General Bid Bulletin No. 16
2 July 2021

IFB No. 21-031-4

THE MALOLOS-CLARK RAILWAY PROJECT AND THE NORTH SOUTH RAILWAY PROJECT-SOUTH LINE (COMMUTER) PACKAGE CP NS-03: ROLLING STOCK-LIMITED EXPRESS TRAINSETS

This General Bid Bulletin is issued to amend/clarify certain provisions in the Bidding Documents for the abovementioned project. Please refer to the attached Annexes of this General Bid Bulletin duly approved by the end-user and co-implementer for details:

1. **Annex "A"** –Answers to Queries from Prospective Bidders including clarifications to the Bidding Documents;

2. **Annex "B"**– Revisions to the Bidding Documents; and

3. **Annex "B – 1"** – Revised pages/amendments and final form as revised/amended.

All other portions of the Bidding Documents affected by these revisions, amendments and/or clarifications shall be made to conform to the same.

Revisions/amendments/clarifications made herein shall be considered an integral part of the Bidding Documents for this project.

For your information and guidance.

For the Bids and Awards Committee IV:

SIGNATURE REDACTED

JOSEPH CONRAD D. DUEÑAS
Chairperson

Annex A

PACKAGE CP NS-03: ROLLING STOCK - LIMITED EXPRESS TRAINSETS
General Bid Bulletin No. 16
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
1.	General Bid Bulletin No. 7 Annex B ERT-162 27.1.1 27.1.2	The contractor shall prepare the equipment for driving simulator as below, and supply to the Driving Simulator Contractor (CP NS-01). The list of equipment shall not be limited to the table below: Regarding the detail of the way to supply the Driving Simulator Contractor, the amount of spare parts and so on, the contractor shall adjust with the CP NS-01 Contractor. The sentence of "the list of equipment shall not be limited to the table below" has been added as per General Bid Bulletin No.7 dated 12 May 2021.	27.1.1 The contractor shall prepare the equipment for driving simulator as below and supply to the Driving Simulator Contractor (CP NS-03) at Mabalacat Depot. ~~The list of equipment shall not be limited to the table below~~: 27.1.2 Regarding the detail of the way to supply the Driving Simulator Contractor ~~the amount of spare parts and so on~~ the contractors shall adjust with the CP NS-01 Contractor.	Please see Annex B for the updated requirement on Supply of Equipment in Training Center.

		However, it is impossible for the Bidder to estimate the associated costs appropriately for Milestone No. 503 of Schedule 1.5 in BF-43 without the information of fixed item and amount. Therefore, please reconsider revising the sentences as provided.		
2.	Volume I of III, Section IV Bidding Form SCHEDULE 1: PRICE SCHEDULES BF-43 Schedule 1.5: Training and Operation and Maintenance Manuals	Milestone No. 503 Procurement and transportation to the Driving Simulator Contractor (under CP NS-01: E&M System and Track Works) the equipment for the driving simulator to be installed in the training center. (Payment for milestone 503 will be made only after completion of the site acceptance testing of the driving simulator and acceptance there of the Engineer.)	(Payment for Milestone 503 will be made ~~only~~ after completion ~~of the Site acceptance testing of the Driving Simulator and acceptance~~ of the delivery to CP NS-01 Contractor ~~thereof by the Engineer.~~)	The bidder's request is rejected. Reference to the ERG 11.9 Train Operation Simulator Parts and ERG 20 Interface Management, the Contractor shall deliver, set up and adjust the train operation simulator, the Contractor shall be interface and coordinate with the CP NS-01 Contractor for the detail of this interface item. The Contractor shall ensure the installed parts are tested and commissioned.

		The bidder assumes that the payment for milestone No. 503 after approval of site acceptance testing of the Driving Simulator is excessive because the site acceptance testing of the driving simulator is beyond CP NS-03 Contractor' control and responsibility. Therefore, the payment to the CP NS-03 Contractor should be made after completion of the delivery of the required parts to the CP NS-01 Contractor and we respectfully request the employer to revise the requirement as proposed. Therefore, the Bidder sincerely requests the Employer to revise the sentence as provided.		

3.	Volume III of III, SECTION VII General Conditions (GC) GC-24 GC-25 4.15 Access Route	The Contractor shall be deemed to have been satisfied as to the suitability and availability of access routes to the Site at Base Date. The Contractor shall use reasonable efforts to prevent any road or bridge from being damaged by the Contractor's traffic or by the Contractor's Personnel. These efforts shall include the proper use of appropriate vehicles and routes. Except as otherwise stated in these Conditions: (a) the Contractor shall (as between the Parties) be responsible for any maintenance which may be required for his use of access routes; (b) the Contractor shall provide all necessary signs or directions along access routes, and shall obtain any permission which may be required from the relevant authorities for his use of routes, signs and directions; (c) the Employer shall not be responsible for any claims which may arise from the use or otherwise of any access route,	The Employer ~~Contractor~~ shall ~~be deemed to have been~~ provide ~~satisfied as to~~ the ~~suitability~~ suitable and ~~availability of~~ available access routes to the Site to the Contractor 1 year before an expected delivery date of the 1st trainset to the Site.~~at Base Date.~~ The Contractor shall use reasonable efforts to prevent any road or bridge from being damaged by the Contractor's traffic or by the Contractor's Personnel. These efforts shall include the proper use of appropriate vehicles ~~and routes~~. Except as otherwise stated in these Conditions: (a) the Contractor shall (as between the Parties) be responsible for any maintenance which may	The bidder's request is rejected. Reference to the ERT 26 Shipping and Delivery, the Contractor shall plan his route to ensure he is aware of actual road conditions, underpasses, bridges and potential other construction works which may hinder his delivery from port to the site. Nevertheless, reference to the ERG 20 Interface Management, the Contractor shall interface and coordinate with Interface Contractors (Civil) and local authorities for the access and delivery route for the delivery of the rolling stock

		(d) the Employer does not guarantee the suitability or availability of particular access routes, and (e) Costs due to non-suitability or non-availability, for the use required by the Contractor, of access routes shall be borne by the Contractor. In many cases of the construction of the new railcar system in abroad, the suitability and availability of access routes to the site is not fully secured, and the Contractor is not able to take such responsibility because civil works such as reinforcement of bridges and roads is outside of our business field. Therefore, the Bidder assumes that the Employer shall provide the suitable and available access routes so that the Contractor can safely deliver the Limited Express Train to the Site. Thus, please consider revising the sentences as provided.	be required for his use of access routes only in the case of the willful act and/or gross negligence by the Contractor; (b) the Contractor shall provide all necessary signs or directions along access routes provided by the Employer , and the Employer shall obtain any permission which may be required from the relevant authorities for the Contractor's ~~his~~ use of routes, signs and directions; (c) the Employer shall coordinate the necessary procedure for use of access routes between the relevant authorities and the Contractor if required; (~~c~~d) the Employer shall ~~not~~ be responsible for any claims which may arise from the use or	

			otherwise of any access route; (~~de~~) the Employer shall ~~does not~~ guarantee the suitability or availability of particular access routes, and (~~ef~~) Costs and additional time due to non-suitability or non-availability, for the use required by the Contractor, of access routes shall be borne by the Employer ~~Contractor~~.	
4.	Volume III of III, SECTION VII General Conditions (GC) GC-22 4.8 Safety Procedures	The Contractor shall: (a) comply with all applicable safety regulations, (b) take care for the safety of all persons entitled to be on the Site, (c) use reasonable efforts to keep the Site and Works clear of unnecessary obstruction so as to avoid danger to these persons, (d) provide fencing, lighting, guarding	The Contractor shall: (a) comply with all applicable safety regulations, (b) take care for the safety of all persons entitled to be on the Site, and (c) use reasonable efforts to keep the Site and Works clear of unnecessary obstruction	The bidder's request is rejected. The Contractor 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 Engineer.

		and watching of the Works until completion and taking over under Clause 10 [Employer's Taking Over], and (e) provide any Temporary Works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the Works, for the use and protection of the public and of owners and occupiers of adjacent land. The Bidder assumes that the provision of the items described in 4.8 (d) and (e) is excessive compared with the other experienced projects or not applicable to the CP NS-03 Contractor because these provisions should be provided by the CP NS-01 Contractor and/or the Employer after the delivery of the trainsets to the Site. Please delete the provisions concerning (d) and (e).	so as to avoid danger to these persons.~~,~~ ~~(d)~~ ~~provide fencing, lighting, guarding and watching of the Works until completion and taking over under Clause 10 [Employer's Taking Over], and~~ ~~(e)~~ ~~provide any Temporary Works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the Works, for the use and protection of the public and of owners and occupiers of adjacent land.~~	
5.	Volume I of III, SECTION IV Bidding Form SCHEDULE 1: PRICE	Milestone No.114 Other obligations with regard to the General Items, that are considered necessary to comply with the	N/A	The Bidder shall refer to the Employer's Requirements to identify all other obligation which shall be comply with

	SCHEDULES BF-36~45 Schedule 1. PRICE SCHEDULE	Contract but which are not covered in other Schedules and the above Milestone items. Milestone No.207 Other obligations with regard to the design… Milestone No.303 Other obligations with regard to the manufacturing, fabrication and shipping… Milestone No.405 Other obligations with regard to the transportation, on-Site assembling and testing… Milestone No.504 Other obligations with regard to Training and Operation and Maintenance Manuals… Milestone No.602 Other obligations with regard to the spare parts, special tools and testing equipment… With regard to Milestone No.114, 207, 303, 405, 504 and 602, the Bidder is not sure what “Other		the Contract which not covered in other Schedules of Milestone items.

		obligations" means and how these Milestones are used. The Bidder requests the Employer to clearly specify the requirements to be covered by these Milestones.		
6.	Volume I of III, SECTION IV Bidding Form SCHEDULE 1: PRICE SCHEDULES BF-45 Schedule 1.6 Spare Parts and Special Tools	Milestone No.601 Delivery to the Site of spare parts, consumables, special tools, testing equipment and measuring instruments including drawings and catalogues in English (original plus 5 hard copies), and obtaining acceptance thereof from the Engineer. It brings significant impact on the Contractor's cash-flow if the Contractor received the lump-sum payment upon delivery of spare parts, consumables, special tools, testing equipment and measuring instruments including drawings and catalogues. Therefore, the Bidder requests to the Employer to divide the payment as provided.	Milestone No.601 Delivery to the Site of spare parts~~,~~ ~~consumables, special tools, testing equipment and measuring instruments including drawings and catalogues in English (original plus 5 hard copies)~~ and obtaining acceptance thereof from the Engineer. Milestone No.602 Delivery to the Site of consumables and obtaining acceptance thereof from the Engineer. Milestone No.603 Delivery to the Site of special tools and	The bidder's request is rejected. The bidder is allowed to propose the breakdown of this milestone during contract negotiation and it shall be resolved before contract compilation.

			obtaining acceptance thereof from the Engineer. Milestone No.604 Delivery to the Site of testing equipment and obtaining acceptance thereof from the Engineer. Milestone No.605 Delivery to the Site of measuring instruments including drawings and catalogues in English (original plus 5 hard copies), and obtaining acceptance thereof from the Engineer.	
7.	Volume III of III, SECTION VII General Conditions (GC) GC-10 1.2 Interpretation	In these conditions, provisions including the expressions "Cost plus profit" require this profit to be one-twentieth (5%) of this Cost unless otherwise indicated in the Contract Data. The percentage (%) of 'Cost plus profit' should be 10%, at least, and therefore the Bidder humbly seek the Employer to change the profit	In these conditions, provisions including the expressions "Cost plus profit" require this profit to be one-tenth ~~twentieth~~ (10~~5~~%) of this Cost unless otherwise indicated in the Contract Data.	The bidder's request is rejected.

		ratio from one-twentieth (5%) to one-tenth (10%).		
8.	General Bid Bulletin No.8 Page 46 of 47 No.73	Responding to the Employer's reply in General Bid Bulletin No.8 dated 19 May 2021, the Bidder understands that only one depot shall be used for the Limited Express Trainsets for the delivery, testing, commissioning and warranty activities if the delivery location will be changed from Mabalacat Depot to the other Depot during the project implementation. If multiple Depots will be used for the Limited Express Trainsets, that results in higher costs, thus please confirm the Bidder's understanding is correct.	N/A	Bidder understanding is not correct. The bidder should consider the event where the LE trains would be required to be stabled at Banlic Depot.
9.	General Bid Bulletin No.2 Volume II of III, SECTION VI Technical Requirements ERT-144 22.7.4.1 Fleet Defects (Pattern Failures)	The occurrence of independent failures with the same root of the same warranted item that exceeds more than 10% percent, or at least three (3) of the total number of identical items supplied may be declared a fleet defect or pattern failure. Please specify the period for a fleet defect or pattern failure.	N/A	Please see Annex B on the updated clause 22.7.4.1

10.	Volume II of III, SECTION VI Technical Requirements ERT-29 1.20.1 Design life	3) General electrical parts: over 12 years 4) Some special parts: about 8 years The Bidder is not sure what "General electrical parts" and "Some special parts" means. The Bidder requests the Employer to clearly specify these requirements.	N/A	Basically, all but specially designated electrical parts (e.g. Propulsion System, Power conversion element, etc.) are 12 years as general electrical parts. However, some special parts are those that have been operating for 8 years, such as relays, contactors, and monitor brightness reduction, which are frequently operated. Considering the above, some special parts may be proposed by Bidder and discussed at the design stage.
11.	General Bid Bulletin No.10 Page 15 of 28 No.27	Although the Bidder received the Employer's replies as per the relevant General Bid Bulletins, it is impossible for the Bidder to estimate the associated cost of the Mockup. The Bidder requests the Employer to provide the possible display locations and actual number of display sites so that the Bidder can estimate the associated cost appropriately. Or, if this detailed information is not available at this moment, please limit the	N/A	Bidder request is rejected.

		Contractor's obligation to deliver the Mockup to the 1st location in Metro Manila area.		
12.	Volume I of III, SECTION IV Bidding Form SCHEDULE 1: PRICE SCHEDULES BF-39 Schedule 1.2 Design	Milestone No.205 Manufacture and delivery of Driver's Cab Mock-up In accordance with in Price Schedule 1.2, the Milestone No.205 stipulates "Manufacture and delivery of Driver's Cab Mock-up". Considering the Bidder' cash-flow, the payment of the Milestone No. 205 should be made upon delivery of Mockup to the first location of display. Please clearly specify the condition accordingly.	N/A	Reference to the Milestone 303 and 405, the Bidder may sub-divide the Milestones and/or add appropriate proposed Milestones to accommodate the requirement for Manufacturing, Fabrication, Shipping, Transportation, On-Site Assembling and Testing for the delivery to the Mock-up to all Sites or display sites including assembling works and logistic to the storage warehouse after the public display as stipulated in the Section VI Employer's Requirements.
13.	Volume III of III, SECTION VII General Conditions (GC) GC-7 1.1.3.7 Defect Notification Period	"Defects Notification Period" means the period for notifying defects in the Works or a Section (as the case may be) under Sub-Clause 11.1 [Completion of Outstanding Work and Remedying Defects], as stated in the Contract Data (with any extension under Sub-Clause 11.3 [Extension of Defects Notification Period]), calculated from the date	N/A	Bidder understanding is not correct. Clause 8.7.3 required the total DNP period of 7 trainset be up to a limit of 4 years from the date of commencement of the first train in-service operation by taking the consideration that each train set will have different taken over date and

	Volume II of III, SECTION VI Employer's Requirements ERG-50 8.7.3 Performance Certificate	on which the Works or Section is completed as certified under Sub-Clause 10.1 [Taking Over of the Works and Sections]. The DNP shall be up to a limit of 4 years from the date of commencement of the first train in-service operation. There is a discrepancy between Clause 1.1.3.7 in General Conditions and Clause 8.7.3 in Employer's Requirements. In accordance with Clause 1.5 in General Conditions, the Bidder understands that the Defect Notification Period shall commence from the date of Taking-Over Certificate and last for two (2) years. Please confirm the Bidder's understanding is correct.		completion of DNP date. The total DNP period from Train 1 taking over date and the completion of Train 7 DNP shall be limit up to 4 years.
14.	Volume II of III, SECTION VI Employer's Requirements ERG-73 12.2.4 Inspection, Testing and Commissioning Plan	5) Trial Operations: The Contractor shall undertake Trial Operations which shall take place at the completion of the testing and commissioning process. The Trial Operations shall be supported by the Engineer and other interested	N/A	At first, trial operation shall be based on ERT Clause 20. According to ERT clause 20, trial operation happens before Take over certificate (TOC) and it includes training

	ERG-76 14.1.4 Training Requirement ERT-130 20.6.2 Trial Operations Volume III of III Attachment 1 PC-8 KD8	parties. It consists of operating the newly procured Rolling Stock, consideration simulating requirements of operating the trains for revenue service, but without active passengers. The Contractor shall recognize the dates for Trial Operations and shall ensure that all appropriate personnel have received adequate training to equip them for all of the tasks required during Trial Operations before the commencement of the Trial Operations. The Contractor shall support the Employer during the Trial Operations which shall take place at the completion of the Testing and Commissioning. Achievement: Completion of Trial Operation support and the whole of the Works. The responsibility between the Employer and the Contractor for the Trial Operations is not clear.		(20.6.1) and some validations (20.6.4). Considering the above, the responsibility during trial operation belongs to the Contractor.

		Although the Contractor is required to ensure all appropriate personnel during the Trial Operation as per Clause 14.1.4 in ERG-76, the Bidder assumes that the Employer is responsible for the Trial Operation and the driver and operation staff, etc. are not the Contractor's scope of works. As such, the Bidder requests the Employer to clarify each responsibility.		
15.	Volume II of III, SECTION VI Employer's Requirements ERT-147 24.2 24.3 Spare Parts ERG-71 11.5 Consumable Spares SOW-3 1.10 Provision for Spare Parts and Special Tools	Although the Bidder received the Employer's replies as per the relevant General Bid Bulletins, the Bidder would like to specify the following with regard to Spare Parts. 1. Spare Parts consists of 1) spares (not Capital Spares) and 2) consumables. 2. Spare Parts (spares and consumables) shall be required for the period of DNP (2 years). 3.	N/A	Please see Annex B for the updated spare part requirement. 1. Spare part consists of O&M spare parts including the consumables and excluding the capital spare. The Contractor shall not be entitled to use any of the O&M Spares and/or Capital Spares (if any) to replace any item in the Works during the installation, erection, and commissioning periods. In addition to the O&M Spares, the Contractor shall keep on the Site throughout the installation, erection, and commissioning periods,

		The price of Spare Parts shall be included in Price Schedule 1.6 for the evaluation. 4. The list of Spare Parts (spares and consumables) shall be approved by the Employer/Engineer prior to the commencement of the procurement phase of the project. Please confirm the Bidder's understanding is correct.		sufficient stocks of Spare Parts to enable immediate replacement of any item in the Works found to be defective or in any way in non-conformance with the Specification prior to the issuance of TOC. ("Testing and Commissioning Spares"). The Contractor shall supply sufficient quantity of Spare Parts to ensure the return to service of a defective car through the Defects Notification period as per clause 1.6 of ERG. 2. O&M spares shall be sufficient for the period of DNP considering the last train DNP period. Spare parts used during the mentioned period shall be replenished by the Contractor and delivered before the issuance of Performance Certificate. 3. Item 1 and 2 shall be included in the Price Schedule 1.6. 4. The list of Spare Parts shall be reviewed by the Engineer during Design stage and will not be subjected to the commencement of the procurement phase of the project.

16.	Volume II of III, ERT-147 24.2 24.3 Spare Parts SECTION VI Employer's Requirements ERG-49 8.5.3 PAC ERG-71 11.4 Capital Spares General Bid Bulletin No.3 Page 10 of 15 No.7	Although the Bidder received the Employer's replies as per the relevant General Bid Bulletins, the Bidder would like to specify the following with regard to Capital Spares. 1. In accordance with GBB No.3, Capital Spares are the parts not required for the replacement until well beyond the end of the 2-year O&M period. Please clarify the commencement date of O&M period. 2. The price of Capital Spares shall be included in Price Schedule 1.7, however, it shall not be evaluated and included in the final Bid Price. If required, the purchase order for Capital Spares shall be issued separately and agreed between the Employer and the Contractor. Although the rates for Capital Spares are required to remain valid for a period of one year after the end of the Defects Notification Period, the Bidder understands that the completion of the Defects Notification Period may be	N/A	Please see Annex B for the updated spare part requirement. 1. The O&M period shall commence after the completion of trial operation. 2. The validity shall take the last train DNP period.

		different between each trainsets. Please clarify the validity.		
17.	Volume II of III, SECTION VI Employer's Requirements ERT-149 24.2 Spare Parts 24.4 Spares Parts and Consumables Required After the Defects Notification Period	24.2.2 The Employer may order additional spares required for the following 15 years from the recommended spare parts and consumables list as provided by the Contractor. 24.4.1 The Contractor shall submit a list of recommended spare parts and consumables deemed to be required in the course of normal train operation after the DNP. 24.4.3 The recommended spare parts list shall be reviewed and finalized based on the experience of operation of the train service in the first year of DNP. The Bidder understands that the Contractor is required to submit the list of recommended spare parts and consumables. However, "recommended spare parts" is described in Clause 1.10 in SOW-3 and Clause 11.1.4 in ERG-	24.2.2 The Employer may order additional spares required for the following 15 years from the ~~r~~Recommended ~~s~~Spare ~~p~~Parts and ~~c~~Consumables list as provided by the Contractor. 24.4.1 The Contractor shall submit a list of ~~r~~Recommended ~~s~~Spare ~~p~~Parts and ~~c~~Consumables deemed to be required in the course of normal train operation after the DNP. 24.4.3 The ~~r~~Recommended ~~s~~Spare ~~p~~Parts and Consumables list shall be reviewed and finalized based on the experience of operation of the train service in the first year of DNP.	Please see Annex B for the updated spare part requirement.

