibilities as a Bidder:

    a) Carefully examine all of the Bidding Documents;

    b) Acknowledge all conditions, local or otherwise, affecting the implementation of the Contract;

    c) Made an estimate of the facilities available and needed for the contract to be bid, if any; and

    d) Inquire or secure Supplemental/Bid Bulletin(s) issued for the *[Name of the Project]*.

IN WITNESS WHEREOF, I have hereunto set my hand this __ day of ___, 20__ at _____, Philippines.

_____
Bidder's Representative/Authorized Signatory

[JURAT]

* This form will not apply for WB funded projects.

Bank Guarantee Form for Advance Payment

To: *[name and address of PROCURING ENTITY]*
[name of Contract]

Gentlemen and/or Ladies:

In accordance with the payment provision included in the Special Conditions of Contract, which amends Clause 10 of the General Conditions of Contract to provide for advance payment, *[name and address of Supplier]* (hereinafter called the "Supplier") shall deposit with the PROCURING ENTITY a bank guarantee to guarantee its proper and faithful performance under the said Clause of the Contract in an amount of *[amount of guarantee in figures and words]*.

We, the *[bank or financial institution]*, as instructed by the Supplier, agree unconditionally and irrevocably to guarantee as primary obligator and not as surety merely, the payment to the PROCURING ENTITY on its first demand without whatsoever right of objection on our part and without its first claim to the Supplier, in the amount not exceeding *[amount of guarantee in figures and words]*.

We further agree that no change or addition to or other modification of the terms of the Contract to be performed thereunder or of any of the Contract documents which may be made between the PROCURING ENTITY and the Supplier, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition, or modification.

This guarantee shall remain valid and in full effect from the date of the advance payment received by the Supplier under the Contract until *[date]*.

Yours truly,

Signature and seal of the Guarantors

_____
[name of bank or financial institution]

_____
[address]

_____
[date]

BID SECURING DECLARATION

REPUBLIC OF THE PHILIPPINES
CITY OF _____)S.S.
x----------x

BID-SECURING DECLARATION
Invitation to Bid/ Request for Expression of Interest No. [5] ***[Insert reference number]***

To: *[Insert name and address of the Procuring Entity]*

I/We[6], the undersigned, declare that:

1. I/We understand that, according to your conditions, bids must be supported by a Bid Security, which may in the form of a Bid-Securing Declaration.

2. I/We accept that: (a) I/We will be automatically disqualified from the bidding for any contract with any procuring entity for a period of two (2) years upon receipt of your Blacklisting Order, and, (b) I/We will pay the applicable fine provided under section of the Guidelines on the Use of Bid Securing Declaration[7], if I/we have committed any of the following actions:

    (i.) Withdrawn my/our Bid during the period of bid validity required in the Bidding Documents; or

    (ii.) Fail or refuse to accept the award and enter into contract or perform any and all acts necessary to the execution of the Contract, in accordance with the Bidding Documents after having been notified of your acceptance of our Bid during the period of bid validity.

3. I/We understand that this Bid-Securing Declaration shall cease to be valid on the following circumstances:

    (a) Upon expiration of the bid validity period, or any extension thereof pursuant to your request;

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[5] *Select one and delete the other.*

[6] *Select one and delete the other. Adapt same instruction for similar terms* throughout the document.

[7] *Issued by the GPPB through GPPB Resolution* 03-2012 on 27 January 2012.

(b) I am/we are declared ineligible or post-disqualified upon receipt of your notice to such effect, and (i) I/We failed to timely file a request for reconsideration or (ii) I/we filed a waiver to avail of said right;

(c) I am/we are declared as the bidder with the Lowest Calculated and Responsive Bid/Highest Rated and Responsive Bid[8], and I/we have furnished the performance security and signed the Contract.

IN WITNESS WHEREOF, I/We have hereunto set my/our hand/s this ___day of *[Month] [Year]* at *[place of execution]*.

[Insert NAME OF BIDDER'S AUTHORIZED REPRESENTATIVE]
[Insert signatory's legal capacity]
Affiant

SUBSCRIBED AND SWORN to before me this ____day of *[month][year]* at *[place of execution]*, Philippines. Affiant/s is/are personally known to me and was/were identified by me through competent evidence of identity as defined in the 2004 Rules on Notarial Practice (A.M. No. 02-8-13-SC). Affiant/s exhibited to me his/her *[insert type of government identification card used]*, with his/her photograph and signature appearing thereon, with no._____ and his/her Community Tax Certificate No. _____issued on _____at_____.

Witness my hand and seal this _____day of *[month] [year]*.

NAME OF NOTARY PUBLIC
Serial No. of Commission _____
Notary Public for _____until_____
Roll of Attorneys No._____
PTR No. __,*[date issued], [place issued]*
IBP No. __,*[date issued], [place issued]*

Doc No. _____
Page No. _____
Book No. _____
Series of _____


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