		70. To avoid all possibility of misunderstanding, the Bidder requests the Employer to define as provided.		
18.	Volume II Section VI ERT-7 ERT-60 1.6.2.1 13 7.1.4 Doors and Door Control General Bid Bulletin No.8 Annex B 1.6.2.1 13 7.1.4 Types of doors General Bid Bulletin No.11	13. Passenger Doors Bi-parting of single leaf plug-in sliding Doors. The doors shall be bi-parting or single leaf plug-in sliding doors,… The Bidder acknowledges the Employer's concern about push back function in pneumatic pocket door system described in Item #9 of GBB #11. The electric driving pocket sliding door system is able to satisfy push back function. Accordingly, the Bidder humbly requests the Employer to allow the single sliding pocket door with push back function	1.6.2.1 13 Passenger Doors Bi-parting or ~~of~~ single leaf plug-in sliding Doors, or single leaf pocket sliding Doors. 7.1.4 The doors shall be bi-parting or single leaf plug-in sliding doors, or single leaf pocket sliding Doors…	Please see annex B.

		for this project and revise the sentences as provided.		
19.	Volume II Section VI ERT-13 1.11.2.6 Brake reaction time	c) Full-service release : 2.0 seconds It is requested that deceleration rate of full-service brake is 4.2km/h, emergency brake is 4.7km/h in ERT 1.11.2.1. Considering brake cylinder pressure varies in proportion to deceleration rate, it is expected that necessary pressure of full-service brake is approximately 90% of emergency brake. On the other hand, it is requested that full-service brake release time is 2.0 seconds, emergency brake release time is 3.0 seconds in ERT 1.11.2.6. Although 90% of pressure is required to apply full-service brake, but only 67% of release time is permitted. So, the bidder considers requirement for full-service brake is not enough. In addition, release of full-service brake needs to apply jerk limitation and release time varies exponentially in accordance with	c) Full-service release: ~~2.0~~ 3.0 seconds	Please see Annex B. According to Bidder's theory, 3.0s×90%=2.7s Therefore, it will be 2.7s. c) Full-service release: ~~2.0~~ 2.7 seconds

		pressure, so it is very severe to comply. Therefore, the bidder request to change this requirement as provided.		
20.	Volume II Section VI ERT-14 1.12.1.2 1.12.1.4 ERT-15 1.12.1.3 1.12.1.6 Noise, Vibration and Aerodynamics	ERT 1.12.1.2 The interior noise level at any point any vehicle (including the Driver's Cab), 1.6m above floor level, while stationary on an open section of track, but with all auxiliary system running, shall not exceed 63 dBA. The Bidder requests the Employer to clarify the requirement about interior noise level with stationary under the auxiliary system operating condition of 63 dBA. Since the air conditioning system is the dominant auxiliary system that affects noise, the Bidder deems that this interior noise requirement with stationary condition is not feasible in consideration of the requirement of air ventilation volume 1100 m3/h in ERT 8.2.4, and there is trade-off relationship between noise level and air ventilation volume. The Bidder considers that the air ventilation volume is directly	ERT 1.12.1.2 The interior noise level at any point any vehicle (including the Driver's Cab), 1.6m above floor level, while stationary on an open section of track, but with all auxiliary system running, shall not exceed ~~63~~ 66 dBA.	Bidder request is accepted. Please see Annex B.

		affected by the vital conditions of the passers and shall give priority over noise requirements. Please note that the requirement of interior noise level under the train running condition specified in ERT 1.12.1.4 will be achieved. The Bidder deems that even though the excellent stationary interior noise level is achieved, it will not affect the passenger's comfort, because the majority of passenger's duration on train will be under the running condition. Accordingly, the Bidder requests the Employer to amend the requirement as proposed revised text.		
21.	Volume II Section VI ERT-20 1.16.4.3 Ground cable	Minimum grounding cable size shall be 6 mm2, unless otherwise reviewed by the Engineer, and the size shall 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.	~~Minimum grounding cable size shall be 6 mm2, unless otherwise reviewed by the Engineer, and the size shall be equal to, or larger than, that of the largest power wire connected to that equipment.~~ The grounding cable connected to the respectively equipment shall be adequate size	Considering the maximum current and margin that flow through each cable, Bidder can propose cable designs based on the proven method. The proven method and record shall be submitted and discussed at the design stage. Please see Annex B.

		The Bidder notes the Employer's response in GBB No. 11, however, in addition to the reasons provided in our previous clarification, we are concerned about the followings: 1) In the event that the grounding cable size is equal to that of the power cable, additional cables and complicated cable routing are required under car, which is not feasible and, we believe, results in requiring significant maintenance efforts. This situation will be also appeared in the interior. For example, if 2 sets of 250 mm2 power cables is needed for the propulsion system, 2 sets of 250 mm2 grounding cables each are required for the main switch, HSCB, VVVF inverter box and filter reactor. 2) Between grounding cable and power cable, current carrying capacity is different due to their installation condition. It is the international standard that current carrying capacity of the cable depends on the installation condition. Typically, the power cable is routed inside conduit and its current carrying capacity reduces, while the ground cable is routed in the air and its current	for connected to the respectively equipment. All grounding wires and cables shall utilize the ring mark in green at either end of grounding wires and cables. ~~Longitudinally striped green and yellow insulation, or heat shrinkable tubing applied over the conductor insulation.~~	

		carrying capacity keeps the same. Also, it is only abnormal situation that excessive current flows through the ground wire, and its duration is very limited by the function of protection component like fuse or circuit breaker. On the other hand, the size of power cable is considered for continuous current in normal operation. This also leads to difference of the size of the grounding cable and the power cable. Therefore, we respectfully request the Employer to reconsider to revise the requirement as proposed, which is same as before.		
22.	Volume II Section VI ERT-20 1.16.5.1 Cable connectors	All cable connectors used in exterior locations shall be rated IP65 using quick connect/disconnect couplings, with positive locking and visual indication of mating. These shall be subject to reviewed by the Engineer. The Bidder recognizes there are such connectors with visual indication of mating or positive locking available for railway	All cable connectors used in exterior locations shall be rated IP65 using quick connect/disconnect couplings~~, with positive locking and visual indication of mating~~. These shall be subject to reviewed by the Engineer.	Please see Annex B.

		application. On the other hand, we also recognize that most of connectors, which are typically small ones such as M12 connector, do not have the function of visual indication of mating or positive locking. Since the connectors with such functions are special products, these cost more than the regular ones and takes time to receive these connectors. For that reason, the Bidder requests the Employer to delete the provision of visual indication of mating and positive locking as follows.		
23.	Volume II Section VI ERT-20 1.16.5.2 Terminal blocks	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. The Bidder requests the Employer to add "stainless stud" with "plated stud", because stainless stud has the same or higher capability of unti-corrosion and it is long term service proven application in	N/A	Please see Annex B.

		numerous railway projects. Also, the Bidder requests to add the WAGO type terminal block as an option, because it is sufficiently service proven products, and widely applied in numerous railway projects for the purpose of improved maintainability and compactification of the space.		
24.	Volume II Section VI ERT-20 1.16.6.1 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 Bidder understands that the purpose of the requirement of 1.16.6.1 is to easily identify the type of the wire during a course of maintenance and so, it is practical and reasonable proposal to mark the wire with a unique wire identification number as close as possible from each end of each wire when any connector parts or	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, or as closely to any connector parts or wiring treatment as possible if they cover the portion from an end of wire. The identification numbering system will correspond to the wire identification numbering system used on the schematic drawings and wiring diagrams.	Please see Annex B.

		wiring treatment is applied at the end of the wire. Therefore, the Bidder respectfully requests the Employer to revise the requirement as proposed.		
25.	Volume II Section VI General Bid Bulletin No.6 ERT-20 1.16.7.2 1.16.9.5 Connectors	The maximum ambient temperature was revised from 45℃ to 40℃ in General Bid Bulletin No.6 of Annex B. The Bidder understands that this revised temperature can be also applied these clauses. Please confirm that the Bidder's understanding is correct.	N/A	Bidder understanding is not correct.
26.	Volume II Section VI ERT-21 1.16.9.1 Wire and Cable Installation	Electrical wires and cables shall be run in cleats, conduit, 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 Bidder acknowledges the Employer’s concern about the risk	N/A	Bidder can propose cable designs based on the proven method. The proven method and record shall be submitted and discussed at the design stage.

		of fire safety described in Item #16 of GBB #11. Since the rubber hose which meets the requirement of MLIT Chapter 8, Section 5, Article 83 in accordance with Clause 21.8.1 shall be used, the Bidder believes the Employer's concern about the risk of fire safety is resolved. In consideration of the said reply, please confirm again that except electrical wires and cables run in cleats, conduit, ducts or wire trays, the electrical wires and cables smaller than 14mm2 / Φ7 at the exterior will protected by rubber hose in widely adopted for other Asian project.		
27.	Volume II Section VI ERT-21 ERT-135 1.16.9.4 Wire and Cable Installation 21.4.8 Voltage Segregation	The Contractor's attention is drawn to the requirements of Sub-Clause 21.4.8 regarding voltage segregation. Wires shall be segregated into separate bundles/harnesses and connectors according to the voltage ratings in the following classes.: 1) Line voltage DC wiring, 2) Low voltage AC wiring (Under 600V),	21.4.8 Wires shall be segregated into separate bundles/harnesses and connectors according to the voltage ratings in the following classes.: 1) Line voltage DC wiring, 2) Low voltage AC wiring (Under 600V), and	Bidder can propose cable designs based on the proven method. The proven method and record shall be submitted and discussed at the design stage. Bidder request for amendment is rejected. The clause was updated. Please refer to GBB No. 13 dated 17 June 2021.

		3) Battery voltage wiring (Under 125V), 4) ETCS wiring, and 5) Radio, Intercom, P/A wiring. Line voltage DC wiring and Low voltage AC wiring (Under 600V) will be physically segregated each other and from the other wiring 3) through 5) because of noise interference. However, because wiring space is very limited and these wiring 3) through 5) are low voltage wirings with sealed as needed, we believe that it is not necessary to segregate these wirings physically. In addition, we will confirm that there is no noise interference through the EMC testing. Therefore, we respectfully request the Employer to revise the requirement as proposed.	3) Others, such as Battery voltage wiring (Under 125V), ETCS wiring, and Radio, Intercom, P/A wiring. ~~3) Battery voltage wiring (Under 125V),~~ ~~4) ETCS wiring, and~~ ~~5) Radio, Intercom, P/A wiring.~~	
28.	Volume II Section VI ERT-30 2.1.4 Anti climber	The carbody design shall incorporate a function of anti-climbing on both ends of all cars to prevent one car from climbing over another in the event of a collision.	N/A	In the event of a collision, there is a requirement for a function that suppresses the riding of each other's Rolling stocks. The detailed method is proposed by Bidder. Bidder understanding is correct.

		The Bidder requests the Employer to clarify the requirement of anti-climbing function. The Bidder understands that if the result of crashworthiness analysis satisfies the anti-overriding requirements without traditional tooth shape anti-climber, the traditional tooth shape anti-climber is not required. Please confirm the foregoing understanding is correct.		
29.	Volume II Section VI ERT-35 2.8.1.9 Compatibility with MCRP, NSCR and NSRP-S General Bid Bulletin No.10 General Bid Bulletin No.11	The Bidder notes the Employer's response in GBB No. 11, however, unfortunately, since the Employer is not able to provide the requested information, the Bidder is not able to investigate and evaluate possibility of unified design arrangement at this moment. Therefore, please delete the requirement of compatibility with MCRP, NSCR and NSRP-S and revise the requirement as proposed.	~~The Contractor shall confirm equipment arrangement of rolling stock in MCRP, NSCR and NSRP-S, and equipment arrangement shall be unified as possible, paying attention to mounted side, mounted positions (especially test valves, valves and cocks used in emergency), and so on.~~ Equipment arrangement shall be designed not to affect maintainability and emergency operation even if special operations are adopted.	This requirement is not changed in consideration of the operator's action and maintenance to abnormalities and the uniformity of maintenance. However, this is not required to be exactly the same, but to be as unified as possible. It is understood that the structure of the limited express rolling stock and the structure of the commuter rolling stock are very different, so discussion will be held so that they can be unified as much as possible at the design stage.

			Example, equipment arrangement shall be designed in consideration with symmetry, when reversed train formation operation will be adopted."	Bidder request for amendment is rejected.
30.	Volume II Section VI ERT-36 3.1.11 Wheel lubrication	Bogie wheelbase shall be between 2100 mm – 2700mm. The Contractor shall include the dry stick type wheel lubricant in case of the wheelbase design is higher than 2100mm. The Bidder understood the Employer's reply as per General Bid Bulletin No.11 dated 9 June 2021 that the dry stick type wheel lubricant is required in case of the wheelbase design is higher than 2100mm. If the Bidder provides the dry stick type wheel lubricant, the Bidder is of the opinion that it shall be equipped on the appropriate number of wheels based on our experience (e.g, 25% of the wheels) to comply with the requirement in ERT 3.4.12 "Objective is that the cars shall basically achieve approximate of	N/A	Bidder understanding is correct.

		150,000km before reprofiling of the wheels is necessary. Wheel flange lubrication is required". Please confirm the foregoing understanding is correct.		
31.	Volume II Section VI ERT-59 6.5.11 Wheel lubrication 6.5.10 General Bid Bulletin No.8	The Contractor shall ensure that indicating lights are installed in both side of car. The light on the side where all the doors are not closed illuminates. The Bidder believes that the indicating lights installed above each door required in ERT 6.5.8 provides the same function as required in ERT 6.5.10 and therefore, we respectfully request the Employer to delete the requirement of ERT 6.5.10.	N/A	Bidder request is rejected. Clause 6.5.10 requires the doors fault indication predominantly for door closed and lock status. In case of isolated doors, this light shall be illuminated. Clause 6.5.8 indicating light is predominantly for the passenger alarm and for O&M personnel guide to door fault location.
32.	Volume II Section VI ERT-61 7.1.14 7.3.17 Passenger Side Entrance Doors	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 normal door operation, the maximum velocity of each door leaf shall not exceed 1.5 m/s. When closed, all passenger side entrance doors shall be automatically and mechanically locked in the fully closed position, preventing the doors being opened	Doors shall fully open within ~~2.0 to 2.5 s~~ 4 ± 0.5 s of the door open command and shall fully close within ~~2.5 to 3.0 s~~ 4 ± 0.5 s of the door close command.	Bidder's request is accepted. Please see Annex B.

		beyond a limited push back facility. When closing, the force shall not exceed 250N. (1) In general, doors for limited express vehicles will be designed with single-leaf sliding door to ensure an appropriate opening width in consideration of passengers with carry-backs and handicapped people, maximizing the passenger compartment area, and giving priority to comfort. In case of a single leaf sliding door, the stroke of one door is longer than that of a bi-parting sliding door, so the opening and closing time will also be slightly longer. Also, ERT 7.3.17 specifies that the door closing or opening time shall be adjustable between two and five seconds. Accordingly, the Bidder humbly requests to revise the sentence as proposed revised text. (2) Although ERT 7.1.14 stipulated that the maximum velocity of normal door operation of each door leaf must not exceed 1.5 m/s, if the door hit with passenger at such a	During normal door operation, the maximum velocity of each door leaf shall not exceed ~~1.5m/s~~ 0.35 m/s for closing and 0.5 m/s for opening.	

		high door operating speed, there are safety concerns due to the large impact force. Accordingly, the Bidder humbly requests to revise the sentence as proposed revised text.		
33.	Volume II Section VI ERT-78 10.3.6 Air reservoirs	Separate systems within the pneumatic system shall be supplied via a vented cut-out valve and a strainer, and shall be provided with separate air reservoirs, supplied through a check valve to protect against sudden loss of air pressure. The air brake reservoir shall be sized to provide at least three emergency brake operations under W2 loading conditions. Reservoirs shall be set to assist moisture collection and shall include automatic/manual drain valves. The Bidder notes the Employer's response in GBB No. 11, however, as explained in our previous request for clarification, it is not feasible to install dedicated air reservoirs including piping arrangement for all individual system due to very limited space under the car.	Separate systems within the pneumatic system shall be supplied via a vented cut-out valve and a strainer, ~~and shall be provided with separate air reservoirs,~~ supplied through a check valve to protect against sudden loss of air pressure.	Bidder request is accepted. Please see Annex B.

		Since our proposed solution complies with other requirements and brings less maintenance efforts, the Bidder request the Employer to reconsider revising the requirement as proposed revised text. Please note that "a strainer" is restored in this request since it was mistakenly deleted in the previous request.		
34.	Volume II of III, SECTION VI ERT-78 10.3.9 Pneumatic System	All flexible hoses shall be date stamped, and its full life indicated. All flexible hose connections on removable assemblies shall be of railway service proven, quick connect coupling. The Bidder assumes that "quick connect coupling" includes the connector that can be replaced without special tools or special work according to Japanese service proven standard connecting method. Please confirm that the Bidder's understanding is correct.	N/A	Bidder understanding is correct.
35.	Volume II of III, SECTION VI	All flexible hoses shall be date stamped, and its full life indicated.	~~All flexible hoses shall be date stamped, and its~~	Please see Annex B.

	ERT-78 10.3.9 Pneumatic System	All flexible hose connections on removable assemblies shall be of railway service proven, quick connect coupling. There are multiple procedures to manage the replacement period of the air hoses. If the flexible hoses are date stamped with its full life indication, it is required to check and update their record every time these hoses are replaced, which requires additional efforts. Since the procedure to manage the replacement period depends on potential suppliers, we would like to propose its procedure during the design stages. Therefore, we respectfully request to revise the requirement as proposed.	~~full life indicated.~~ All flexible hose connections on removable assemblies shall be of railway service proven, quick connect coupling. The method of stamping date and full life of the flexible hoses shall be proposed by the Contractor during the design stage, which shall be discussed and mutually agreed by the parties.	
36.	Volume II of III, SECTION VI ERT-92 14.7.9.1 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	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	Please see Annex B.

		position. Alkali-resistant paint is applied to the battery box and tray. The Bidder notes the Employer's response in GBB No. 11, however, as explained in our previous request for clarification, from quality point view, we don't recommend that Alkali-resistant paint is applied to the battery tray made of stainless steel because it can be easily peeled off after dried. If Alkali-resistant paint was applied and peeled off, the Employer is required to repaint the tray, which results in increase of maintenance cost. Therefore, the Bidder respectfully request the Employer to reconsider revising the requirement as proposed.	stainless-steel roll-out tray, with positive stops when pulled out and a lock in the stored position. Alkali-resistant paint is applied to the battery box ~~and tray~~.	
37.	Volume II of III, SECTION VI ERT-93 14.7.9.3 Battery Installation	The roll-out tray shall have resinous wheel so as to insulate the box and the carriage. Since the Bidder seeks the best proposal for the Limited Express Trainsets to the Employer, the Bidder humbly requests the Employer to allow to increase the	The roll-out tray shall have resinous wheel so as to insulate the box and the carriage, or other proven roll-out design (slide rail type, etc.)	Please see Annex B.

		number of alternatives and revise the sentences as provided.		
38.	Volume II of III, SECTION VI ERT-98 15.6 Electrical jumper wire	Electrical jumper wire that is necessary for transmission between the vehicles shall be specified by TMS supplier and shall be achieved 1 million cycles of performance test. Couplings shall be HART type or similar. The Bidder assumes the requirement of 1 million cycles of performance test is excessive. In other projects, the 15 hundred thousand cycles of performance test in accordance with JRIS E 6801 have been conducted for each project and the electrical jumper wire works without any trouble. Therefore, please consider to revise the sentence as provided.	Electrical jumper wire that is necessary for transmission between the vehicles shall be specified by TMS supplier and shall be achieved ~~1 million cycles of~~ the performance test in accordance with JRIS E 6801. Couplings shall be HART type or similar.	Bidder request is rejected. Clause 15.6 was amended in GBB 15.
39.	Volume II of III, SECTION VI ERT-133 21.2.5 Fasteners	All bolts and cap screws shall have the head marked to indicate grade. All nuts shall be marked to indicate grade The Bidder notes the Employer's response in GBB No.11, however,	All bolts and cap screws shall have the head marked to indicate grade. All nuts shall be marked to indicate grade. Alternate arrangement can be proposed by the	Please see Annex B.

		we still believe that our proposal is the service-proven method and brings less maintenance efforts, which will be beneficial to the Employer and therefore, we respectfully request the Employer to revise the requirement as proposed.	Contractor during design stages, which shall be reviewed and approved by the Employer as far as the Contractor proves its application of the alternative arrangement in any railcar projects all over the world.	
40.	Volume II of III, SECTION VI ERT-134 21.4.2.1 Wire Insulation	Cables shall conform to EN50264 or other equivalent standards. The Bidder assumes that the Japanese regulations/standards have been applied to the carbody and equipment wires and cables used in MCRP, NSCR and NSRP-S Since EN50264 is the standard for specific wires and so, is not applicable to other types of wires such as shielded wires. Additionally, in consideration of compatibility with the equipment of MCRP, NSCR and NSRP-S, the Bidder assumes that the same Japanese regulations/standards should be accepted. Therefore, the Bidder requests the Employer to amend the requirement to allow Japanese regulations/standards.	Cables shall comply with EN standards or Japanese regulations/standards. ~~conform to EN50264 or other equivalent standards.~~	Please see Annex B.

41.	Volume II/III - Part 2 Section VI ERT Chapter 24.2 Clause 24.2.3 292/355 (ERT-147) Spare Parts and Special Tools - Spare parts	The Contractor shall provide a complete listing of spares and consumables to be supplied, including the following information: a. Contractor part number; b. Original equipment manufacturer part number; and c. Part description. d. Price e. Primary Vendor name/contact/address f. Secondary Vendor name/ contact/ address Please note that some spares will be delivered only by one primary vendor. For that reason, the Bidder ask to change the point f.	The Contractor shall provide a complete listing of spares and consumables to be supplied, including the following information: a. Contractor part number; b. Original equipment manufacturer part number; and c. Part description. d. Price e. Primary Vendor name/contact/address f. If available, secondary Vendor name/ contact/ address	Please refer to Annex B on updated requirements on spare parts.
42.	Part 2 – Employer's Requirements Section V1. Employer's Requirements Technical Requirements ERT147 24.2 Spare Parts	24.2.5 The spare part supplied during DNP shall include at least the below list of spare parts as minimum. The quantity shall be based on one (1) trainset basis. Final list shall be confirmed during design stage. 1: Wheel and Axle Assembly for Motor; 2: Wheel and Axle Assembly for Trailer Bogie; 3: Wheel Assembly; …….	24.2.5 The spare part supplied during DNP shall include at least the below list of spare parts as minimum. Unless otherwise stated, the quantity shall be based on one (1) trainset basis. Final list shall be confirmed during design stage.	Please refer to Annex B on updated requirements on spare parts.

		59: 2 Spare Trailer Bogies Complete 60: 2 Spare Motor Bogies Complete 61: Spare trailer bogie wheels – 1 trainset 62: Spare motor bogie wheels – 1 trainset 1) The Bidder understand, 59: 2 Trailer Bogies Complete & 60: Motor Bogies Complete are not required to supply for one trainset basis but 2 units each only, please confirm (the Bidder wants to clarify the requirement as stipulated in the next column). There are many items referring wheel, please reconfirm, required minimum quantities of item 1, 2, 3, 61 and 62.		
	GBB08 5/47 Item No. 6	1) The bidder's understanding is correct. Refer to the Annex B for the amendment. The Contractor shall submit the final list of capital spare during the design stage The bidder shall refer to the quantity stated as a minimum, however, please note that the list is not exhausted, the Contractor shall provide a list for		

		material and spares use for 2 years based on the anticipated train mileage and previous contracts experience. 1) The Bidder concerns, item 3 - Wheel Assembly and Item 61: Spare trailer bogie wheels – 1 trainset as well as Item 62: Spare motor bogie wheels – 1 trainset are duplicated. Therefore, the Bidder would like to reconfirm Item 3 Wheel Assembly is also required with the quantity based on 1 trainset in minimum on top of item 61 and 62. 2) Item 1: Wheel and Axle Assembly for Motor and 2: Wheel and Axle Assembly for Trailer Bogie are partly included in item 59: Spare Trailer Bogies Complete and item 60: Spare Motor Bogies Complete. Therefore, the Bidder would like to reconfirm Item 1: Wheel and Axle Assembly for Motor and 2: Wheel and Axle Assembly for Trailer Bogie are also required with the quantity based on 1 trainset in minimum on top of item 59 and60.		

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		Volume I Part 1 – Bidding Procedure
1	Section IV – Bidding Forms Schedule 1.9: Provisional Sums BF-48	Delete and replace the description for the Provisional Items of PS-03 with the following: Provisional Sum in accordance with Sub-Clause 13.5 of the Conditions of Contract to cover the following items as a minimum: Execution and completion of the Provisional Works by the Contractor under these Conditions and/or the Contract. The Employer and/or the Engineer may from time-to-time issue instructions to the Contractor with regard to the use, utilization and expenditure of such Provisional Sums.
		Volume II Part 2 – Employer's Requirements
2	ERT-159 – 160 27	Added clause 27.1.1: Two (2) Train Operation Simulators at the Training Center in Mabalacat Depot will be provided by under CPNS-01 contract. One (1) Train Operation Simulator shall be designed for the Commuter Train (CP NS-02) and the other one (1) for Limited Express Train (CP NS-03). The train operation simulators shall be provided in order to establish a high-quality approach for driver training and route familiarization. It is essential to train the required number of train drivers ready prior to the taking-over of NSCR. They may be newly trained and/or be existing drivers from existing lines. Accordingly, these drivers have to be familiar with the new line profile and the newly applied signaling system before the inauguration. In addition, drivers shall be trained in handling emergencies such as rolling stock faults, signaling faults and railway bogie faults, derailment, accidents etc.

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		Added clause 27.1.2: The Contractor shall be involved in the design of the Train Operation Simulator for the Limited Express Train (CP NS-03) which will be led by the CP NS-01 Contractor. The Contractor shall provide not limited to the design information, drawings, technical specification etc. which are required for the achievement of final design of the Train Operation Simulator for the Limited Express Train (CP NS-03). Added clause 27.1.3: The Contractor shall provide all necessary interfacing support to the CP NS-01 Contractor throughout the period of the delivery of the Train Operation Simulator for Limited Express Train at the Training Center in Mabalacat Depot. Added clause 27.1.4 (Previously 27.1.1): The Contractor shall prepare the equipment for driving simulator as below, and supply to the Driving Simulator Contractor (CP NS-01). The related parts and equipment shall be the same as in the real cab and given notice of no objection by the Engineer during final design stage. The detailed equipment list is shown below:

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Description	Qty.	Remarks
Cab saloon partition door	1 set	
Cab seat	1 set	
Cab side doors	1 set	
Passenger side door system	1 set	Passenger door manual release mechanism (inside and outside) is included.
Passenger emergency call system	1 set	
Brake release cock	1 set	
Driver's Console	1 set	Master Controller, Buttons switch panels, Gauges, Electric meters, TMS unit, Sun-visor are included.

Added clause 27.1.5:

The Contractor shall constantly use his best endeavour for the delivery of the Train Operation Simulator for the Limited Express Train (CP NS-03) the Training Center in Mabalacat Depot not

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		limited to the design, manufacturing, testing and commissioning and defect notification period of the Train Operation Simulator. Amended clause 27.2.1: The Contractor shall prepare and supply the equipment for Training Center as below: 1) Pantograph: 1 set 2) Bogie-assembly for Motor-car including traction motor, gearbox, and coupling: 1 set Amended clause 27.2.2: The Contractor shall constantly use his best endeavour to provide the support not limited to the supply and delivery of the equipment as per clause 27.2.1 of the ERT, to the Training Center in Mabalacat Depot until the completion of Defect Notification Period of this contract.
3	ERT-147 – 150 24	Added new clause 24.2.1: The Contractor shall provide the following Spare Parts, which shall be sufficient for the duration of testing, commissioning, FFR, DNP and for the duration of period for revenue operation mentioned below: Added new clause 24.2.2:

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		Testing and Commissioning Spare Parts: 1) In addition to the O&M Spares, the Contractor shall keep on the Site throughout the installation, erection, and commissioning periods, sufficient stocks of Spare Parts to enable immediate replacement of any item in the Works found to be defective or in any way in non-conformance with the Specification prior to the issuance of TOC. ("Testing and Commissioning Spares"); 2) The Contractor shall use his best endeavour to supply and deliver the Testing and Commissioning Spares on or before the commencement of the on-site testing and commissioning; 3) The Contractor shall submit to the Employer's for review a list of all Testing and Commissioning Spares that shall be made available during the on-site testing and commissioning; Added new clause 24.2.3: O&M Spare Parts: 1) The Contractor shall provide recommended Spare Parts in sufficient quantity of seven (7) Limited Express Trains for period of two (2) years revenue service beyond each train taking over date, excluding the major non-expendable equipment (capital) spares; 2) O&M Spare Parts shall comprise of the Operational Spares, Preventive Maintenance, Corrective Maintenance & Overhaul Spares; 3) The Contractor shall not be entitled to use any of the O&M Spares and/or Capital Spares (if any) to replace any item in the Works during the installation, erection, and commissioning periods.

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		4) The O&M Spare Parts shall include the Consumables Spares required to perform the trains preventative maintenance not limited to Table 1: Basic Rolling Stock Maintenance Categories of this ERT; 5) If applicable, the O&M Spare Parts shall include the overhaul spare parts; 6) The Contractor shall supply and deliver the O&M Spares prior to the taking over of trains; 7) At the end of the Defects Notification Period, the stock of O&M spares shall be replenished and handed to the Employer to cover a further period of two (2) years of operation and maintenance beyond the DNP. Added clause 24.2.2 (Previous 24.2.1): The Contractor shall state at which year a major overhaul is required for each component or sub-system. The Contractor shall provide an overhaul parts and price list together with a time estimate to overhaul each component, assembly or sub-system for all overhaul parts not included in item 24.2.1. Updated clause 24.2.4 (Previous 24.2.3): The Contractor shall provide a complete listing of spares and consumables to be supplied, including the following information: a. Contractor part number; b. Original equipment manufacturer part number; and c. Part description.

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		d. Price e. Primary Vendor name/contact/address f. If available, secondary Vendor name/ contact/ address Updated clause 24.2.5 (Previous 24.2.4): The Contractor shall provide list of O&M spare part during the design stage for engineer review. The list shall include information not limited to clause 24.2.4, clause ERG 11.1.2 and the delivery schedule. The Contractor shall also submit the final list of capital spare during the design stage for engineer review which are required for the limited express train maintainability. Added clause 24.2.6: All spares quantities shall be rounded up to the nearest deliverable unit e.g., cable shall be delivered in complete drums, liquids in complete sealed containers, small parts in complete packs. Updated clause 24.3.1: The Contractor shall supply sufficient quantity of Spare Parts to ensure the return to service of a defective car through the Defects Notification period as per clause 1.6 of ERG. The Contractor shall not be entitled to use any of the O&M Spares and/or Capital Spares (if any) to replace any item in the Works during the installation, erection, and commissioning periods. Updated clause 24.3.2:

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		The O&M Spare Parts which are used during the DNP shall be replenished immediately at no extra cost to the Employer not later than six (6) months before the end of the last train DNP as per clause 24.2.1.2 of this ERT. Updated clause 24.3.3: The Contractor shall handover to the Employer the replenished O&M Spares to complete the total of spare part, as per the list mentioned in clause 24.2.5 under this contract for the issuance of Performance Certificate. Updated clause 24.3.4: If any additional spares and consumables including parts replacement, which has not been listed, become necessary during the DNP, the spare parts shall be added to the list mentioned in clause 24.2.5 and shall be delivered by the Contractor during the DNP. These parts shall be replenished as per clause 24.3.2. This shall be deemed to have been included in the Price Schedules. Replaced clause 24.4.1: The Contractor shall provide the updated final list of O&M spare part for the issuance of the Performance Certificate. Replaced clause 24.4.2:

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		The list shall provide the information not limited to as per clause 24.2.4, 24.2.5 and 24.3.4. The list shall also include the list of recommended spare parts and consumables deemed to be required in the course of normal train operation after the DNP including but not limited to overhaul spare and capital spares. Clause 24.4.2 is now 24.4.3: Clause 24.4.3 is now 24.4.4:
4	ERT-157 26.2.4	Updated clause 26.2.4: All documents, manuals, drawings and other deliverables shall be delivered to Employer.
5	ERT-158 26.2.10	Updated clause 26.2.10: The Contractor shall comply with all relevant requirements of the Employer or relevant section of local government and/or any other relevant authority regarding any traffic arrangements that may be necessary for delivery of the vehicle from port to the site. The Contractor shall make all arrangements and full responsibility for transportation to the site.
6	ERG-49 to 50 8.6	Updated clause 8.6: **Rolling Stock Taking Over Certificate (TOC)** Updated clause 8.6.1:

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		The Contractor shall provide a Taking Over Performance Reports to support the applications for Rolling Stock TOC for each trainset and the Performance Certificate for the fleet (7 trainsets). Updated clauses 8.6.2: The Rolling Stock TOC Performance report shall be issued for each trainset prior to operational acceptance and shall provide: 1) Technical design justification of performance; 2) Cross reference to Rolling Stock performance in a similar application; 3) The design prediction at LRU (Line replaceable unit) level (MDBF, OMTTR and CMTTR) of all capital components; 4) Failure mode, effect, & criticality analysis (FMECA) and Fault Tree Analysis (FTA), FTA shall only applicable to new or critical subsystem equipment or when failure consequences is not solved. 5) Reliability Critical item list which might impact the operations of the train or train service, 6) Manufacturing Completion Certificate for each train, 7) Design Qualification Testing Completion Certificate, 8) Factory Acceptance Tests Completion Certificate, 9) Train Delivery to site completion Certificate, 10) Design Safety Case of Safety Report,

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		11) Engineer Notice of No Objection of submitted list of As-built Drawing, 12) Engineer Notice of No Objection of completion of Training program, 13) On-site Testing and Commissioning Completion Certificate for each train, and 14) Train Operation Completion Certificate for each train 1500 km (FFR) Deleted clause 8.6.3:
7	ERG-50 8.7	Added clause 8.7.4: The Rolling Stock Performance report shall be issued progressively on a monthly basis, shall be finalized at the end of DNP to support the application of Performance Certificate which shall include and not limited to: 1) In-service FFR operational performance of individual trainsets as per clause 8.5; 2) In-service operational performance of the fleet (7 trainsets) MDBF as per clause 8.5; 3) The in-service OMTTR and CMTTR of all capital components as per clause 8.5, 4) Completion of Defect Remedial, 5) Completion of Open Item, 6) Completion of Modification, and 7) Completion of Spare Part, Special Tools and Test Equipment delivery including the

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		replenished spare parts delivery, final spare part list after DNP, additional spares and consumables including parts replacement, which was not listed, become necessary during the DNP, list associated with spare parts as per clause ERT 24.2 and 8) DRACAS report
8	ERG-47 8.17, 8.18	Updated clause 8.1.7: A Taking Over Certificate (TOC) will be issued for each trainset. In order to obtain a TOC for the Rolling Stock from the Employer/Engineer, it is required that each trainset achieves 1,500 km of Fault-Free Running (FFR) during the integrated testing and commissioning and given notice of no objection by the engineer to the requirement set forth in clause 8.6 of ERG. Updated clause 8.1.8: A Performance Certificate will be issued by the Engineer for the total performance of the fleet. This Performance Certificate is required to be achieved by the end of the Defect Notification Period (DNP). Prerequisites to obtain the Performance Certificate includes: each trainset shall achieve 10,000 km or 2 months of FFR, the fleet (7 trainsets) shall achieve a Mean Distance Between Failures (MDBF) of 50,000 km causing a delay greater than 5 minutes, a fleet in-service Operational Mean Time To Restore (OMTTR) of 15 minutes, the fleet maintainability of capital components a Corrective Mean Time To Repair (CMTTR) of 4 hours and the given notice of no objection by the engineer to the requirement set forth in clause 8.7 of ERG.

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9	ERG-70 - 71 11.1.4, 11.2.1, 11.3.3, 11.5. 11.8	Updated clause 11.1.4: The Contractor shall submit a comprehensive list of recommended spare parts and consumables in accordance with the requirements specified in the ERG and ERT for the period as per ERT clause 24.2 for the Rolling Stock operation and maintenance. Updated clause 11.2.1: Spares parts shall be manufactured, tested and delivered to the Employer by the Contractor, as part of the Performance Acceptance Criteria (PAC) stated at Clause 8.5. The spare parts shall suitably packed and identified for prolonged storage as per clause 17 in this ERG. Updated clause 11.3.3: In the event the Employer/Engineer encountered an inconsistency of the approved list and the maintenance manual or other means, at no adjustment to the Contract sum, the Contractor shall with immediate effect shall update the lists and delivered the additional special tools and test equipment as per clause ERT 24.8 and as stated at Clause 8.7 for the issuance of Performance Certificate. Updated clause 11.5: Spare Parts Updated clause 11.5.2: The spare parts shall be listed in a practical format as per clause 11.1.2 of ERG

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		Updated clause 11.5.3: The stock of all spare parts shall be replenished at the end of the Defects Notification Period to match the quantity with the list of spare part approved during the design stage. Added clause 11.5.4: The Contractor shall submit the spare part delivery list and schedule for the engineer review during design review. The O&M spare parts shall be delivered to the Employer prior to the issuance of 1st train taking over certificate. Added clause 11.5.5: The list shall be updated and submitted for engineer review six (6) months before the end of defect notification period to form the final approved spare part delivery list and shall not absolve the Contractor obligation under this contract to demonstrate the requirement in clause 8.5 of ERG. The list shall be identified as the final spare part list. Added clause 11.5.6: The final spare part list shall include the additional spares and consumables parts to the approved list during design which was not previously listed and become necessary during the DNP.

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ITEM NO.	REFERENCE/CLAUSE/ SECTION	REVISIONS / AMENDMENTS
		Added clause 11.5.7: The Contractor shall complete all of the final spare parts delivery to the Employer prior to the completion of Defect Notification Period and for the issuance of the Performance Certificate Added clause 11.8: **1.1** Coding and Tagging of all Equipment, Spare Parts and Special Tools and Test Equipment 1.1.1 All Equipment, Spare Parts, Special Tools, and Test Equipment to be delivered to the Employer shall each carry a tag suitably marked, bar-coded (as directed by the Engineer), and numbered to sustain harsh environments. 1.1.2 Each individual item of equipment shall be fitted with permanent identifications label in accordance the with the coding and numbering convention and requirement developed by the CMMS for all E&M components, parts, and equipment. 1.1.3 In this respect the term "individual item of equipment" shall refer to a complete assembly of components and to each removable submodule within the complete assembly. 1.1.4 The identification label shall be permanently attached in such a way that it shall not become detached or illegible during the lifetime of the system from any cause including wear and tear, environmental effects (such as rain, direct sunlight, etc.) or any other influence. Preference shall be given to embossed or engraved metallic labels mechanically fastened by riveting or similar means to the item to which they refer. 1.1.5 All labels shall be easily cleaned to remove dirt and debris (including grease and oil) without disturbing the legibility properties.

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10	ERG 82	Added clause 17: **1** PACKAGING, SHIPPING, AND DELIVERY **1.1 General** 1.1.1 The Contractor shall be fully responsible for the provision and maintenance of acceptable storage facilities for the Plant and any materials or equipment he intends to use for carrying out of the Works or for incorporating into the Works. 1.1.2 The Contractor shall prepare, protect and store, in a manner to be accepted by the Engineer, all equipment and materials so as to safeguard them against loss or damage from repeated handling, from climatic influences, and all other hazards arising during transport, shipment, or storage on or off the site. Secured and covered storage shall be provided for all equipment and materials other than those accepted by the Engineer as suitable for open storage. 1.1.3 The Contractor must write the following items on all packages, but not limited to them. 1) Name of packing content 2) Quantity of packing content 3) Size and weight of package 4) Precautions of package handling 5) Packing number or contract number 1.1.4 The Contractor must prepare a packing list and check it at the time of both shipment and delivery. 1.1.5 When the Contractor delivers a package from a temporary site to an actual use site, the Contractor must deliver it carefully by grasping its packing contents and observe strict precautions of package

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		handling. **1.2 Crating** 1.2.1 The Contractor shall provide all packing, crates, and marking. The consignments for shipment shall be packed and marked in accordance with the Engineer's instructions. In doing so, it shall comply with the following requirements; 1) Each case, crate, or package shall be waterproof, rot-proof, and insect/rodent-proof, of robust construction, and suitable for the intended purpose. The Contractor shall, in determining the packing materials to be used, take cognizance of the climatic conditions likely to occur during the period of transport, shipment, and storage. 2) Each case, crate, or package shall be legibly and indelibly marked in large letters with the site address, Contract number, "right way up", opening points, and other markings as necessary to permit materials to be readily identified and handled during transit and when received at the Site. 3) Each case, crate, or package shall contain a comprehensive packing list showing the number, mark, size, weight, and contents together with any relevant drawings. A second copy of the packing list shall be enclosed in a watertight enclosure on the outside of each case or package. The distribution of additional copies of each packing list shall be in accordance with the Engineer's instruction. 4) All items heavier than 100 kg shall be marked on the outside of the case to show the gross and net weights, the points for slinging, and where the weight is bearing. 5) Care shall be taken to prevent movement of items within cases, crates, or packages by the provision of bracing, straps, and securing bolts as necessary. Bags of loose items shall be packed in cases and shall be clearly identified by well-secured metal labels on which the quantity and name of the part and its index or catalogue number have been stamped.

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		6) Plug connected electronic circuit boards shall be removed from their racks, packed, and shipped separately. 7) All packing shall be free from sharp edges to prevent injury to persons or other objects. 8) Each bulky/heavy case, crate, or package shall include wedge(s) for easy loading and unloading by mechanical handling equipment such as a forklift truck. 9) Electronic circuit boards, integrated circuits (IC), and the like shall be well protected by using appropriate packing, e.g., anti-static bubble bag or similar. 10) Rubber products and the like shall be suitably packed to avoid damage including but not limited to hardening, deformation, and peel-off. **1.3 General Precautions** 1.3.1 Spare parts shall be tropicalized in their packing for prolonged storage in accordance with appropriate international standards and shall be suitably and individually labeled to indicate: 1) shelf life and date of manufacture; 2) type or condition(s) of storage and special handling information; 3) description of item and relevant part number; 4) serial number, if applicable; 5) inspection/test certificate number and batch number; and 6) Contract number, variation order number, and item number. 1.3.2 Tubes, cable, and conductor ends, and other similar openings shall be properly sealed and blanked off to prevent ingress of dirt or moisture. Flanged ends shall be protected by adhesive tape or jointing material covered by a properly secured wooden blank not smaller than the flange itself.

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		Plain tube ends shall be closed off with bungs or plugs or suitable materials firmly fixed in position. 1.3.3 Particular care shall be taken to prevent mechanical transport-related damage or corrosion of shafts and journals where they rest on timber or other supports which may contain moisture. At such points, wrappings impregnated with anti-rusting composition and of sufficient strength to resist chafing under the pressures and movements during transit shall be used. 1.3.4 Spare ball and roller bearings and similarly protected items shall not be removed from the manufacturer's wrappings or packing. 1.3.5 Fragile materials shall be packed in such a way that they shall not be damaged during transit and when they are properly unpacked for quality inspection. Glass items shall be capable of being easily re-packed without removing the original wrappings or packing for long-term storage within the same packing case. 1.3.6 Appropriate precautions in accordance with the Contractor's safety regulations, the regulations of the Employer, and statutory regulations shall be taken in respect of all hazardous, toxic, inflammable, etc. materials. **1.4 Packing Procedures** 1.4.1 All required inspection/test certificates shall be supplied and packed together with individual material. All packaging materials and procedures shall be subject to review by the Engineer. 1.4.2 All empty cases, crates, or packages, whether or not returnable, shall be removed from the Site by the Contractor or stored by the Contractor in such a way that they do not interfere with the progress of the works of the Contractors. **1.5 Shipping** 1.5.1 The Contractor shall notify the Engineer ten (10) days in advance of any expected shipment date and give further notification of the actual shipment date and routing when such information is

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		subsequently established. This shall complement the inspection requirements prior to delivery as specified herein. 1.5.2 Two copies of packing lists and quality certificates shall be attached to each case or package to be shipped. One copy shall be placed inside the package and the second copy shall be enclosed in a watertight enclosure on the outside of each case or package. A copy of packing lists and quality certificates shall be sent to the Engineer after each package of the Works, the equipment, spare parts, and other items to be shipped have been shipped. 1.5.3 Without prejudice to any other provisions of the Contract, and unless otherwise specifically described, the Contractor shall be responsible for all legal requirements, duties, dues, taxes, and other such requirements and expenditures required for the importation of the Works, the equipment, spare parts, and other items to be supplied under the Contract into Republic of the Philippines. 1.5.4 The Contractor shall clear the Works, the equipment, spare parts, and other items to be supplied under the Contract through Republic of the Philippines' customs/ Philippine port in accordance with all Government of Republic of the Philippines' Enactments. **1.6 Delivery** 1.6.1 The Contractor shall deliver the materials/equipment and all items to be supplied under the Contract to the Site. 1.6.2 The Contractor shall unload the materials/equipment and all items to be supplied under the Contract at the designated delivery point and positioning or storing them. 1.6.3 Any part of the materials/equipment or any item to be supplied under the Contract that is damaged in transit shall not be considered as delivered until repairs or replacements have been made and all necessary spare parts or items have been delivered to the Site. 1.6.4 All documents, manuals, drawings, and other deliverables shall be delivered to an address in the

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<table>
<tr><th>ITEM NO.</th><th>REFERENCE/CLAUSE/ SECTION</th><th>REVISIONS / AMENDMENTS</th></tr>
<tr><td></td><td></td><td>Republic of the Philippines to be designated by the Engineer in writing.
1.6.5 The Contractor shall store and secure the Works, material/equipment, spare parts, and other items until the same has been inspected and are considered delivered at the designated point by the Engineer.
1.6.6 The Contractor shall remove temporary fittings required for shipment and re-assembly of equipment and shall complete this prior to the equipment or parts thereof being inspected and before they are considered delivered.
1.6.7 An item shall be considered delivered when all damages have been repaired and all documentation and post-delivery preparation have been completed to the satisfaction of the Engineer.</td></tr>
<tr><td>11</td><td>ERG-96

Appendix A: Definitions and Abbreviations</td><td>Added/Amended the following Definitions:<table><tr><td>Capital Spare Parts</td><td>means those items which are expected to remain in operation and not require replacement until well beyond the end of the 2-year O&M period and which, because of the length of time it would take to get a replacement for such items, could cause a prolonged shutdown if they had to be replaced. The provision of these items is not included in the Accepted Contract Amount and, if required, shall be ordered by the Employer under separate purchase orders not forming part of the Contract. The applicable purchase rates shall nonetheless be those committed to by the Contractor under this Contract, which rates shall remain valid for a period of one year after the end of the Defects Notification Period</td></tr><tr><td>O&M Spare Parts</td><td>all those items that the Contractor has advised the Employer will need to be replaced during the O&M period since they do not have longevity beyond two years. The cost of all such items shall be deemed to be included in the Accepted Contract Amount. If any items not included in the</td></tr></table></td></tr>
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<tr><th>ITEM NO.</th><th>REFERENCE/CLAUSE/ SECTION</th><th>REVISIONS / AMENDMENTS</th></tr>
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<tr><td></td><td>list of “O&M Spares” fail during the O&M period and are not capable of being satisfactorily repaired, they shall be treated as defects and must be replaced by the Contractor as soon as reasonably possible, all at no extra cost to the Employer.</td></tr>
<tr><td>Testing and Commissioning Spare Parts</td><td>means all those spares that may be required to ensure that, after all, testing and commissioning work has been completed (including all “Integrated Testing and Commissioning” work), and prior to taking over by the Employer, the work to be taken over is in full compliance with the Employer’s Requirements and is ready to go into operation. The cost of all such items shall be deemed to be included in the Accepted Contract Amount.</td></tr>
</table>
</td></tr>
<tr><td>12</td><td>ERT-7
1.6.2.1 (14)</td><td>Updated 1.6.2.1 (11) previously (14):

Passenger Doors — Bi-parting or single leaf plug-in sliding Doors or single leaf pocket sliding Doors.</td></tr>
<tr><td>13</td><td>ERT-60
7.1.4</td><td>Updated 7.1.4:

Side door number is two for each side, and position of the door must adjust to PSD door position. When express train stop at station, train door shall be inside the width of the PSD door, considering the accuracy of stopping ±350mm by ATO (Automatic Train Operation). The Contractor shall Interface with the PSD NS-01 Contractor on the requirement of door positioning between the Rolling Stock and PSD in accordance with section 7.8 of the ERT. The doors shall be bi-parting or single leaf plug-in sliding doors or single leaf pocket sliding doors, constructed to prevent hands/finger pinning at the pocket section during operation. An airtight structure is preferred. If airtight structure</td></tr>
</table>

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		is adopted, the mechanical door system must be fit to this system. The proposed door type shall be a proven solution to the constructability with the platform door under CP NS-01 contract, the maintainability, the safety and the performance of the rolling stock.
14	ERT-13 1.11.2.6	Updated clause 1.11.2.6: In addition, the pneumatic system shall meet the following brake reaction time or to follow EN 13452: a) Full-service application : 1.5 seconds b) Emergency application : Max 1.5 seconds c) Full-service release : 2.7 seconds d) Emergency release : 3.0 seconds
15	ERT-14 1.12.1.2	Updated clause 1.12.1.2: The interior noise level at any point in any vehicle (including the Driver's Cab), 1.6m above floor level, while stationary on an open section of track, but with all auxiliary systems running, shall not exceed 66 dBA
16	ERT-20 - 21 1.16.4.3. 1.16.5.1, 1.16.5.2, 1.16.6.1	Updated clause 1.16.4.3: The grounding cable connected to the respectively equipment shall be adequate size for connected to the respectively equipment. All grounding wires and cables shall utilize internationally recognized color code subject to the review by the engineer during design stage.

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		Updated clause 1.16.5.1: All cable connectors used in exterior locations shall be rated IP65 using quick connect/disconnect couplings. These shall be subject to reviewed by the Engineer. Updated clause 1.16.5.2: Terminal blocks, where used, shall be of a high quality, plated stud type or stainless stud with plated stud, 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. Updated Clause 1.16.6.1: 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, or as closely to any connector parts or wiring treatment as possible if they cover the portion from an end of wire. The identification numbering system will correspond to the wire identification numbering system used on the schematic drawings and wiring diagrams.
17	ERT-61 7.1.14	Updated Clause 7.1.14: All doors shall open and close simultaneously. Doors shall fully open within 4 ± 0.5 s of the door open command and shall fully close within 4 ± 0.5 s of the door close command. During normal

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		door operation, the maximum velocity of each door leaf shall not exceed0.35 m/s for closing and 0.5 m/s for opening. When closed, all passenger side entrance doors shall be automatically and mechanically locked in the fully closed position, preventing the doors being opened beyond a limited push back facility. When closing, the force shall not exceed 250N.
18	ERT-78 10.3.6, 10.3.9	Updated clause 10.3.6: Separate systems within the pneumatic system shall be supplied via a vented cut-out valve and a strainer, supplied through a check valve to protect against sudden loss of air pressure. The air brake reservoir shall be sized to provide at least three emergency brake operations under W2 loading conditions. Reservoirs shall be set to assist moisture collection and shall include automatic/manual drain valves. Updated Clause 10.3.9: All flexible hoses shall be date stamped, and its full life indicated, unless otherwise proposed by the Contractor during the design stage and reviewed by the Engineer. All flexible hose connections on removable assemblies shall be of railway service proven, quick connect coupling or compatible to ISO 8434, unless otherwise proposed by the Contractor during the design stage and reviewed by the Engineer
19	ERT-92 14.7.9.1, 14.7.9.3	Updated Clause 14.7.9.1: 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

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		be mounted in a stainless-steel roll-out tray, with positive stops when pulled out and a lock in the stored position. Alkali-resistant paint is applied to the battery box. Updated Clause 14.7.9.3: The roll-out tray shall have resinous wheel so as to insulate the box and the carriage, or other proven roll-out design (slide rail type, etc.).
20	ERT-133 21.2.5	Updated Clause 21.2.5: All bolts and cap screws shall have the head marked to indicate grade unless otherwise proposed by the Contactor during design review which shall be reviewed by the Engineer. All nuts shall be marked to indicate grade, unless otherwise proposed by the Contactor during design review which shall be reviewed by the Engineer.
21	ERT-134 21.4.2.1	Updated Clause 21.4.2.1: Cables shall comply with EN standards or Japanese regulations/standards.

Annex B – Attachment 1

Schedule 1.9 : Provisional Sums

Item No.	Provisional Items	Provisional Sum	
		Local Currency (PHP)	Foreign Currency (JPY)
	Provisional Sum in accordance with Sub-Clause 13.5 of the Conditions of Contract to cover the following items as a minimum:		
PS-01	Preparation and implementation of HIV/AIDS program (Refer to Conditions of Contract Sub-Clause 6.7)	3,000,000	0
PS-02	Preparation and implementation of Gender and Development (GAD)	15,000,000	0
PS-03	Provisional Sum in accordance with Sub-Clause 13.5 of the Conditions of Contract to cover the following items as a minimum: Execution and completion of the Provisional Works by the Contractor under these Conditions and/or the Contract. The Employer and/or the Engineer may from time-to-time issue instructions to the Contractor with regard to the use, utilization and expenditure of such Provisional Sums. ~~a) Any design change initiated by the Employer~~ ~~b) Additional software required to execute Works~~ ~~c)Any additional testing~~	134,000,000	0
	Total of Provisional Sum except PS-DB Note: The additional percentage payment in accordance with the Conditions of Contract Sub-Clause 13.5 (b) (ii) is included in the above amounts.	152,000,000	0
PS-DB	Dispute Board's cost to be shared by the Employer, one half of the invoices of the DB for its fee and expenses - (refer to Conditions of Contract Sub-Clause 20.2). Note: The Contractor's overheads and profits shall not be payable for this amount.	0	34,500,000
	Total for Schedule 1.9 (Carried forward to Grand Summary)	**152,000,000**	**34,500,000**

Note: If the Contractor has actually expended in other foreign currencies than the Foreign Currency specified in the Contract, then the amount expended will be converted to Foreign Currency using the exchange rate of Telegraphic Transfer Selling rate officially published by the MUFG Bank, Ltd. on the website every day as at the last working day of the month in which such payment is made. A copy of the said exchange rate shall be a part of the supporting document for the Application for Interim Payment Certificate.

Schedule 1.9 : Provisional Sums

Item No.	Provisional Items	Provisional Sum	
		Local Currency (PHP)	Foreign Currency (JPY)
	Provisional Sum in accordance with Sub-Clause 13.5 of the Conditions of Contract to cover the following items as a minimum:		
PS-01	Preparation and implementation of HIV/AIDS program (Refer to Conditions of Contract Sub-Clause 6.7)	3,000,000	0
PS-02	Preparation and implementation of Gender and Development (GAD)	15,000,000	0
PS-03	Provisional Sum in accordance with Sub-Clause 13.5 of the Conditions of Contract to cover the following items as a minimum: Execution and completion of the Provisional Works by the Contractor under these Conditions and/or the Contract. The Employer and/or the Engineer may from time-to-time issue instructions to the Contractor with regard to the use, utilization and expenditure of such Provisional Sums.	134,000,000	0
	Total of Provisional Sum except PS-DB Note: The additional percentage payment in accordance with the Conditions of Contract Sub-Clause 13.5 (b) (ii) is included in the above amounts.	152,000,000	0
PS-DB	Dispute Board's cost to be shared by the Employer, one half of the invoices of the DB for its fee and expenses - (refer to Conditions of Contract Sub-Clause 20.2). Note: The Contractor's overheads and profits shall not be payable for this amount.	0	34,500,000
	Total for Schedule 1.9 (Carried forward to Grand Summary)	**152,000,000**	**34,500,000**

Note: If the Contractor has actually expended in other foreign currencies than the Foreign Currency specified in the Contract, then the amount expended will be converted to Foreign Currency using the exchange rate of Telegraphic Transfer Selling rate officially published by the MUFG Bank, Ltd. on the website every day as at the last working day of the month in which such payment is made. A copy of the said exchange rate shall be a part of the supporting document for the Application for Interim Payment Certificate.

Bidder's Signature _____

27 Supply of Equipment for Training Center

27.1 Equipment for Driving Simulator

27.1.1 Two (2) Train Operation Simulators at the Training Center in Mabalacat Depot will be provided by under CPNS-01 contract. One (1) Train Operation Simulator shall be designed for the Commuter Train (CP NS-02) and the other one (1) for Limited Express Train (CP NS-03). The train operation simulators shall be provided in order to establish a high-quality approach for driver training and route familiarization. It is essential to train the required number of train drivers ready prior to the taking-over of NSCR. They may be newly trained and/or be existing drivers from existing lines. Accordingly, these drivers have to be familiar with the new line profile and the newly applied signaling system before the inauguration. In addition, drivers shall be trained in handling emergencies such as rolling stock faults, signaling faults and railway bogie faults, derailment, accidents etc.

27.1.2 The Contractor shall be involved in the design of the Train Operation Simulator for the Limited Express Train (CP NS-03) which will be led by the CP NS-01 Contractor. The Contractor shall provide not limited to the design information, drawings, technical specification etc. which are required for the achievement of final design of the Train Operation Simulator for the Limited Express Train (CP NS-03).

27.1.3 The Contractor shall provide all necessary interfacing support to the CP NS-01 Contractor throughout the period of the delivery of the Train Operation Simulator for Limited Express Train at the Training Center in Mabalacat Depot.

~~27.1.1~~27.1.4 The Contractor shall prepare the equipment for driving simulator as below, and supply to the Driving Simulator Contractor (CP NS-01). The related parts and equipment shall be the same as in the real cab and given notice of no objection by the Engineer during final design stage. The detailed equipment list is shown below:

Description	Qty.	Remarks
Cab saloon partition door	1 set	
Cab seat	1 set	
Cab side doors	1 set	
~~Coupler items~~	~~1 set~~	~~Automatic coupler, Valve, Jumper cable and Flag are included.~~
~~Door~~	~~1 set~~	~~Emergency switch and unlock system are included.~~
Passenger side door system	1 set	Passenger door manual release mechanism (inside and outside) is included.
Passenger emergency call system	1 set	
Brake release cock~~valve~~	1 set	

Description	Qty.	Remarks
Driver's Console	1 set	Master Controller, Buttons switch panels, Gauges, Electric meters, TMS unit, ~~Signal monitor~~ ~~(*1)~~, ~~Wiper~~, Sun-visor are included.
~~Handy talks except for Digital Space Radio~~ ~~(*2)~~ ~~(PA, PEC, and Driver/Trainee)~~	~~1 set~~	~~Connect to Instructor's Console.~~
~~Train Protection Radio~~	~~1 set~~	
~~Sound system~~	~~1 set~~	~~Simulated PA systems and train radio system, Speaker (inside and outside) are included.~~
TMS control unit	1 set	

~~(*1): Signaling equipment is supplied by E&M signaling Contractor (CP NS-01).~~
~~(*2): Digital Space Radio is supplied by E&M Signaling Contractor (CP NS-01).~~

~~27.1.2~~27.1.5 ~~Regarding the detail of the way to supply to the Driving Simulator Contractor, the amount of spare parts and so on, the Contractor shall adjust with the CP NS-01 Contractor.~~The Contractor shall constantly use his best endeavour for the delivery of the Train Operation Simulator for the Limited Express Train (CP NS-03) the Training Center in Mabalacat Depot not limited to the design, manufacturing, testing and commissioning and defect notification period of the Train Operation Simulator.

27.2 Other Equipment for Training Center

27.2.1 The Contractor shall prepare and supply the equipment for Training Center as below:

~~27.2.1.1~~1) Pantograph ~~:~~ : 1 set

~~27.2.1.2~~2) Bogie-assembly for Motor-car including traction motor, gearbox, and coupling: 1 set

27.2.2 ~~Regarding the detail of the way to supply, the Contractor shall adjust with the CP NS-01 Contractor~~. The Contractor shall constantly use his best endeavour to provide the support not limited to the supply and delivery of the equipment as per clause 27.2.1 of the ERT, to the Training Center in Mabalacat Depot until the completion of Defect Notification Period of this contract.

27 Supply of Equipment for Training Center

27.1 Equipment for Driving Simulator

27.1.1 Two (2) Train Operation Simulators at the Training Center in Mabalacat Depot will be provided by under CPNS-01 contract. One (1) Train Operation Simulator shall be designed for the Commuter Train (CP NS-02) and the other one (1) for Limited Express Train (CP NS-03). The train operation simulators shall be provided in order to establish a high-quality approach for driver training and route familiarization. It is essential to train the required number of train drivers ready prior to the taking-over of NSCR. They may be newly trained and/or be existing drivers from existing lines. Accordingly, these drivers have to be familiar with the new line profile and the newly applied signaling system before the inauguration. In addition, drivers shall be trained in handling emergencies such as rolling stock faults, signaling faults and railway bogie faults, derailment, accidents etc.

27.1.2 The Contractor shall be involved in the design of the Train Operation Simulator for the Limited Express Train (CP NS-03) which will be led by the CP NS-01 Contractor. The Contractor shall provide not limited to the design information, drawings, technical specification etc. which are required for the achievement of final design of the Train Operation Simulator for the Limited Express Train (CP NS-03).

27.1.3 The Contractor shall provide all necessary interfacing support to the CP NS-01 Contractor throughout the period of the delivery of the Train Operation Simulator for Limited Express Train at the Training Center in Mabalacat Depot.

27.1.4 The Contractor shall prepare the equipment for driving simulator as below, and supply to the Driving Simulator Contractor (CP NS-01). The related parts and equipment shall be the same as in the real cab and given notice of no objection by the Engineer during final design stage. The detailed equipment list is shown below:

Description	Qty.	Remarks
Cab saloon partition door	1 set	
Cab seat	1 set	
Cab side doors	1 set	
Passenger side door system	1 set	Passenger door manual release mechanism (inside and outside) is included.
Passenger emergency call system	1 set	
Brake release cock	1 set	
Driver's Console	1 set	Master Controller, Buttons switch panels, Gauges, Electric meters, TMS unit, , Sun-visor are included.
TMS control unit	1 set	

27.1.5 The Contractor shall constantly use his best endeavour for the delivery of the Train Operation Simulator for the Limited Express Train (CP NS-03) the Training Center in Mabalacat Depot not limited to the design, manufacturing, testing and commissioning and defect notification period of the Train Operation Simulator.

27.2 Other Equipment for Training Center

27.2.1 The Contractor shall prepare and supply the equipment for Training Center as below:

1) Pantograph : 1 set
2) Bogie-assembly for Motor-car including traction motor, gearbox, and coupling: 1 set

27.2.2 . The Contractor shall constantly use his best endeavour to provide the support not limited to the supply and delivery of the equipment as per clause 27.2.1 of the ERT, to the Training Center in Mabalacat Depot until the completion of Defect Notification Period of this contract.

24 Spare Parts and Special Tools

24.1 General

24.1.1 The Contractor shall provide spare parts, special tools as specified in both the General Requirements as well as this clause.

24.1.2 As part of the performance acceptance criteria, the Contractor shall deliver the spares and consumables, special tools and diagnose test equipment to the Site.

24.2 Spare Parts

24.2.1 ~~The Contractor shall provide a list of capital spares and consumables (spares and consumables) and supply for the Defects Notification Period (DNP).~~The Contractor shall provide the following Spare Parts, which shall be sufficient for the duration of testing, commissioning, FFR, DNP and for the duration of period for revenue operation mentioned below:

24.2.1.1 Testing and Commissioning Spare Parts:

1) In addition to the O&M Spares, the Contractor shall keep on the Site throughout the installation, erection, and commissioning periods, sufficient stocks of Spare Parts to enable immediate replacement of any item in the Works found to be defective or in any way in non-conformance with the Specification prior to the issuance of TOC. ("Testing and Commissioning Spares");
2) The Contractor shall use his best endeavour to supply and deliver the Testing and Commissioning Spares on or before the commencement of the on-site testing and commissioning;
3) The Contractor shall submit to the Employer's for review a list of all Testing and Commissioning Spares that shall be made available during the on-site testing and commissioning;

24.2.1.2 O&M Spare Parts:

1) The Contractor shall provide recommended Spare Parts in sufficient quantity of seven (7) Limited Express Trains for period of two (2) years revenue service beyond each train taking over date, excluding the major non-expendable equipment (capital) spares;
2) O&M Spare Parts shall comprise of the Operational Spares, Preventive Maintenance, Corrective Maintenance & Overhaul Spares;
3) The Contractor shall not be entitled to use any of the O&M Spares and/or Capital Spares (if any) to replace any item in the Works during the installation, erection, and commissioning periods.
4) The O&M Spare Parts shall include the Consumables Spares required to perform the trains preventative maintenance not limited to Table 1: Basic Rolling Stock Maintenance Categories of this ERT;
5) If applicable, the O&M Spare Parts shall include the overhaul spare parts;
6) The Contractor shall supply and deliver the O&M Spares prior to the taking over of trains;
7) At the end of the Defects Notification Period, the stock of O&M spares shall be replenished and handed to the Employer to cover a further period of two (2) years of

operation and maintenance beyond the DNP.

~~24.2.1~~24.2.2 The Contractor shall state at which year a major overhaul is required for each component or sub-system. The Contractor shall provide an overhaul parts and price list together with a time estimate to overhaul each component, assembly or sub-system for all overhaul parts not included in item 24.2.1.

~~24.2.2~~24.2.3 The Employer may order additional spares required for the following 15 years from the recommended spare parts and consumables list as provided by the Contractor.

~~24.2.3~~24.2.4 The Contractor shall provide a complete listing of spares and consumables to be supplied, including the following information:

a. Contractor part number;
b. Original equipment manufacturer part number; and
c. Part description.
d. Price
e. Primary Vendor name/contact/address
f. If available, ~~S~~secondary Vendor name/ contact/ address

24.2.5 The Contractor shall provide list of O&M spare part during the design stage for engineer review. The list shall include information not limited to clause 24.2.4, clause ERG 11.1.2 and the delivery schedule. The Contractor shall also submit the final list of capital spare during the design stage for engineer review which are required for the limited express train maintainability~~.~~

24.2.6 All spares quantities shall be rounded up to the nearest deliverable unit e.g., cable shall be delivered in complete drums, liquids in complete sealed containers, small parts in complete packs.

~~24.2.4~~

~~24.2.5 The spare part supplied during DNP shall include at least the below list of spare parts as minimum. The quantity shall be based on one (1) trainset basis. Final list shall be confirmed during design stage.~~

~~No~~	~~Description~~
~~1~~	~~Wheel and Axle Assembly for Motor;~~
~~2~~	~~Wheel and Axle Assembly for Trailer Bogie;~~
~~3~~	~~Wheel Assembly;~~
~~4~~	~~Primary Suspension;~~
~~5~~	~~Secondary Suspension;~~
~~6~~	~~Tread Brake Assembles;~~
~~7~~	~~Gearbox Assembly;~~
~~8~~	~~Flexible Coupling Assembly (link for Gear box and Traction Motor);~~
~~9~~	~~Traction Motor Assembly;~~
~~10~~	~~Current Return Assembly;~~
~~11~~	~~Air Compressor Assembly;~~
~~12~~	~~Air Drier for Compressed Air;~~
~~13~~	~~Pantograph Assembly;~~
~~14~~	~~Arrestor Assembly~~
~~15~~	~~Air Conditioning Unit Assembly;~~
~~16~~	~~ACU Compressor Assembly;~~

No	Description
17	Unit Brake Assemblies;
18	Evaporator Blower Assembly;
19	Air Conditioning Unit (ACU) Control;
20	Battery Set;
21	Battery Contactor
22	Auxiliary Power Supply Equipment;
23	Replaceable Circuit Boards for (APSE);
24	Main Control Device (PCE);
25	Replaceable Circuit Boards for (PCE);
26	Major sub-assemblies of Main Control Devices;
27	Master Controller (Rate Controller);
28	Cab Console Assembly;
29	Cab Switch Panel;
30	Cab Relay Board;
31	Jumper and Cable Assemblies;
32	Main Circuit Breaker;
33	CCTV Assemblies;
34	Semi-permanent Coupler and Draft Gear;
35	Slewing Ring;
36	Destination Sign Assembly;
37	Door Actuator;
38	Door Controller;
39	Interior Panel;
40	Windows;
41	Windscreen;
42	Passenger Door;
43	Cab Side Door;
44	Cab Saloon Door;
45	Passenger Seats;
46	Drivers Chair;
47	Panels of Cab;
48	Interior Lights;
49	Exterior Lights (head light, brake light, etc.);
50	Wiper Assembly;
50	Washer Tank;
52	Horn Assembly;
53	Train Management System;
54	Glass of Windows and Doors;
55	Flooring Material;
56	Power Electronic Control Equipment (PECE);
57	Brake Control Unit (BCU); and
58	Any other items.
59	2 Spare Trailer Bogies Complete
60	2 Spare Motor Bogies Complete
61	Spare trailer bogie wheels – 1 trainset
62	Spare motor bogie wheels – 1 trainset
63	Axle bearings
64	Brake discs, 1 trainset

24.2.6 This list is not exhaustive. The Contractor shall provide a list for material and spares use for 2 years based on the anticipated train mileage and previous contracts experience.

24.3 Spares Parts and Consumables Required During the Defects Notification Period

24.3.1 The Contractor shall supply ~~the spares and consumables to service the trains during the DNP.~~ sufficient quantity of Spare Parts to ensure the return to service of a defective car through the Defects Notification period as per clause 1.6 of ERG. The Contractor shall not be entitled to use any of the O&M Spares and/or Capital Spares (if any) to replace any item in the Works during the installation, erection, and commissioning periods.

~~24.3.1~~

24.3.2 ~~In case any of these spares and consumables~~The O&M Spare Parts which are used during the DNP ~~, they~~ shall be replenished immediately at no extra cost to the Employer not later than six (6) months before the end ~~immediately after~~ of the last train DNP as per clause 24.2.1.2 of this ERT.~~,~~

24.3.3 ~~T~~the Contractor shall handover to the Employer the replenished ~~additional spares and consumables required~~O&M Spares~~,~~ ~~if any,~~ to complete the total of ~~these items~~spare part, as per the list mentioned in clause 24.2.5 under this contract for the issuance of Performance Certificate.~~.~~

~~24.3.2~~

24.3.4 If any additional spares and consumables including parts replacement, which has not been listed, become necessary during the DNP, the ~~same shall~~spare parts shall be added to the list mentioned in clause 24.2.5 and shall be ~~provided~~ delivered by the Contractor during the DNP. These parts shall be replenished as per clause 24.3.2. This shall be deemed to have been included in the Price Schedules.

~~24.3.3 , along with one additional set for any further requirement at no additional cost. The cost for the same shall be deemed to have been included in the Price Schedules.~~

24.4 Spares Parts and Consumables Required After the Defects Notification Period

24.4.1 The Contractor shall provide the updated final list of O&M spare part for the issuance of the Performance Certificate.

24.4.2 The list shall provide the information not limited to as per clause 24.2.4, 24.2.5 and 24.3.4. The list shall also include the list of recommended spare parts and consumables deemed to be required in the course of normal train operation after the DNP including but not limited to overhaul spare and capital spares.

~~24.4.1 The Contractor shall submit a list of recommended spare parts and consumables deemed to be required in the course of normal train operation after the DNP.~~

~~24.4.2~~24.4.3 The list shall quote the unit rates with guaranteed prices valid up to one year after the completion of the DNP, but after this, all price escalation shall be considered but the Contractor shall give an escalation formula to be applied to the quoted price, in case spares are ordered later than one year after the completion of the DNP.

~~24.4.3~~24.4.4 The recommended spare parts list shall be reviewed and finalized based on the experience of operation of the train service in the first year of DNP.

24 Spare Parts and Special Tools

24.1 General

24.1.1 The Contractor shall provide spare parts, special tools as specified in both the General Requirements as well as this clause.

24.1.2 As part of the performance acceptance criteria, the Contractor shall deliver the spares and consumables, special tools and diagnose test equipment to the Site.

24.2 Spare Parts

24.2.1 The Contractor shall provide the following Spare Parts, which shall be sufficient for the duration of testing, commissioning, FFR, DNP and for the duration of period for revenue operation mentioned below:

24.2.1.1 Testing and Commissioning Spare Parts:

1) In addition to the O&M Spares, the Contractor shall keep on the Site throughout the installation, erection, and commissioning periods, sufficient stocks of Spare Parts to enable immediate replacement of any item in the Works found to be defective or in any way in non-conformance with the Specification prior to the issuance of TOC. ("Testing and Commissioning Spares");
2) The Contractor shall use his best endeavour to supply and deliver the Testing and Commissioning Spares on or before the commencement of the on-site testing and commissioning;
3) The Contractor shall submit to the Employer's for review a list of all Testing and Commissioning Spares that shall be made available during the on-site testing and commissioning;

24.2.1.2 O&M Spare Parts:

1) The Contractor shall provide recommended Spare Parts in sufficient quantity of seven (7) Limited Express Trains for period of two (2) years revenue service beyond each train taking over date, excluding the major non-expendable equipment (capital) spares;
2) O&M Spare Parts shall comprise of the Operational Spares, Preventive Maintenance, Corrective Maintenance & Overhaul Spares;
3) The Contractor shall not be entitled to use any of the O&M Spares and/or Capital Spares (if any) to replace any item in the Works during the installation, erection, and commissioning periods.
4) The O&M Spare Parts shall include the Consumables Spares required to perform the trains preventative maintenance not limited to Table 1: Basic Rolling Stock Maintenance Categories of this ERT;
5) If applicable, the O&M Spare Parts shall include the overhaul spare parts;
6) The Contractor shall supply and deliver the O&M Spares prior to the taking over of trains;
7) At the end of the Defects Notification Period, the stock of O&M spares shall be replenished and handed to the Employer to cover a further period of two (2) years of operation and maintenance beyond the DNP.

24.2.2 The Contractor shall state at which year a major overhaul is required for each component or sub-system. The Contractor shall provide an overhaul parts and price list together with a time estimate to overhaul each component, assembly or sub-system for all overhaul parts not included in item 24.2.1.

24.2.3 The Employer may order additional spares required for the following 15 years from the recommended spare parts and consumables list as provided by the Contractor.

24.2.4 The Contractor shall provide a complete listing of spares and consumables to be supplied, including the following information:

a. Contractor part number;
b. Original equipment manufacturer part number; and
c. Part description.
d. Price
e. Primary Vendor name/contact/address
f. If available, secondary Vendor name/ contact/ address

24.2.5 The Contractor shall provide list of O&M spare part during the design stage for engineer review. The list shall include information not limited to clause 24.2.4, clause ERG 11.1.2 and the delivery schedule. The Contractor shall also submit the final list of capital spare during the design stage for engineer review which are required for the limited express train maintainability

24.2.6 All spares quantities shall be rounded up to the nearest deliverable unit e.g., cable shall be delivered in complete drums, liquids in complete sealed containers, small parts in complete packs.

24.3 Spares Parts and Consumables Required During the Defects Notification Period

24.3.1 The Contractor shall supply sufficient quantity of Spare Parts to ensure the return to service of a defective car through the Defects Notification period as per clause 1.6 of ERG. The Contractor shall not be entitled to use any of the O&M Spares and/or Capital Spares (if any) to replace any item in the Works during the installation, erection, and commissioning periods.

24.3.2 The O&M Spare Parts which are used during the DNP shall be replenished immediately at no extra cost to the Employer not later than six (6) months before the end of the last train DNP as per clause 24.2.1.2 of this ERT.

24.3.3 The Contractor shall handover to the Employer the replenished O&M Spares to complete the total of spare part, as per the list mentioned in clause 24.2.5 under this contract for the issuance of Performance Certificate.

24.3.4 If any additional spares and consumables including parts replacement, which has not been listed, become necessary during the DNP, the spare parts shall be added to the list mentioned in clause 24.2.5 and shall be delivered by the Contractor during the DNP. These parts shall be replenished as per clause 24.3.2. This shall be deemed to have been included in the Price Schedules.

24.4 Spares Parts and Consumables Required After the Defects Notification Period

24.4.1 The Contractor shall provide the updated final list of O&M spare part for the issuance of the Performance Certificate.

24.4.2 The list shall provide the information not limited to as per clause 24.2.4, 24.2.5 and

24.3.4. The list shall also include the list of recommended spare parts and consumables deemed to be required in the course of normal train operation after the DNP including but not limited to overhaul spare and capital spares.

24.4.3 The list shall quote the unit rates with guaranteed prices valid up to one year after the completion of the DNP, but after this, all price escalation shall be considered but the Contractor shall give an escalation formula to be applied to the quoted price, in case spares are ordered later than one year after the completion of the DNP.

24.4.4 The recommended spare parts list shall be reviewed and finalized based on the experience of operation of the train service in the first year of DNP.

24.5 **Guarantee Period of Spare Parts:**

24.5.1 The Contractor shall provide an Obsolescence Plan covering the availability of Spares and Consumables for a period of not less than 15 years from the date of completion of the DNP.

24.5.2 Should the manufacturing of the listed parts, spares and consumables be discontinued due to unavoidable circumstances, before the end of the 15 years covered by the Obsolescence Plan, the Contractor shall give sufficient notice to the Employer of such intention. The Employer shall be given sufficient opportunity of ordering such quantities of spare parts the Employer may require prior to close-down of production.

24.5.3 Should circumstances beyond the Contractor's control prohibit the Contractor complying with the above obligations, the Employer shall by default be entitled to the following, but not limited to:

1) Manufacturing drawings;
2) Specifications;
3) Patterns; and
4) All other relevant information in respect of each spares item affected.

24.5.4 This is to enable the Employer to make or have made such spare parts. Under the aforesaid circumstances, the Contractor shall also grant to the Employer, without payment of any royalty or charge, full right and liberty to make and have made such spare parts and make copies of such drawings, patterns, specifications and other information, provided it is for exclusive use of the Employer and only for the Project covered under this Contract.

24.6 **Special Tools**

24.6.1 The Contractor shall provide a sufficient number of special tools required, to enable the Employer to properly maintain the trains.

24.6.2 These tools shall include, but not be limited to special assembly/disassembly jigs, test benches, simulators (as applicable) handling tools, equipment mounting/dismounting tools, diagnostic test equipment for all electronic assemblies, test stands and simulators as may apply, interface hardware & software, hook-up lines/cables to test all train line systems, and other tools considered particular to the car and its equipment.

24.6.3 The number of tools required to be supplied shall be as reviewed by the Engineer.

26 Shipping and Delivery

26.1 Shipping

26.1.1 At no time shall cars or spare parts be exposed to salt water or spray when unprotected. Loading on deck shall not be allowed.

26.1.2 The Contractor 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 Engineer prior to the shipment of any cars.

26.1.3 The Contractor shall notify the 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.

26.1.4 Unless otherwise reviewed by the Engineer, no loose or boxed equipment shall be permitted to be shipped in the cars.

26.1.5 The Contractor shall be responsible for the insurance for shipping.

26.2 Delivery

26.2.1 The Contractor shall be responsible for delivery of all items to be supplied under this Contract to the Site as designated by the Engineer.

26.2.2 The Contractor 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 Engineer.

26.2.3 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.

26.2.4 All documents, manuals, drawings and other deliverables shall be delivered to Employer~~Operator~~.

26.2.5 The Contractor 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 Engineer.

26.2.6 Removal of all temporary fittings required for shipment and re-assembly of equipment shall be the responsibility of the Contractor, and shall be completed prior to the cars or parts being inspected and considered delivered.

26.2.7 In good time prior to delivery, the Contractor shall plan his route to ensure he is aware of actual road conditions, underpasses, bridges and potential other construction works which may hinder his delivery from port to the site.

26.2.8 The Contractor shall make all necessary arrangements and payments for any import export regulation from the supplier to the designated depot.

26.2.9 The items shall be considered delivered when all damage (if occurred) has been repaired to as-new condition and all documentation and post-delivery preparation has been completed to the satisfaction of the Engineer.

26 Shipping and Delivery

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26.1.1 At no time shall cars or spare parts be exposed to salt water or spray when unprotected. Loading on deck shall not be allowed.

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26.2.4 All documents, manuals, drawings and other deliverables shall be delivered to Employer.

26.2.5 The Contractor 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 Engineer.

26.2.6 Removal of all temporary fittings required for shipment and re-assembly of equipment shall be the responsibility of the Contractor, and shall be completed prior to the cars or parts being inspected and considered delivered.

26.2.7 In good time prior to delivery, the Contractor shall plan his route to ensure he is aware of actual road conditions, underpasses, bridges and potential other construction works which may hinder his delivery from port to the site.

26.2.8 The Contractor shall make all necessary arrangements and payments for any import export regulation from the supplier to the designated depot.

26.2.9 The items shall be considered delivered when all damage (if occurred) has been repaired to as-new condition and all documentation and post-delivery preparation has been completed to the satisfaction of the Engineer.

26.2.10 The Contractor shall comply with all relevant requirements of the Employer or relevant

26.2.10 The Contractor shall comply with ~~the~~ all relevant requirements of the ~~DOTr or~~Employer or relevant section of local government and/or any other relevant authority regarding any traffic arrangements that may be necessary for delivery of the vehicle from port to the site. The Contractor shall make all arrangements and full responsibility for transportation to the site.

26.2.11 Attention shall be paid to not only public roads but also private roads in the depot. The Contractor shall understand details of the depot, and shall pay attention not to damage both rolling stocks and facilities of the depot.

26.2.10 The Contractor shall comply with all relevant requirements of the Employer or relevant section of local government and/or any other relevant authority regarding any traffic arrangements that may be necessary for delivery of the vehicle from port to the site. The Contractor shall make all arrangements and full responsibility for transportation to the site.

26.2.11 Attention shall be paid to not only public roads but also private roads in the depot. The Contractor shall understand details of the depot, and shall pay attention not to damage both rolling stocks and facilities of the depot.

trainsets shall be restored to operational order in an OMTTR of 15 minutes.

3) **CMTTR** – Corrective Mean Time To Repair (CMTTR) capital components shall not be greater than 4 hours.

8.5.4 Where appropriate, the Contractor shall also specify RAM (Reliability, Availability and Maintainability) requirements for the design, operation and maintenance of subsystems where the failure mode, effects and criticality analysis (FMECA) identify failure modes that have a maintenance, operations or safety impact, using the risk assessment methodology.

8.5.5 The Contractor shall commence the use of the Data reporting analysis and corrective action system (DRACAS) prior to any factory or site acceptance tests and report to the Employer/Engineer on a regular basis.

~~8.5.6~~

8.6 ~~Performance Reports~~Rolling Stock Taking Over Certificate (TOC)

8.6.1 The Contractor shall provide a Taking Over Performance Reports to support the applications for Rolling Stock TOC for each trainset and the Performance Certificate for the fleet (7 trainsets).

8.6.2 The Rolling Stock TOC Performance report shall be issued for each trainset prior to operational acceptance and shall provide:

1) Technical design justification of performance;

2) Cross reference to Rolling Stock performance in a similar application;

3) The design prediction at LRU (Line replaceable unit) level (MDBF, OMTTR and CMTTR) of all capital components;

4) Failure mode, effect, & criticality analysis (FMECA) and Fault Tree Analysis (FTA), FTA shall only applicable to new or critical subsystem equipment or when failure consequences is not solved.

~~4)~~

5) Reliability Critical item list which might impact the operations of the train or train service,

6) Manufacturing Completion Certificate for each train,

7) Design Qualification Testing Completion Certificate,

8) Factory Acceptance Tests Completion Certificate,

9) Train Delivery to site completion Certificate,

10) Design Safety Case of Safety Report,

~~9)~~

~~10)~~11) Engineer Notice of No Objection of submitted list of As-built Drawing,

~~11)~~12) Engineer Notice of No Objection of c~~C~~ompletion of Training program,

~~12)~~13) On-site Testing and Commissioning Completion Certificate for each train, and

~~13)~~14) Train Operation Completion Certificate for each train 1500 km (FFR)

~~8.6.3 The Rolling Stock Performance report shall be issued progressively on a monthly basis, shall be finalized at the end of DNP, and shall provide:~~

~~1) In-service FFR operational performance of individual trainsets as per clause 8.3.3;~~

~~2) In service operational performance of the fleet (7 trainsets) MDBF as per clause 8.3.3;~~

~~3) The in-service OMTTR and CMTTR of all capital components as per clause 8.3.3,~~

~~4) Completion of Defect Remedial,~~

~~5) Completion of Open Item,~~

~~6) Completion of Modification, and~~

~~7) Completion of Spare Part, Special Tools and Test Equipment delivery, and~~

~~8) DRACAS report~~

8.7 Performance Certificate

8.7.1 During the in-service Defects Notification Period (DNP), the fleet (all 7 trainsets) in total shall demonstrate successful achievement of the Performance Acceptance Criteria (PAC) which will be a prerequisite of the application for a Performance Certificate to be issued by the Engineer.

8.7.2 Failure to meet the PAC within the DNP shall mean that the DNP shall be extended until such time as the PAC of the total fleet has been met. All cost associated with the extension of the DNP shall be borne by the Contractor.

8.7.3 The DNP shall be up to a limit of 4 years from the date of commencement of the first train in-service operation.

8.7.4 The Rolling Stock Performance report shall be issued progressively on a monthly basis, shall be finalized at the end of DNP to support the application of Performance Certificate which shall include and not limited to:

1) In-service FFR operational performance of individual trainsets as per clause 8.5;

2) In-service operational performance of the fleet (7 trainsets) MDBF as per clause 8.5;

3) The in-service OMTTR and CMTTR of all capital components as per clause 8.5,

4) Completion of Defect Remedial,

5) Completion of Open Item,

6) Completion of Modification, and

7) Completion of Spare Part, Special Tools and Test Equipment delivery including the replenished spare parts delivery, final spare part list after DNP, additional spares and consumables including parts replacement, which was not listed, become necessary during the DNP, list associated with spare parts as per clause ERT 24.2 and

8) DRACAS report

~~8.7.3~~8.7.5

8.8 Safety Assurance

8.8.1 Safety

8.8.1.1 Safety is defined as freedom from those conditions that can cause death, injury, occupational illness, or damage to or loss of equipment or property. All circumstances susceptible to cause injuries or fatalities of passengers, operation staff, and maintenance staff are considered as risks, and by extension, includes all events leading to a partial or total destruction of costly equipment. The objective of safety is expressed by the capability of the Rolling Stock to keep the physical integrity of the asset and to preserve

8.5.5 The Contractor shall commence the use of the Data reporting analysis and corrective action system (DRACAS) prior to any factory or site acceptance tests and report to the Employer/Engineer on a regular basis.

8.6 Rolling Stock Taking Over Certificate (TOC)

8.6.1 The Contractor shall provide a Taking Over Performance Reports to support the applications for Rolling Stock TOC for each trainset and the Performance Certificate for the fleet (7 trainsets).

8.6.2 The Rolling Stock TOC Performance report shall be issued for each trainset prior to operational acceptance and shall provide:

1) Technical design justification of performance;
2) Cross reference to Rolling Stock performance in a similar application;
3) The design prediction at LRU (Line replaceable unit) level (MDBF, OMTTR and CMTTR) of all capital components;
4) Failure mode, effect, & criticality analysis (FMECA) and Fault Tree Analysis (FTA), FTA shall only applicable to new or critical subsystem equipment or when failure consequences is not solved.
5) Reliability Critical item list which might impact the operations of the train or train service,
6) Manufacturing Completion Certificate for each train,
7) Design Qualification Testing Completion Certificate,
8) Factory Acceptance Tests Completion Certificate,
9) Train Delivery to site completion Certificate,
10) Design Safety Case of Safety Report,
11) Engineer Notice of No Objection of submitted list of As-built Drawing,
12) Engineer Notice of No Objection of completion of Training program,
13) On-site Testing and Commissioning Completion Certificate for each train, and
14) Train Operation Completion Certificate for each train 1500 km (FFR)

8.7 Performance Certificate

8.7.1 During the in-service Defects Notification Period (DNP), the fleet (all 7 trainsets) in total shall demonstrate successful achievement of the Performance Acceptance Criteria (PAC) which will be a prerequisite of the application for a Performance Certificate to be issued by the Engineer.

8.7.2 Failure to meet the PAC within the DNP shall mean that the DNP shall be extended until such time as the PAC of the total fleet has been met. All cost associated with the extension of the DNP shall be borne by the Contractor.

8.7.3 The DNP shall be up to a limit of 4 years from the date of commencement of the first train in-service operation.

8.7.4 The Rolling Stock Performance report shall be issued progressively on a monthly basis, shall be finalized at the end of DNP to support the application of Performance Certificate which shall include and not limited to:

1) In-service FFR operational performance of individual trainsets as per clause 8.5;

2) In-service operational performance of the fleet (7 trainsets) MDBF as per clause 8.5;

3) The in-service OMTTR and CMTTR of all capital components as per clause 8.5,

4) Completion of Defect Remedial,

5) Completion of Open Item,

6) Completion of Modification, and

7) Completion of Spare Part, Special Tools and Test Equipment delivery including the replenished spare parts delivery, final spare part list after DNP, additional spares and consumables including parts replacement, which was not listed, become necessary during the DNP, list associated with spare parts as per clause ERT 24.2 and

8) DRACAS report

8.8 Safety Assurance

8.8.1 Safety

8.8.1.1 Safety is defined as freedom from those conditions that can cause death, injury, occupational illness, or damage to or loss of equipment or property. All circumstances susceptible to cause injuries or fatalities of passengers, operation staff, and maintenance staff are considered as risks, and by extension, includes all events leading to a partial or total destruction of costly equipment. The objective of safety is expressed by the capability of the Rolling Stock to keep the physical integrity of the asset and to preserve the safety during railway operations and maintenance for passengers, staff and persons in general. The safety assurance program aims to reduce to a tolerable level the probability of occurrence of catastrophic or critical events causing damage to assets or harm to any person. The Contractor shall follow appropriate risk reduction principle such as ALARP (As Low as Reasonably Possible) to demonstrate the risk acceptance to the Employer.

8.8.1.2 The Contractor shall bear the duty of safety in design for the assurance of safety for the life cycle of operations for MCRP and NSRP-S. The Rolling Stock shall fulfil the safety requirements of all General Requirements and Technical Requirements and shall demonstrate that the train is fit for purpose to be operated and maintained in a safe manner for these projects.

8.8.2 System Safety Management Plan (SMP)

8.8.2.1 Within the SAMP, the Contractor shall provide a Safety Management Plan (SMP) for review by the Engineer however the document shall detail the specific safety related activities planned to be carried out by the Contractor to ensure the design solution will ultimately provide a level of assurance that the project safety requirements have been achieved.. The SMP shall cover the design, manufacture, testing, commissioning and integrated testing phases, and safety management for in-service passenger operations. The Plan shall further identify how the magnitude and seriousness of events or malfunctions which could result in harm to passengers or staff and damage to equipment or property will be minimized.

8.8.2.2 System Safety Management Plan shall detail, but not limited to, the following:

1) Organization of the Safety team

2) Management of Safety-related interfaces with other contractors.

3) Provisions and procedures for providing feedback to and interacting with other disciplines in the Contractor's team, e.g. design, manufacturing, testing and commissioning and maintenance etc.

8.1 General

8.1.1 System Assurance Management is applicable for all stages of the Rolling Stock development, including design, manufacture, testing, commissioning, systems integration, trial operations, and in-service operations.

8.1.2 The Contractor shall submit a comprehensive System Assurance Management Plan (SAMP) which contains all requirements within this ERG Section 8 of this document, for the Engineer's review. The SAMP shall include, but not limited to the Contractor's methodology to plan, manage and control the system assurance process, organization and roles/responsibilities of the key personnel for system assurance, tasks, program and procedures for system assurance, and an internal audit program.

8.1.3 The System Assurance activities~~Plan~~ shall cover Reliability, Availability, Maintainability and Safety, Electromagnetic Compatibility (EMC), Fire Safety strategy and System Engineering. shall cover the System Assurance Management, System Safety (including the Electromagnetic Compatibility (EMC), Fire Safety strategy), Software Management and Control, Reliability, Availability, Maintainability (RAM) and Requirement Management. The SAP shall include (but not be limited to) the following details: Project Organization; Roles and Responsibilities; Assurance processes and outputs; System Safety processes and outputs; RAM processes and outputs; Requirements management processes and outputs; Assurance Reporting; and Timescales for Assurance Activities.

8.1.4 The System Assurance Management Plan shall comprise a programme showing in detail the timing of each activity and the anticipated dates for submission of system assurance documentation. The programme will break down the planned activities into discrete stages of work as a minimum design, manufacturing, installation, testing and commissioning and RAM demonstrations.

8.1.5 ~~System Assurance~~The Plan shall clearly identify the reviews to be performed at the end of each stage of the programme. The Contractor shall convene formal System Assurance Review (SAR) meetings to review all SA activities and to ensure operational hazards are comprehensively identified within the scope of the Contract. The SAR meetings shall be held quarterly, or when there is any key system change, and meeting records shall be submitted by the Contractor to the Employer. The Employer and the Engineers may participate in the SAR .System Assurance Report shall be submitted at the end of each stage of the programme which covered all the subjects above. ~~The Subsystem Assurance Plans will be consistent in approach with the System Assurance Plan~~. The Contractor's subcontractor or supplier shall provide the SAMP which will be in consistent in approach with the Contractor SAMP.

8.1.6 The SAMP shall be certified by the Contractor's internal department or by a third-party independent engineer from the design and manufacturing section. The SAMP shall be specifically developed for this Contract. ~~The SAMP shall address the Performance (Reliability, Availability, Maintainability) and Safety of the Rolling Stock.~~

8.1.7 A Taking Over Certificate (TOC) will be issued for each trainset. In order to obtain a TOC for the Rolling Stock from the Employer/Engineer, it is required that each trainset achieves 1,500 km of Fault-Free Running (FFR) during the integrated testing and commissioning and given notice of no objection by the engineer to the requirement set forth in clause 8.6 of ERG.~~.~~

8.1.8 A Performance Certificate will be issued by the Engineer for the total performance of the fleet. This Performance Certificate is required to be achieved by the end of the Defect Notification Period (DNP). Prerequisites to obtain the Performance Certificate includes: each trainset shall achieve 10,000 km or 2 months of FFR, the fleet (7 trainsets) shall achieve a Mean Distance Between Failures (MDBF) of 50,000 km causing a delay greater

than 5 minutes, a fleet in-service Operational Mean Time To Restore (OMTTR) of 15 minutes, ~~and~~ the fleet maintainability of capital components a Corrective Mean Time To Repair (CMTTR) of 4 hours ~~.~~and the given notice of no objection by the engineer to the requirement set forth in clause 8.7 of ERG.

8.1.9 The Contractor shall provide sufficient documented information for review by the Engineer. It is expected that the design demonstration of the Rolling Stock performance shall be achieved through supplier-based material self-certification, including cross-references to proven and accredited in-service performance of Rolling Stock equipment supplied in a similar railway application.

8.1.10 With regard to Safety, it is expected that certification shall be achieved through supplier-based information via application of cross references to previously certified acceptances from a reputable body (e.g., train operators, national railways authorities, independent accredited safety bodies, etc.) of similarly supplied Rolling Stock equipment, with a product-generic safety case application to be made based on existing safety certification.

8.1.11 The Employer shall conduct compliance audits during design, development, manufacture and testing and commissioning phases to ensure that the Contractor has met all relevant System Assurance requirements. The Engineer shall give 7 days' notice to the Contractor about the audit arrangement. The Contractor shall provide all necessary assistance to enable the Employer or his representative complete the audit.

~~8.1.11~~8.1.12 The Contractor shall propose design, implementation techniques and measures, depending on the SIL of the function in line with the principles of EN50128 and EN50129 or other equivalent standard subject to the given notice of no objection by the Engineer.

8.2 Performance Assurance Plan (PAP)

8.2.1 Within the SAMP, the Contractor shall submit a Performance Assurance Plan (PAP) or RAM Assurance Plan as per EN 50126 or IEC 62278 or any other equivalent international standard for the Rolling Stock as an assurance of reliability, for operational service. Reliability and availability will be assessed against specific targets laid out in this tender. In order to provide confidence that the final operating system shall achieve the requirements of the performance measures, RAM analyses and assessments shall be undertaken at appropriate stages of the project by the Contractor.~~to comply with the Employers Requirement (functional, performance and safety Requirements) and submitted for review by the Employer/Engineer.~~ The PAP shall describe the activities that the Contractor proposes to carry out during the life cycle of the design, implementation and operation of the Rolling Stock, to ensure that design solution will ultimately provide a level of assurance that the project availability requirements have been achieved.~~and shall demonstrate compliance with the Employer's Requirements, achievement of a TOC for each train set, and a Performance Certificate for the total fleet (7 trainsets).~~

8.2.2 ~~The Contractor shall implement~~ Since availability is a function of reliability and maintainability, the Contractor shall require to carry out reliability and maintainability analysis to show the system availability targets will be met and have been achieved by the end of the Demonstration phase.~~a formal Maintainability Plan for Rolling stock any other applicable system to comply with the Technical Requirements (ERT).~~

8.3 Performance (RAM) Requirements

8.3.1 The Contractor shall submit the Performance or RAM (Reliability, Availability and Maintainability) Target Apportionment Report in the preliminary design stage.

8.3.2 The Contractor shall conduct a Preliminary RAM Analysis which shall give an initial

8.1 General

8.1.1 System Assurance Management is applicable for all stages of the Rolling Stock development, including design, manufacture, testing, commissioning, systems integration, trial operations, and in-service operations.

8.1.2 The Contractor shall submit a comprehensive System Assurance Management Plan (SAMP) which contains all requirements within this ERG Section 8 of this document, for the Engineer's review. The SAMP shall include, but not limited to the Contractor's methodology to plan, manage and control the system assurance process, organization and roles/responsibilities of the key personnel for system assurance, tasks, program and procedures for system assurance, and an internal audit program.

8.1.3 The System Assurance activities shall cover Reliability, Availability, Maintainability and Safety, Electromagnetic Compatibility (EMC), Fire Safety strategy and System Engineering. shall cover the System Assurance Management, System Safety (including the Electromagnetic Compatibility (EMC), Fire Safety strategy), Software Management and Control, Reliability, Availability, Maintainability (RAM) and Requirement Management. The SAP shall include (but not be limited to) the following details: Project Organization; Roles and Responsibilities; Assurance processes and outputs; System Safety processes and outputs; RAM processes and outputs; Requirements management processes and outputs; Assurance Reporting; and Timescales for Assurance Activities.

8.1.4 The System Assurance Management Plan shall comprise a programme showing in detail the timing of each activity and the anticipated dates for submission of system assurance documentation. The programme will break down the planned activities into discrete stages of work as a minimum design, manufacturing, installation, testing and commissioning and RAM demonstrations.

8.1.5 The Plan shall clearly identify the reviews to be performed at the end of each stage of the programme. The Contractor shall convene formal System Assurance Review (SAR) meetings to review all SA activities and to ensure operational hazards are comprehensively identified within the scope of the Contract. The SAR meetings shall be held quarterly, or when there is any key system change, and meeting records shall be submitted by the Contractor to the Employer. The Employer and the Engineers may participate in the SAR .System Assurance Report shall be submitted at the end of each stage of the programme which covered all the subjects above.. The Contractor's subcontractor or supplier shall provide the SAMP which will be in consistent in approach with the Contractor SAMP.

8.1.6 The SAMP shall be certified by the Contractor's internal department or by a third-party independent engineer from the design and manufacturing section. The SAMP shall be specifically developed for this Contract.

8.1.7 A Taking Over Certificate (TOC) will be issued for each trainset. In order to obtain a TOC for the Rolling Stock from the Employer/Engineer, it is required that each trainset achieves 1,500 km of Fault-Free Running (FFR) during the integrated testing and commissioning and given notice of no objection by the engineer to the requirement set forth in clause 8.6 of ERG.

8.1.8 A Performance Certificate will be issued by the Engineer for the total performance of the fleet. This Performance Certificate is required to be achieved by the end of the Defect Notification Period (DNP). Prerequisites to obtain the Performance Certificate includes: each trainset shall achieve 10,000 km or 2 months of FFR, the fleet (7 trainsets) shall achieve a Mean Distance Between Failures (MDBF) of 50,000 km causing a delay greater than 5 minutes, a fleet in-service Operational Mean Time To Restore (OMTTR) of 15 minutes, the fleet maintainability of capital components a Corrective Mean Time To

Repair (CMTTR) of 4 hours and the given notice of no objection by the engineer to the requirement set forth in clause 8.7 of ERG.

8.1.9 The Contractor shall provide sufficient documented information for review by the Engineer. It is expected that the design demonstration of the Rolling Stock performance shall be achieved through supplier-based material self-certification, including cross-references to proven and accredited in-service performance of Rolling Stock equipment supplied in a similar railway application.

8.1.10 With regard to Safety, it is expected that certification shall be achieved through supplier-based information via application of cross references to previously certified acceptances from a reputable body (e.g., train operators, national railways authorities, independent accredited safety bodies, etc.) of similarly supplied Rolling Stock equipment, with a product-generic safety case application to be made based on existing safety certification.

8.1.11 The Employer shall conduct compliance audits during design, development, manufacture and testing and commissioning phases to ensure that the Contractor has met all relevant System Assurance requirements. The Engineer shall give 7 days' notice to the Contractor about the audit arrangement. The Contractor shall provide all necessary assistance to enable the Employer or his representative complete the audit.

8.1.12 The Contractor shall propose design, implementation techniques and measures, depending on the SIL of the function in line with the principles of EN50128 and EN50129 or other equivalent standard subject to the given notice of no objection by the Engineer.

8.2 Performance Assurance Plan (PAP)

8.2.1 Within the SAMP, the Contractor shall submit a Performance Assurance Plan (PAP) or RAM Assurance Plan as per EN 50126 or IEC 62278 or any other equivalent international standard for the Rolling Stock as an assurance of reliability, for operational service. Reliability and availability will be assessed against specific targets laid out in this tender. In order to provide confidence that the final operating system shall achieve the requirements of the performance measures, RAM analyses and assessments shall be undertaken at appropriate stages of the project by the Contractor. The PAP shall describe the activities that the Contractor proposes to carry out during the life cycle of the design, implementation and operation of the Rolling Stock, to ensure that design solution will ultimately provide a level of assurance that the project availability requirements have been achieved.

8.2.2 Since availability is a function of reliability and maintainability, the Contractor shall require to carry out reliability and maintainability analysis to show the system availability targets will be met and have been achieved by the end of the Demonstration phase.

8.3 Performance (RAM) Requirements

8.3.1 The Contractor shall submit the Performance or RAM (Reliability, Availability and Maintainability) Target Apportionment Report in the preliminary design stage.

8.3.2 The Contractor shall conduct a Preliminary RAM Analysis which shall give an initial indication of any RAM problems which may arise which might affect the performance of the rolling stock.

8.3.3 The Contractor shall provide RAM Management Plan (Can be part of Systems Assurance Management plan), RAM Analysis Report, RAM Demonstration Test, Maintainability Demonstration Test Plan, FMECA Analysis Report, RAM Demonstration Report and DRACAS report as necessary in the relevant stages of the project.

8.3.4 RAM Management Plan shall include the strategy for the management of RAM and safety

Inspection and Test Plan(s) and other related documents(s) by the Engineer, the Contractors shall provide those plans to their site representative(s) involved with the respective works.

11 SPARE PARTS LIST, SPECIAL TOOLS AND TEST EQUIPMENT

11.1 Details of Supply

11.1.1 During the design review phase, the Contractor shall submit to the Engineer the proposed spare parts list and the list of special tools and test equipment deliverables. The lists shall be approved by the Employer/Engineer prior to the commencement of the procurement phase of the project., including parts numbers, description/name and quantities for all delivery to be done.

11.1.2 The Contractor shall provide adequate information into the lists with information not limited to:

1) The manufacturer's part number;
2) Space for the Employer's part number;
3) Description - a full description of the spare part, including a note as to whether it is a sealed unit or whether it is an assembly or sub-assembly which can be broken down into component parts. The detail of the breakdown shall be included as part of the submission under Sub-Clause 13.4;
4) Quantity supplied;
5) Expected utilization in twelve months;
6) Overall dimensions and weight including packing (if any) for shelf space purposes;
7) A note as to interchangeability or otherwise with similar parts;
8) The unit price;
9) The source - the manufacturer's name and address; and
10) The normal manufacturing and shipment lead times for additional quantities.
11) Applicable illustration
12) Applicable figures
13) Applicable mechanical information
14) Application electrical information
15) Dimension
16) Life expectancy etc.

11.1.3 The Contractor shall be allowed to request for changes to the approved list upon submitting a change request by updating the revision lists submission. The change request shall be reviewed and approved by the Employer/Engineer. Any additional cost incurred due to the changes of the lists shall be borne by the Contractor. Employer/Engineer statement of No Objection to the lists shall not absolve the Contractor obligation under the contract.

11.1.4 The Contractor shall submit a comprehensive list of recommended spare parts and consumables in accordance with the requirements specified in the ERG and ERT for the period ~~of at least 2 years~~as per ERT clause 24.2 for~~of~~ the Rolling Stock operation and maintenance.

11.1.5 The Contractor shall also provide all special tools, diagnostic test equipment, test benches, jigs, etc. that shall be necessary for the operations and maintenance of the Rolling Stock and associated equipment which support the heavy maintenance of the rolling stock. The Contractor shall responsible for the delivery, installation, testing & commissioning of the approved special tools, diagnostic test equipment, test benches, jigs etc. The Contractor shall deliver the training of the special tools, diagnosis test equipment, test benches, jigs, etc.to the Employer's personnel as per clause 1.12.

11.2 Spare Parts Manufacture and Delivery

11.2.1 Spares parts shall be manufactured, tested and delivered to the Employer by the Contractor, as part of the Performance Acceptance Criteria (PAC) stated at Clause 8.5. The spare parts shall suitably packed and identified for prolonged storage as per clause 17 in this ERG.~~.~~

11.3 Special Tools and Test Equipment

11.3.1 Special tools, test equipment, jigs, fixtures and gauges required to carry out all functions described in the maintenance instructions or as required by the Particular Technical Requirements shall be delivered as part of the Performance Acceptance Criteria (PAC) stated at Clause 8.5, according to the approved lists by the Employer/Engineer.

11.3.2 The Contractor may add any additional equipment required, but, at no extra cost to the Employer. The extent of supply shall include protective or carrying cases, as may be appropriate for the storage and use of each item.

11.3.3 In the event the Employer/Engineer encountered an inconsistency of the approved list and the maintenance manual or other means, at no adjustment to the Contract sum, the Contractor shall with immediate effect shall update the lists and delivered the additional special tools and test equipment as per clause ~~11.1.5~~ERT 24.8 and as ~~part of the PAC~~ stated at Clause 8.7 for the issuance of Performance Certificate.~~3~~.

11.4 Capital Spares

11.4.1 The Contractor is to provide recommended list of Capital Spares for the limited express train.

11.4.2 The proposed capital spares by the Contractor shall be able to support the unit exchange program and to achieve the efficient CMTTR as per clause 8.5.3.

11.5 Spare Parts~~Consumable Spares~~

11.5.1 The Contractor shall provide all spare parts for all of its supplied equipment necessary during the Defects Notification Period, the price of which shall have been included in the Schedule of Prices.

11.5.2 The spare parts shall be listed in a practical format as per clause 11.1.2 of ERG~~.~~

11.5.3 The stock of all ~~consumable~~ spare parts shall be replenished at the end of the Defects Notification Period to match ~~as a minimum~~the quantity with the list of ~~consumables~~ spare part approved during the design stage.~~of the bid and be handed over to the Employer.~~

11.5.4 The Contractor shall submit the spare part delivery list and schedule for the engineer review during design review. The O&M spare parts shall be delivered to the Employer prior to the issuance of 1st train taking over certificate.

11.5.5 The list shall be updated and submitted for engineer review six (6) months before the end of defect notification period to form the final approved spare part delivery list and shall not absolve the Contractor obligation under this contract to demonstrate the requirement

in clause 8.5 of ERG. The list shall be identified as the final spare part list.

11.5.6 The final spare part list shall include the additional spares and consumables parts to the approved list during design which was not previously listed and become necessary during the DNP.

~~11.5.3~~11.5.7 The Contractor shall complete all of the final spare parts delivery to the Employer prior to the completion of Defect Notification Period and for the issuance of the Performance Certificate.

11.6 Start-Up Material

11.6.1 The Contractor shall provide all material for testing and commissioning and sufficient material to start the service.

11.7 Spare Parts Installation Support

11.7.1 The Contractor shall provide sufficient maintenance support staff to ensure that the all spares can be efficiently installed during the Defects Notification Period.

11.8 Coding and Tagging of all Equipment, Spare Parts and Special Tools and Test Equipment

11.8.1 All Equipment, Spare Parts, Special Tools, and Test Equipment to be delivered to the Employer shall each carry a tag suitably marked, bar-coded (as directed by the Engineer), and numbered to sustain harsh environments.

11.8.2 Each individual item of equipment shall be fitted with permanent identifications label in accordance the with the coding and numbering convention and requirement developed by the CMMS for all E&M components, parts, and equipment.

11.8.3 In this respect the term "individual item of equipment" shall refer to a complete assembly of components and to each removable submodule within the complete assembly.

11.8.4 The identification label shall be permanently attached in such a way that it shall not become detached or illegible during the lifetime of the system from any cause including wear and tear, environmental effects (such as rain, direct sunlight, etc.) or any other influence. Preference shall be given to embossed or engraved metallic labels mechanically fastened by riveting or similar means to the item to which they refer.

11.8.5 All labels shall be easily cleaned to remove dirt and debris (including grease and oil) without disturbing the legibility properties.

~~**11.8 (Not Used)**~~

11.9 Train Operation Simulator Parts

11.9.1 ~~The Contractor shall transport, set up and adjust the train operation simulator by the designated date.~~The Contractor shall procure and transport to the Driving Simulator Contractor (under CP NS-01: E&M System and Track Works) the equipment for the Driving Simulator to be installed in the Training Center by the designated date.

12 INSPECTION, TESTING AND COMMISSIONING

12.1 General

12.1.1 The Contractor shall perform all necessary testing and commissioning activities in order to ensure satisfactory operation of the Rolling Stock completed system plus compliance with the requirements of the Technical Requirements. The Engineer shall witness the

shall be reviewed and approved by the Employer/Engineer. Any additional cost incurred due to the changes of the lists shall be borne by the Contractor. Employer/Engineer statement of No Objection to the lists shall not absolve the Contractor obligation under the contract.

11.1.4 The Contractor shall submit a comprehensive list of recommended spare parts and consumables in accordance with the requirements specified in the ERG and ERT for the period as per ERT clause 24.2 for the Rolling Stock operation and maintenance.

11.1.5 The Contractor shall also provide all special tools, diagnostic test equipment, test benches, jigs, etc. that shall be necessary for the operations and maintenance of the Rolling Stock and associated equipment which support the heavy maintenance of the rolling stock. The Contractor shall responsible for the delivery, installation, testing & commissioning of the approved special tools, diagnostic test equipment, test benches, jigs etc. The Contractor shall deliver the training of the special tools, diagnosis test equipment, test benches, jigs, etc.to the Employer's personnel as per clause 1.12.

11.2 Spare Parts Manufacture and Delivery

11.2.1 Spares parts shall be manufactured, tested and delivered to the Employer by the Contractor, as part of the Performance Acceptance Criteria (PAC) stated at Clause 8.5. The spare parts shall suitably packed and identified for prolonged storage as per clause 17 in this ERG.

11.3 Special Tools and Test Equipment

11.3.1 Special tools, test equipment, jigs, fixtures and gauges required to carry out all functions described in the maintenance instructions or as required by the Particular Technical Requirements shall be delivered as part of the Performance Acceptance Criteria (PAC) stated at Clause 8.5, according to the approved lists by the Employer/Engineer.

11.3.2 The Contractor may add any additional equipment required, but, at no extra cost to the Employer. The extent of supply shall include protective or carrying cases, as may be appropriate for the storage and use of each item.

11.3.3 In the event the Employer/Engineer encountered an inconsistency of the approved list and the maintenance manual or other means, at no adjustment to the Contract sum, the Contractor shall with immediate effect shall update the lists and delivered the additional special tools and test equipment as per clause ERT 24.8 and as stated at Clause 8.7 for the issuance of Performance Certificate..

11.4 Capital Spares

11.4.1 The Contractor is to provide recommended list of Capital Spares for the limited express train.

11.4.2 The proposed capital spares by the Contractor shall be able to support the unit exchange program and to achieve the efficient CMTTR as per clause 8.5.3.

11.5 Spare Parts

11.5.1 The Contractor shall provide all spare parts for all of its supplied equipment necessary during the Defects Notification Period, the price of which shall have been included in the Schedule of Prices.

11.5.2 The spare parts shall be listed in a practical format as per clause 11.1.2 of ERG

11.5.3 The stock of all spare parts shall be replenished at the end of the Defects Notification Period to match the quantity with the list of spare part approved during the design stage.

11.5.4 The Contractor shall submit the spare part delivery list and schedule for the engineer review during design review. The O&M spare parts shall be delivered to the Employer prior to the issuance of 1st train taking over certificate.

11.5.5 The list shall be updated and submitted for engineer review six (6) months before the end of defect notification period to form the final approved spare part delivery list and shall not absolve the Contractor obligation under this contract to demonstrate the requirement in clause 8.5 of ERG. The list shall be identified as the final spare part list.

11.5.6 The final spare part list shall include the additional spares and consumables parts to the approved list during design which was not previously listed and become necessary during the DNP.

11.5.7 The Contractor shall complete all of the final spare parts delivery to the Employer prior to the completion of Defect Notification Period and for the issuance of the Performance Certificate.

11.6 Start-Up Material

11.6.1 The Contractor shall provide all material for testing and commissioning and sufficient material to start the service.

11.7 Spare Parts Installation Support

11.7.1 The Contractor shall provide sufficient maintenance support staff to ensure that the all spares can be efficiently installed during the Defects Notification Period.

11.8 Coding and Tagging of all Equipment, Spare Parts and Special Tools and Test Equipment

11.8.1 All Equipment, Spare Parts, Special Tools, and Test Equipment to be delivered to the Employer shall each carry a tag suitably marked, bar-coded (as directed by the Engineer), and numbered to sustain harsh environments.

11.8.2 Each individual item of equipment shall be fitted with permanent identifications label in accordance the with the coding and numbering convention and requirement developed by the CMMS for all E&M components, parts, and equipment.

11.8.3 In this respect the term "individual item of equipment" shall refer to a complete assembly of components and to each removable submodule within the complete assembly.

11.8.4 The identification label shall be permanently attached in such a way that it shall not become detached or illegible during the lifetime of the system from any cause including wear and tear, environmental effects (such as rain, direct sunlight, etc.) or any other influence. Preference shall be given to embossed or engraved metallic labels mechanically fastened by riveting or similar means to the item to which they refer.

11.8.5 All labels shall be easily cleaned to remove dirt and debris (including grease and oil) without disturbing the legibility properties.

11.9 Train Operation Simulator Parts

11.9.1 The Contractor shall procure and transport to the Driving Simulator Contractor (under CP NS-01: E&M System and Track Works) the equipment for the Driving Simulator to be installed in the Training Center by the designated date.

12 INSPECTION, TESTING AND COMMISSIONING

12.1 General

16.4.3 On-Site Notice

16.4.3.1 The Contractor shall post on-site notices with the guidance of the Engineer with a clear description of the Works and indication of anticipated completion dates together with the enquiry hotline and internet website information. Advance notices shall be given in carrying out the Works which maximize the impact on local residents.

16.4.4 Hotline

16.4.4.1 The Contractor shall set up a twenty-four (24) hour hotline with the guidance of the Engineer to provide enquiry services to the public and the Contractor shall ensure queries and enquiries regarding the Works are taken seriously and dealt with swiftly.

16.4.4.2 Whenever a complaint is received, response shall be made within seven (7) calendar days. If a longer processing time is needed, an interim reply shall be served to the complainant within seven (7) calendar days.

~~16.4.5 Construction Site Tour~~

~~16.4.5.1 The Contractor shall cooperate with and provide periodic tours of the Works to the public and stakeholders during the construction period. The main target audiences are stakeholders, ordinary families and students. Site visitors can become a means for advertising and promoting the benefit of MCRP/NSRP-S projects. Tours shall be planned at least once in every three months, subject to the Engineer's review.~~

~~16.4.6~~16.4.5 Coordination with Other Contractors

~~16.4.6.1~~16.4.5.1 The Contractor shall coordinate with external interfacing parties and interface contractors in the implementation of public relations activities.

~~16.4.7~~16.4.6 Measurement and Payment

~~16.4.7.1~~16.4.6.1 No separate payment shall be paid for preparing and submitting the public relations plan, public consultation, and public relation tools all associated costs shall be deemed to be included in the other BOQ items describe above.

17 PACKAGING, SHIPPING, AND DELIVERY

17.1 General

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

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

17.1.3 The Contractor must write the following items on all packages, but not limited to them.

1) Name of packing content
2) Quantity of packing content
3) Size and weight of package
4) Precautions of package handling
5) Packing number or contract number

17.1.4 The Contractor must prepare a packing list and check it at the time of both shipment and delivery.

17.1.5 When the Contractor delivers a package from a temporary site to an actual use site, the Contractor must deliver it carefully by grasping its packing contents and observe strict precautions of package handling.

17.2 Crating

17.2.1 The Contractor shall provide all packing, crates, and marking. The consignments for shipment shall be packed and marked in accordance with the Engineer's instructions. In doing so, it shall comply with the following requirements;

1) Each case, crate, or package shall be waterproof, rot-proof, and insect/rodent-proof, of robust construction, and suitable for the intended purpose. The Contractor shall, in determining the packing materials to be used, take cognizance of the climatic conditions likely to occur during the period of transport, shipment, and storage.

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

3) Each case, crate, or package shall contain a comprehensive packing list showing the number, mark, size, weight, and contents together with any relevant drawings. A second copy of the packing list shall be enclosed in a watertight enclosure on the outside of each case or package. The distribution of additional copies of each packing list shall be in accordance with the Engineer's instruction.

4) All items heavier than 100 kg shall be marked on the outside of the case to show the gross and net weights, the points for slinging, and where the weight is bearing.

5) Care shall be taken to prevent movement of items within cases, crates, or packages by the provision of bracing, straps, and securing bolts as necessary. Bags of loose items shall be packed in cases and shall be clearly identified by well-secured metal labels on which the quantity and name of the part and its index or catalogue number have been stamped.

6) Plug connected electronic circuit boards shall be removed from their racks, packed, and shipped separately.

7) All packing shall be free from sharp edges to prevent injury to persons or other objects.

8) Each bulky/heavy case, crate, or package shall include wedge(s) for easy loading and unloading by mechanical handling equipment such as a forklift truck.

9) Electronic circuit boards, integrated circuits (IC), and the like shall be well protected by using appropriate packing, e.g., anti-static bubble bag or similar.

10) Rubber products and the like shall be suitably packed to avoid damage including but not limited to hardening, deformation, and peel-off.

17.3 General Precautions

17.3.1 Spare parts shall be tropicalized in their packing for prolonged storage in accordance with appropriate international standards and shall be suitably and individually labeled to indicate:

1) shelf life and date of manufacture;

2) type or condition(s) of storage and special handling information;

3) description of item and relevant part number;

4) serial number, if applicable;

5) inspection/test certificate number and batch number; and

6) Contract number, variation order number, and item number.

17.3.2 Tubes, cable, and conductor ends, and other similar openings shall be properly sealed and blanked off to prevent ingress of dirt or moisture. Flanged ends shall be protected by adhesive tape or jointing material covered by a properly secured wooden blank not smaller than the flange itself. Plain tube ends shall be closed off with bungs or plugs or suitable materials firmly fixed in position.

17.3.3 Particular care shall be taken to prevent mechanical transport-related damage or corrosion of shafts and journals where they rest on timber or other supports which may contain moisture. At such points, wrappings impregnated with anti-rusting composition and of sufficient strength to resist chafing under the pressures and movements during transit shall be used.

17.3.4 Spare ball and roller bearings and similarly protected items shall not be removed from the manufacturer's wrappings or packing.

17.3.5 Fragile materials shall be packed in such a way that they shall not be damaged during transit and when they are properly unpacked for quality inspection. Glass items shall be capable of being easily re-packed without removing the original wrappings or packing for long-term storage within the same packing case.

17.3.6 Appropriate precautions in accordance with the Contractor's safety regulations, the regulations of the Employer, and statutory regulations shall be taken in respect of all hazardous, toxic, inflammable, etc. materials.

17.4 Packing Procedures

17.4.1 All required inspection/test certificates shall be supplied and packed together with individual material. All packaging materials and procedures shall be subject to review by the Engineer.

17.4.2 All empty cases, crates, or packages, whether or not returnable, shall be removed from the Site by the Contractor or stored by the Contractor in such a way that they do not interfere with the progress of the works of the Contractors.

17.5 Shipping

17.5.1 The Contractor shall notify the Engineer ten (10) days in advance of any expected shipment date and give further notification of the actual shipment date and routing when such information is subsequently established. This shall complement the inspection requirements prior to delivery as specified herein.

17.5.2 Two copies of packing lists and quality certificates shall be attached to each case or package to be shipped. One copy shall be placed inside the package and the second copy shall be enclosed in a watertight enclosure on the outside of each case or package. A copy of packing lists and quality certificates shall be sent to the Engineer after each package of the Works, the equipment, spare parts, and other items to be shipped have been shipped.

17.5.3 Without prejudice to any other provisions of the Contract, and unless otherwise specifically described, the Contractor shall be responsible for all legal requirements,

duties, dues, taxes, and other such requirements and expenditures required for the importation of the Works, the equipment, spare parts, and other items to be supplied under the Contract into Republic of the Philippines.

17.5.4 The Contractor shall clear the Works, the equipment, spare parts, and other items to be supplied under the Contract through Republic of the Philippines' customs/ Philippine port in accordance with all Government of Republic of the Philippines' Enactments.

17.6 Delivery

17.6.1 The Contractor shall deliver the materials/equipment and all items to be supplied under the Contract to the Site.

17.6.2 The Contractor shall unload the materials/equipment and all items to be supplied under the Contract at the designated delivery point and positioning or storing them.

17.6.3 Any part of the materials/equipment or any item to be supplied under the Contract that is damaged in transit shall not be considered as delivered until repairs or replacements have been made and all necessary spare parts or items have been delivered to the Site.

17.6.4 All documents, manuals, drawings, and other deliverables shall be delivered to an address in the Republic of the Philippines to be designated by the Engineer in writing.

17.6.5 The Contractor shall store and secure the Works, material/equipment, spare parts, and other items until the same has been inspected and are considered delivered at the designated point by the Engineer.

17.6.6 The Contractor shall remove temporary fittings required for shipment and re-assembly of equipment and shall complete this prior to the equipment or parts thereof being inspected and before they are considered delivered.

17.6.7 An item shall be considered delivered when all damages have been repaired and all documentation and post-delivery preparation have been completed to the satisfaction of the Engineer.

~~**17 (NOT USED)**~~

18 REQUIREMENTS MANAGEMENT

18.1 General

18.1.1 The Contractor shall use ComplyPro software to manage the requirements and supply a total of three (3) licenses for the Engineer and Employer. All the cost associated to the software usage and maintenance (including the licenses supplied to the Engineer and Employer) shall be under Contractor own cost. The licenses shall be maintained until the issuance of the Performance Certificate for the final trainset. The Contractor shall appoint a suitably qualified and competent persons to carry out requirements management.

18.1.2 The Contractor shall prepare and submit to the Engineer a Requirement Management Plan within thirty (30) days of the date of the commence date. The Requirement Management Plan shall define the processes employed by the Contractor to ensure that all appropriate requirements are managed to ensure the proposed design solution meets the design requirements and demonstrated through verification and validation evidence. The Requirement traceability database will be managed through the rational database; "ComplyPro".

18.1.3 The Contractor shall develop a database of all requirements associated with a number of definition documents defined such as but not limited to, the ERG and ERT. The Contractor will then provide evidence that the identified requirements have been

taken to minimize the impact to the public. Ways of communication channels shall also be published in the newsletters such as the website, and phone numbers of the enquiry hotline.

16.4.3 On-Site Notice

16.4.3.1 The Contractor shall post on-site notices with the guidance of the Engineer with a clear description of the Works and indication of anticipated completion dates together with the enquiry hotline and internet website information. Advance notices shall be given in carrying out the Works which maximize the impact on local residents.

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16.4.6 Measurement and Payment

16.4.6.1 No separate payment shall be paid for preparing and submitting the public relations plan, public consultation, and public relation tools all associated costs shall be deemed to be included in the other BOQ items describe above.

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17.3.2 Tubes, cable, and conductor ends, and other similar openings shall be properly sealed and blanked off to prevent ingress of dirt or moisture. Flanged ends shall be protected by adhesive tape or jointing material covered by a properly secured wooden blank not smaller than the flange itself. Plain tube ends shall be closed off with bungs or plugs or suitable materials firmly fixed in position.

17.3.3 Particular care shall be taken to prevent mechanical transport-related damage or corrosion of shafts and journals where they rest on timber or other supports which may contain moisture. At such points, wrappings impregnated with anti-rusting composition and of sufficient strength to resist chafing under the pressures and movements during transit shall be used.

17.3.4 Spare ball and roller bearings and similarly protected items shall not be removed from the manufacturer's wrappings or packing.

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17.5.3 Without prejudice to any other provisions of the Contract, and unless otherwise specifically described, the Contractor shall be responsible for all legal requirements, duties, dues, taxes, and other such requirements and expenditures required for the importation of the Works, the equipment, spare parts, and other items to be supplied under the Contract into Republic of the Philippines.

17.5.4 The Contractor shall clear the Works, the equipment, spare parts, and other items to be supplied under the Contract through Republic of the Philippines' customs/ Philippine port in accordance with all Government of Republic of the Philippines' Enactments.

17.6 Delivery

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17.6.3 Any part of the materials/equipment or any item to be supplied under the Contract that is damaged in transit shall not be considered as delivered until repairs or replacements have been made and all necessary spare parts or items have been delivered to the Site.

17.6.4 All documents, manuals, drawings, and other deliverables shall be delivered to an address in the Republic of the Philippines to be designated by the Engineer in writing.

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17.6.6 The Contractor shall remove temporary fittings required for shipment and re-assembly of equipment and shall complete this prior to the equipment or parts thereof being inspected and before they are considered delivered.

17.6.7 An item shall be considered delivered when all damages have been repaired and all documentation and post-delivery preparation have been completed to the satisfaction of the Engineer.

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18.1 General

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18.1.2 The Contractor shall prepare and submit to the Engineer a Requirement Management Plan within thirty (30) days of the date of the commence date. The Requirement Management Plan shall define the processes employed by the Contractor to ensure that all appropriate requirements are managed to ensure the proposed design solution meets the design requirements and demonstrated through verification and validation evidence. The Requirement traceability database will be managed through the rational database; "ComplyPro".

18.1.3 The Contractor shall develop a database of all requirements associated with a number of definition documents defined such as but not limited to, the ERG and ERT. The Contractor will then provide evidence that the identified requirements have been managed appropriately. The database shall:

1) Ensure that the criteria for the purpose of verification and validation of the Requirements have been recorded with appropriate attributes assigned;

2) Clearly identify requirements that have a direct impact on Safety and RAM

Appendix A: Definitions and Abbreviations

This section defines the terms used in this General Requirements and, Technical Requirements for Rolling Stock.

Table A.1 Definitions

Definition	Original terms
Applicable Laws	The governing laws and regulations in force in the Philippines.
As-Built Drawings	Drawings produced by the Contractor and endorsed by the Engineer as true records of the construction of the Permanent Works and which have been agreed with the Engineer, if the Employer's Design is changed during the course of the Works, the As-built Drawings shall be prepared by the Contractor and endorsed by the Engineer.
ATO Operation	Train operated under ATO.
ATP Mode (Train Operation)	The mode of train operation when train speed is controlled manually but is supervised by the primary ATP system to ensure safety speed limits are not exceeded
Capital Spare Parts	means those items which are expected to remain in operation and not require replacement until well beyond the end of the 2-year O&M period and which, because of the length of time it would take to get a replacement for such items, could cause a prolonged shutdown if they had to be replaced. The provision of these items is not included in the Accepted Contract Amount and, if required, shall be ordered by the Employer under separate purchase orders not forming part of the Contract. The applicable purchase rates shall nonetheless be those committed to by the Contractor under this Contract, which rates shall remain valid for a period of one year after the end of the Defects Notification Period
Combined Services Drawings	Drawings showing the locations, layouts and sizes of all services including those of the Contractor, and the interfaces with Interface contractors, so as to eliminate all clashes.
Commencement Date	The date specified in the Contract, or by some other arrangement with the Employer, upon which operations and activities required for the execution of the Works are to commence.
Commissioning	The process of setting to work relevant electrical and mechanical elements of the building services or complete transportation system through a series of integrated tests that demonstrate the installation and performance in accordance with the specified criteria.
Consist	Any collection of cars, serviceable and operable, of minimum 2 vehicle length and maximum 8-vehicle length with a cab at each end
Consumables	those parts that are not repairable and usually have a relatively short life span.
Contract Completion Date	the date specified in the Contract upon which the Works are to be completed and handed over to the Employer.
Defects Notification Period	Period for notifying Defects in the works calculated from the date on which the works completed as certified by taking over certificate.
Detailed Works Program	The Contractor's Works program, showing the sequence, design, manufacture, delivery to the site, erection, construction,

	installation, testing, commissioning of the works and related activities in the form and content prescribed by the specification, or any amended or varied version thereof, as submitted by the Contractor and given Notice of No Objection by the Engineer in accordance with the Contract.
Disadvantaged Persons	Passengers who are physically handicapped or have physical difficulty. These shall include senior citizens, the blind, people in wheelchairs, pregnant woman, and the like.
Dwell Time	The elapsed time from when a train stops alongside a platform until it starts again.

~~Definition~~	~~Original terms~~
Execution of the Works	The manufacture, supply, transportation, delivery to the Site, construction, erection, installation, testing, commissioning, performance testing, completion, and training in the use of the Works in accordance with the Contract; the preparation and/or delivery (as appropriate) of all information, drawings and manuals in respect of the Works required by the Contract, the provision of such spare parts, consumables, tools and spare materials as are required by the Contract to be provided by the Contractor for the performance of its defects liability obligations, and the management of all such matters.
External Interfacing Parties	Those parties with whom it is the Contractor's responsibility to coordinate the Works with and includes all relevant bodies and entities, in particular Government authorities, departments and regulatory bodies, utility companies, property developers, consultants, and contractors of adjacent projects whether ongoing or planned. The Contractor shall identify all such interfacing parties in the Interface Management Plan (IMP).
GCR	General Consultant for MCRP and NSRP-S.
Interface Contractors	The contractors, other than the Contractor, engaged by the Employer, who are undertaking works on the other contract packages. The Contractor shall identify all such interface contractors in the interface management plan.
LGU	A Local Government Unit, which refers to the local council or administrative body for a geographical area.
Main Line	All tracks over which trains carry fare paying passengers, including all berths, plus sidings and connections between, up to the limits leading into a yard.
Manual Operation	Train operated by operator under one of the following modes: ATP, ROS, RM or ATP Cut-out modes.
MCRP Project	Malolos-Clark Railway Project, which is the entirety of the project for which this specification applies and which the Works shall construct.
NSCR Project	North-South Commuter Rail Project, which is the entirety of the project for which the Works shall construct.
NSRP-S Project	North South Railway Project-South Line, which is the entirety of the project for which this specification applies and which the Works shall construct.
NSTren	General Consultant for NSCR Project.

O&M Spare Parts	all those items that the Contractor has advised the Employer will need to be replaced during the O&M period since they do not have longevity beyond two years. The cost of all such items shall be deemed to be included in the Accepted Contract Amount. If any items not included in the list of "O&M Spares" fail during the O&M period and are not capable of being satisfactorily repaired, they shall be treated as defects and must be replaced by the Contractor as soon as reasonably possible, all at no extra cost to the Employer.
Operational Mean Time to Restore (OMTTR)	Is defined as the average time to restore/normalize Rolling Stock with a fault on the main line
Spare Parts	Those parts which are generally repairable and normally have a service life of several years.
Taking Over	The point where the Works or any part thereof has passed all relevant tests and can be Taken-Over by the Employer in accordance with the GC and PC, notwithstanding the Works may have certain outstanding minor works to be completed, but nonetheless such shall not affect the Employer's beneficial use of the Works or part as intended by the Contract.
Testing and Commissioning Spare Parts	means all those spares that may be required to ensure that, after all, testing and commissioning work has been completed (including all "Integrated Testing and Commissioning" work), and prior to taking over by the Employer, the work to be taken over is in full compliance with the Employer's Requirements and is ready to go into operation. The cost of all such items shall be deemed to be included in the Accepted Contract Amount.

Appendix A: Definitions and Abbreviations

This section defines the terms used in this General Requirements and, Technical Requirements for Rolling Stock.

Table A.1 Definitions

Definition	Original terms
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ATO Operation	Train operated under ATO.
ATP Mode (Train Operation)	The mode of train operation when train speed is controlled manually but is supervised by the primary ATP system to ensure safety speed limits are not exceeded
Capital Spare Parts	means those items which are expected to remain in operation and not require replacement until well beyond the end of the 2-year O&M period and which, because of the length of time it would take to get a replacement for such items, could cause a prolonged shutdown if they had to be replaced. The provision of these items is not included in the Accepted Contract Amount and, if required, shall be ordered by the Employer under separate purchase orders not forming part of the Contract. The applicable purchase rates shall nonetheless be those committed to by the Contractor under this Contract, which rates shall remain valid for a period of one year after the end of the Defects Notification Period
Combined Services Drawings	Drawings showing the locations, layouts and sizes of all services including those of the Contractor, and the interfaces with Interface contractors, so as to eliminate all clashes.
Commencement Date	The date specified in the Contract, or by some other arrangement with the Employer, upon which operations and activities required for the execution of the Works are to commence.
Commissioning	The process of setting to work relevant electrical and mechanical elements of the building services or complete transportation system through a series of integrated tests that demonstrate the installation and performance in accordance with the specified criteria.
Consist	Any collection of cars, serviceable and operable, of minimum 2 vehicle length and maximum 8-vehicle length with a cab at each end
Consumables	those parts that are not repairable and usually have a relatively short life span.
Contract Completion Date	the date specified in the Contract upon which the Works are to be completed and handed over to the Employer.
Defects Notification Period	Period for notifying Defects in the works calculated from the date on which the works completed as certified by taking over certificate.
Detailed Works Program	The Contractor's Works program, showing the sequence, design, manufacture, delivery to the site, erection, construction,

	installation, testing, commissioning of the works and related activities in the form and content prescribed by the specification, or any amended or varied version thereof, as submitted by the Contractor and given Notice of No Objection by the Engineer in accordance with the Contract.
Disadvantaged Persons	Passengers who are physically handicapped or have physical difficulty. These shall include senior citizens, the blind, people in wheelchairs, pregnant woman, and the like.
Dwell Time	The elapsed time from when a train stops alongside a platform until it starts again.
Execution of the Works	The manufacture, supply, transportation, delivery to the Site, construction, erection, installation, testing, commissioning, performance testing, completion, and training in the use of the Works in accordance with the Contract; the preparation and/or delivery (as appropriate) of all information, drawings and manuals in respect of the Works required by the Contract, the provision of such spare parts, consumables, tools and spare materials as are required by the Contract to be provided by the Contractor for the performance of its defects liability obligations, and the management of all such matters.
External Interfacing Parties	Those parties with whom it is the Contractor's responsibility to coordinate the Works with and includes all relevant bodies and entities, in particular Government authorities, departments and regulatory bodies, utility companies, property developers, consultants, and contractors of adjacent projects whether ongoing or planned. The Contractor shall identify all such interfacing parties in the Interface Management Plan (IMP).
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Main Line	All tracks over which trains carry fare paying passengers, including all berths, plus sidings and connections between, up to the limits leading into a yard.
Manual Operation	Train operated by operator under one of the following modes: ATP, ROS, RM or ATP Cut-out modes.
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NSTren	General Consultant for NSCR Project.
O&M Spare Parts	all those items that the Contractor has advised the Employer will need to be replaced during the O&M period since they do not have longevity beyond two years. The cost of all such items shall be

	deemed to be included in the Accepted Contract Amount. If any items not included in the list of "O&M Spares" fail during the O&M period and are not capable of being satisfactorily repaired, they shall be treated as defects and must be replaced by the Contractor as soon as reasonably possible, all at no extra cost to the Employer.
Operational Mean Time to Restore (OMTTR)	Is defined as the average time to restore/normalize Rolling Stock with a fault on the main line
Spare Parts	Those parts which are generally repairable and normally have a service life of several years.
Taking Over	The point where the Works or any part thereof has passed all relevant tests and can be Taken-Over by the Employer in accordance with the GC and PC, notwithstanding the Works may have certain outstanding minor works to be completed, but nonetheless such shall not affect the Employer's beneficial use of the Works or part as intended by the Contract.
Testing and Commissioning Spare Parts	means all those spares that may be required to ensure that, after all, testing and commissioning work has been completed (including all "Integrated Testing and Commissioning" work), and prior to taking over by the Employer, the work to be taken over is in full compliance with the Employer's Requirements and is ready to go into operation. The cost of all such items shall be deemed to be included in the Accepted Contract Amount.

1.6.2 Vehicle Physical Characteristics

1.6.2.1 The following physical characteristics indicate fundamental vehicle dimensions that should be given careful attention.

1.	Carbody Length (excluding coupler, overhang of leading car)	19,500 mm
2.	Overall length (excluding overhang of leading car)?	20,000 mm
3.	Train length (~~In case of~~ 8 cars consist, excluding overhang of both leading cars)	160,000 mm
~~4.~~	~~Overall Width (excluding light on both sides of the vehicle)~~	~~2,950 mm~~
~~5.~~	~~Overall height from top of rail to roof (excluding air conditioning system on the roof)~~	~~3,655 mm~~
~~6.~~4.	Door arrangement shall comply with Sub-Clause ~~7~~8.1 of this ERT	
~~7.~~5.	Floor height	1,130～1,150 mm
~~8.~~6.	Pantograph lock down height	Max. 4,150 mm
~~9.~~7.	Pantograph height working range	4,400 – 5,415 mm
~~10.~~8.	Wheel Diameter	780～860 mm
~~11.~~9.	Wheelbase	2,100 - 2700 mm
~~12.~~10.	Distance between Bogie center	13,800 mm
~~13.~~11.	Passenger Doors	Bi-parting or single leaf plug-in sliding Doors or single leaf pocket sliding Doors.
~~14.~~12.	Doorway entrance width	more than 900 mm (This is narrow, 1300 is usual which allows 2 streams of passengers to enter/exit)
~~15.~~13.	Gangway door width	more than 800 mm
~~16.~~14.	Doorway height	1,850 mm
~~17.~~15.	Windows	Double glazed, tempered safety glass suggests shown as laminated glass
~~18.~~16.	Maximum axle load under W2 condition	16,000 kg
~~19.~~17.	Wheel back-to-back	1359 – 1362 mm

1.7 Track Standards

Main Line	: EN 60 E1	Standard Length 25m
Depot	: JIS 50N	Standard Length 25m

1.8 Route Data

1.8.1 Horizontal Curve Radius

1) For main line: More than 260 m for NSCR-N1, NSCR-N2 and NSCR-SC
2) For side track: More than 100m
3) For stations: More than 400 m
4) For turnouts: More than 160 m (Main Line) for NSCR-N1;

mounted) cars with operator cab is shown in Appendix A. The bidder shall propose the limited express eight (8) cars train formation comprises of motor mounted cars, trailer cars and cars with operator cab. The proposed formation and the equipment architecture shall meet the system requirements in this tender not limited to weights limits, train performance, noise and vibration etc. The proposed train formation and equipment architecture data/documents shall be provided in the bid submission.

1.6.1.3 The limited express train formation and equipment arrangement architecture shall be finalised during design stage. Any time and cost implication to the changes of train formation and equipment arrangement architecture from the bid submission to the given notice of no objection at final design, shall be borne by the Contractor and no contract variation shall be provided by the Employer.

1.6.1.4 Auxiliary Power Equipment, Battery and Battery charger location shall be arranged to avoid the EMI to the signaling equipment unless otherwise specified.

1.6.1.5 The mass (tare weight) of the 8-cars trainset shall be 315 tons or less.

1.6.1.6 Weight balance, lower center of gravity, etc., shall be taken into consideration. The weight distribution shall be as defined in IEC 61133 or any equivalent standard approved the Engineer.

1.6.1.7 Total gross axle load of leading car and middle car shall not exceed 16 Tonnes for loads as in section 8.5 of IEC61133

1.6.1.8 Provision for 10 car trainsets shall be provided for future upgrade. The evidence of data/document shall be provided in the bid submission.

1.6.1.9 Typical Power and Auxiliary Electric System Configuration is as follow:

1) Six (6) power conversion systems which can drive four (4) AC motors shall be equipped in suitable three (3) intermediate cars of trainsets. Two (2) auxiliary power supply systems with a primary inverter to serve the auxiliary loads shall be equipped in the proper place of trainsets. The simplified block diagram for reference is shown in Appendix A

1.6.1.10 The bidder shall propose the power and auxiliary electric system configuration and this proposal shall be submitted in the bid submission. The positions where these devices shall be reviewed by the Engineers. Both leading cars shall be trailer car (not motor mounted) considering EMC and the mounted space for on-board ETCS, Running and Stopping Assistant system and PSD controller.

1.6.1.11 Under emergency conditions, one train in W2 (Clause 1.1) loading must be capable of operating with another train in W2 loading coupled to it for hauling or pushing.

1.6.1.12 The major electrical equipment table shall be provided by bidder in the bid submission. The major electrical equipment table shall be finalized during design stage.

1.6.2 Vehicle Physical Characteristics

1.6.2.1 The following physical characteristics indicate fundamental vehicle dimensions that should be given careful attention.

1.	Carbody Length (excluding coupler, overhang of leading car)	19,500 mm
2.	Overall length (excluding overhang of leading car)?	20,000 mm
3.	Train length	160,000 mm

(8 cars consist, excluding overhang of both leading cars)

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4.	Door arrangement shall comply with Sub-Clause 7.1 of this ERT	
5.	Floor height	1,130～1,150 mm
6.	Pantograph lock down height	Max. 4,150 mm
7.	Pantograph height working range	4,400 – 5,415 mm
8.	Wheel Diameter	780～860 mm
9.	Wheelbase	2,100 - 2700 mm
10.	Distance between Bogie center	13,800 mm
11.	Passenger Doors	Bi-parting or single leaf plug-in sliding Doors or single leaf pocket sliding Doors.
12.	Doorway entrance width	more than 900 mm (This is narrow, 1300 is usual which allows 2 streams of passengers to enter/exit)
13.	Gangway door width	more than 800 mm
14.	Doorway height	1,850 mm
15.	Windows	Double glazed, tempered safety glass suggests shown as laminated glass
16.	Maximum axle load under W2 condition	16,000 kg
17.	Wheel back-to-back	1359 – 1362 mm

1.7 Track Standards

Main Line	: EN 60 E1	Standard Length 25m
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1.8 Route Data

1.8.1 Horizontal Curve Radius

1) For main line: More than 260 m for NSCR-N1, NSCR-N2 and NSCR-SC
2) For side track: More than 100m
3) For stations: More than 400 m
4) For turnouts: More than 160 m (Main Line) for NSCR-N1;
   More than 165m (Main Line) for NSCR-N2 and NSCR-SC
5) For depot: More than 100 m for NSCR-N1, NSCR-N2 and NSCR-SC

1.8.2 Transition Curve Length:

1.8.2.1 For NSCR-N1:

1) Maximum out of L1, L2, and L3
2) Where L1=800 C, L2=7.5 CV, L3=6.75 CdV
3) Length between transition curves: more than 20 m

7 Doors and Door Control

7.1 Passenger Side Entrance Doors, Gangway Doors and Saloon Separation Doors

7.1.1 The side entrance door operator design and functionality shall be based on a "fail-safe" principle and high standards of safety and security for passengers. Design, safety and testing of the passenger doors shall be compliant with MLIT Article 74 or other equivalent standards.

7.1.2 Two (2) electrically operated doors shall be provided on each side of every car. All doorways shall have a clear opening of 900 mm, as minimum, (1300mm is preferred as this allows 2 streams of passengers to alight/board simultaneously see TCRP report 13) and a clear height of 1850 mm.

7.1.3 The number of the doors and their dimensions shall allow the complete evacuation within three minutes by passengers in emergency. An emergency exit shall be able to be opened by a passenger from inside the train. All external passenger doors shall be equipped with emergency opening devices allowing them to be used as emergency exits

7.1.4 Side door number is two for each side, and position of the door must adjust to PSD door position. When express train stop at station, train door shall be inside the width of the PSD door, considering the accuracy of stopping ±350mm by ATO (Automatic Train Operation). The Contractor shall Interface with the PSD NS-01 Contractor on the requirement of door positioning between the Rolling Stock and PSD in accordance with section 7.8 of the ERT. The doors shall be ~~the sliding pocket~~ bi-parting or single leaf plug-in sliding doors or single leaf pocket sliding doors, constructed to prevent hands/finger pinning at the pocket section during operation. An airtight structure is preferred. If airtight structure is adopted, the mechanical door system must be fit to this system. The proposed door type shall be a proven solution to the constructability with the platform door under CP NS-01 contract, the maintainability, the safety and the performance of the rolling stock.

7.1.5 The Rolling Stock shall be a high-floor design, with level boarding from platforms. Wheelchair and mobility-impaired boarding shall not require the use of bridging or lifting devices. The horizontal distance of the passenger door thresholds shall be 1,475 +/- 25 mm from the track center.

7.1.6 Doors shall be vibration free and sufficiently insulated against heat and sound transmission. Exterior and Interior surfaces of the door leaves shall be finished to match the adjacent surfaces of the car. The doors shall be free from dimples, warping, spot welding depression and any other blemish.

7.1.7 The closed-door leaves shall be capable of withstanding loads imposed by passengers leaning on them under crush loading conditions. The doors shall be designed and tested such that the door leaves sustain such pressure with no permanent deformation. The Contractor shall submit test procedure and results based on best international practices.

7.1.8 It shall be extremely improbable for a door to detached from the car under any operating conditions, including heavy side load from standing passengers or sudden pressure transients.

7.1.9 No single defect or failure of any part of any door system shall produce a situation capable of causing injury to the passenger and the employer personnel etc.

7.1.10 Door guides and supports shall be mounted within the section of doorway protected by the door seals and shall not allow ingress of dirt, debris, or any other foreign matter likely to result in excessive wear or incorrect operation of the door equipment.

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7.1.10 Door guides and supports shall be mounted within the section of doorway protected by the door seals and shall not allow ingress of dirt, debris, or any other foreign matter likely to result in excessive wear or incorrect operation of the door equipment.

7.1.11 The Contractor shall indicate the amount of time required to replace a door leaf in-situ

of the wheel diameter.

1.11.2 Performance Values

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

1.	Maximum operation speed	: 160km/h
2.	Maximum Design Speed (It shall be considered the difference between the calculated speed and the actual speed, and overshoot.) This design speed applies to all railway systems	: 170 km/h or higher
3.	Acceleration (at W2 loading)	: Minimum 0.83 m/s^2 (0-40 kmph, thereafter, the Bidder shall make their own calculation of traction force in order to comply with the basic requirements)
4.	Starting Tractive effort	:400 kN or higher
5.	Maximum Power output at wheel	:5200 kW
6.	Jerk limit under all acceleration and service braking conditions (Max.)	: 1.1 m/s3
7.	Service deceleration	: 4.2km/h/s
8.	Wheel diameter	: 860mm (New) / : 820mm (Half worn) : 780mm (Fully worn) : (792 minimum reprofiling diameter)
9.	Emergency deceleration	: 4.7km/h/s
10.	Axial Thrust	:1500kN
11.	Severity of Service	: Shall meet conditions of continuous 1 round trip of peak operation at loads of 7t/car or higher without adverse effect to any system (7t/car is passenger load but see comments about EN 15663 clause 6 Table 3)

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

1.11.2.3 Coefficients of adhesion for the train speed between 120km/h and 160km/h should be lower ~~than the~~than the train speed under 120km/h. During the design stage, adhesion should be considered during deceleration of speed over 120km/h is lower compare to the speed under 120km/h, and for the average deceleration the adhesion must satisfied the demanded braking effort for emergency braking.

1.11.2.4 Jerk during acceleration and deceleration shall not be more than 1.1 m/s3 (except under emergency braking condition) and in any direction. Failure of jerk limiting system shall not limit braking effort.

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

1.11.2.6 In addition, the pneumatic system shall meet the following brake reaction time or to follow EN 13452:

a) Full service application : 1.5 seconds

b) Emergency application : Max 1.5 seconds~~1.2 seconds~~

c) Full service release : 2.7~~0~~ seconds

d) Emergency release : 3.0 seconds

	speed applies to all railway systems	
3.	Acceleration (at W2 loading)	: Minimum 0.83 m/s^2 (0-40 kmph, thereafter, the Bidder shall make their own calculation of traction force in order to comply with the basic requirements)
4.	Starting Tractive effort	:400 kN or higher
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6.	Jerk limit under all acceleration and service braking conditions (Max.)	: 1.1 m/s3
7.	Service deceleration	: 4.2km/h/s
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9.	Emergency deceleration	: 4.7km/h/s
10.	Axial Thrust	:1500kN
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1.11.2.2 Acceleration and deceleration values shall be maintained under all loading conditions. All braking requirements shall be maintained under all loading conditions.

1.11.2.3 Coefficients of adhesion for the train speed between 120km/h and 160km/h should be lower than the train speed under 120km/h. During the design stage, adhesion should be considered during deceleration of speed over 120km/h is lower compare to the speed under 120km/h, and for the average deceleration the adhesion must satisfied the demanded braking effort for emergency braking.

1.11.2.4 Jerk during acceleration and deceleration shall not be more than 1.1 m/s3 (except under emergency braking condition) and in any direction. Failure of jerk limiting system shall not limit braking effort.

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

1.11.2.6 In addition, the pneumatic system shall meet the following brake reaction time or to follow EN 13452:

a) Full service application : 1.5 seconds

b) Emergency application : Max 1.5 seconds

c) Full service release : 2.7 seconds

d) Emergency release : 3.0 seconds

1.11.2.7 The brake reaction times of a and b are defined from the order of braking to 90% of BC pressure, and these of c and d are defined from full pressure to 10% of BC pressure.

1.11.2.8 Brake slip/slide protection shall apply to all braking modes.

1.11.3 Performance Characteristics

1.11.3.1 Performance curves for traction and braking shall be established based on kN / metric ton versus speed for the W2 loading condition.

1.11.3.2 The corresponding traction motor characteristics, and the train mass, shall be considered in the Design Performance Curve as defined in JIS E 6102 or equivalent standard.

holding 8 cars train-sets coupled to a disabled (without any brake) 8 cars train-sets both trains at W0 load condition on 3.5% grade. For the test at 7t/car written above, it is also permitted to convert from the results of empty tests and certain loaded tests.

1.11.5.2 In addition, brake performance tests shall be done as per ERT 1.11.1 and shall be submitted for Engineers review and comments.

1.11.5.3 The Contractor shall confirm that any train with 20% defective parking brake the units will hold a train at W2 loading on the greatest gradient.

1.11.6 Performance Calculation

1.11.6.1 The Contractor shall calculate train performance by simulation. Running curve with speed versus distance for both directions in powering and braking modes at W0 and W2 loading shall be provided as a simulation result.

1.11.6.2 Rotating mass shall be calculated by the shape of the wheel, brake disc, rotor of motor etc. for the performance calculation.

1.11.7 Energy Consumption

1.11.7.1 The Contractor shall design the train to minimize the energy consumption.

1.11.7.2 The Contractor shall calculate the energy consumption of train at the unit of kWh/ton/km in case of running on entire revenue line for both directions at loading condition of W0, and W2.

1.11.7.3 The motor efficiency shall not be less than 94%.

1.12 Noise, Vibration and Aerodynamics

1.12.1 Noise Requirements

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

1.12.1.2 The interior noise level at any point in any vehicle (including the Driver's Cab), 1.6m above floor level, while stationary on an open section of track, but with all auxiliary systems running, shall not exceed 6~~3~~ dBA.

1.12.1.3 The exterior noise level of any vehicle, measured 7.5m from the center and 1.5m above rail level, while stationary on an open section of track with all auxiliary systems running, shall not exceed 75 dBA.

1.12.1.4 The interior noise level at any point in any vehicle (including the Driver's Cab) 1.6m above floor level, with the train running at 90 km/h in the tunnel section of track, with all auxiliary systems running, shall not exceed 88 dBA.

1.12.1.5 Test to be conducted at the Contractors' proposed facility.

1.12.1.6 The exterior noise level of any vehicle, measured 7.5m from the center and 1.5m above rail level, with the train running at 90km/h on an open section of track with all auxiliary systems running, shall not exceed 88 dBA. Test to be conducted at the Contractors' proposed facility.

1.12.1.7 The tests shall be conducted according to JIS E4021 or other equivalent standards for the internal noise except for provisions specified above.

1.12.1.8 The tests shall be conducted according to JIS E4025 or other equivalent standards for the external noise except for provisions specified above.

1.12.1.9 Measurement of running train noise, both for the interior and the exterior noise, shall be conducted on NSCR, MCRP and NSRP-S mainline track or at the Contractor's proposed

shall be provided as a simulation result.

1.11.6.2 Rotating mass shall be calculated by the shape of the wheel, brake disc, rotor of motor etc. for the performance calculation.

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1.11.7.3 The motor efficiency shall not be less than 94%.

1.12 Noise, Vibration and Aerodynamics

1.12.1 Noise Requirements

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

1.12.1.2 The interior noise level at any point in any vehicle (including the Driver's Cab), 1.6m above floor level, while stationary on an open section of track, but with all auxiliary systems running, shall not exceed 66 dBA.

1.12.1.3 The exterior noise level of any vehicle, measured 7.5m from the center and 1.5m above rail level, while stationary on an open section of track with all auxiliary systems running, shall not exceed 75 dBA.

1.12.1.4 The interior noise level at any point in any vehicle (including the Driver's Cab) 1.6m above floor level, with the train running at 90 km/h in the tunnel section of track, with all auxiliary systems running, shall not exceed 88 dBA.

1.12.1.5 Test to be conducted at the Contractors' proposed facility.

1.12.1.6 The exterior noise level of any vehicle, measured 7.5m from the center and 1.5m above rail level, with the train running at 90km/h on an open section of track with all auxiliary systems running, shall not exceed 88 dBA. Test to be conducted at the Contractors' proposed facility.

1.12.1.7 The tests shall be conducted according to JIS E4021 or other equivalent standards for the internal noise except for provisions specified above.

1.12.1.8 The tests shall be conducted according to JIS E4025 or other equivalent standards for the external noise except for provisions specified above.

1.12.1.9 Measurement of running train noise, both for the interior and the exterior noise, shall be conducted on NSCR, MCRP and NSRP-S mainline track or at the Contractor's proposed facility where rail roughness is compliant with JIS E4021/4025 or other equivalent standards.

1.12.1.10 Noise requirements and test plan shall be submitted by the Contractor and reviewed by the Engineer.

1.12.2 Vibration Requirements

1.12.2.1 All equipment, sub-assemblies and components shall be capable of withstanding shock and vibrations of the Rolling Stock satisfactorily such that they do not fail prematurely on this account earlier to the designed life. To establish this requirement, all of equipment, sub-assemblies and components shall be subjected to shock and vibration test to JIS E 4031 or other relevant standard. Various equipment on the vehicles complies with JIS E

practical operational record and reviewed by the Engineer. The type of connector and contact material shall be reviewed by the Engineer. The board material shall be suitable to rail application ~~and the number of layers in a multi-layer board shall not exceed six~~. Components shall not be installed using sockets unless specifically reviewed by the Engineer. Use of surface mount devices shall be reviewed by the Engineer. Semiconductor operating temperature rating ~~shall meet or exceed +85°C~~ be according to EN or other international Standards.~~.~~

1.16.1.2 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. Printed Circuit Boards shall be conformal coated, unless otherwise agreed to by the Engineer.

1.16.2 Equipment Accessibility

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

1.16.3 Device Reference Designators

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

1.16.4 Grounding

1.16.4.1 Safety grounding points shall be provided on all electrical equipment, unless otherwise reviewed by the Engineer. Grounding points shall be of tinned copper, clean, free from paint, and of a sufficient 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.

1.16.4.2 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.

1.16.4.3 The grounding cable connected to the respectively equipment shall be adequate size for connected to the respectively equipment. ~~Minimum grounding cable size shall be 6 mm2, unless otherwise reviewed by the Engineer, and the size shall be equal to, or larger than, that of the largest power wire connected to that equipment.~~ All grounding wires and cables shall utilize internationally recognized color code subject to the review by the engineer during design stage. ~~longitudinally striped green and yellow insulation, or heat shrinkable tubing applied over the conductor insulation.~~

1.16.5 Electrical Interface

1.16.5.1 All cable connectors used in exterior locations shall be rated IP65 using quick connect/disconnect couplings~~, with positive locking and visual indication of mating~~. These shall be subject to reviewed by the Engineer.

1.16.5.2 Terminal blocks, where used, shall be of a high quality, plated stud type or stainless stud with plated stud, 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.

1.16.5.3 The current capacity rating of all wiring interface connectors and terminal blocks, shall have de-rating compensation in accordance with applicable standard for expected high ambient temperature.

1.16.6 Wire Identification

1.16.6.1 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, or as closely to any connector parts or wiring treatment as possible if they cover the portion from an end of wire. The identification numbering system will correspond to the wire identification numbering system used on the schematic drawings and wiring diagrams.

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

1.16.7 Connectors

1.16.7.1 A single family of connectors shall be used for similar connections and functions within the Rolling Stock 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.

1.16.7.2 All connectors shall have sufficient current ratings, with applied de-rating factors for expected operating temperatures of not less than 45 ℃.

1.16.8 Suppression

1.16.8.1 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.

1.16.9 Wire and Cable Installation

1.16.9.1 Electrical wires and cables shall be run in cleats, conduit, 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.

1.16.9.2 The Contractor shall provide adequate and stress-relieving provisions for the cabling of the racks and the equipment after these are mounted to ensure that cables are not fouling other equipment, chafing or unduly stressed.

1.16.9.3 Electrical cables for propulsion system and auxiliary power system shall ~~be twisted~~ keep the minimum spacings and run-in ducts made of aluminum alloy, metal conduits or closed ducts for separating the cables as the countermeasure for EMC.

1.16.9.4 The Contractor's attention is drawn to the requirements of Sub-Clause 21.4.8 regarding voltage segregation.

1.16.9.5 All wires and cables shall have sufficient current ratings, with applied de-rating factors for expected operating temperature of not less than 45 ℃.

1.16.9.6 All wires and cable shall have sufficient spares; the wires and cable installation and number of spare wires and cables shall be subject to review by the Engineer.

1.17 Fail Safe Design

1.17.1 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: couplers, door systems, on-board signaling systems, communication systems, wheel spin/slide systems, emergency brakes and propulsion power shut off systems shall be included as a minimum.

1) Only components having a high reliability and predictable failure modes and that

1.16.4.3 The grounding cable connected to the respectively equipment shall be adequate size for connected to the respectively equipment. All grounding wires and cables shall utilize internationally recognized color code subject to the review by the engineer during design stage.

1.16.5 Electrical Interface

1.16.5.1 All cable connectors used in exterior locations shall be rated IP65 using quick connect/disconnect couplings. These shall be subject to reviewed by the Engineer.

1.16.5.2 Terminal blocks, where used, shall be of a high quality, plated stud type or stainless stud with plated stud, 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.

1.16.5.3 The current capacity rating of all wiring interface connectors and terminal blocks, shall have de-rating compensation in accordance with applicable standard for expected high ambient temperature.

1.16.6 Wire Identification

1.16.6.1 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, or as closely to any connector parts or wiring treatment as possible if they cover the portion from an end of wire. The identification numbering system will correspond to the wire identification numbering system used on the schematic drawings and wiring diagrams.

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

1.16.7 Connectors

1.16.7.1 A single family of connectors shall be used for similar connections and functions within the Rolling Stock 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.

1.16.7.2 All connectors shall have sufficient current ratings, with applied de-rating factors for expected operating temperatures of not less than 45 ℃.

1.16.8 Suppression

1.16.8.1 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.

1.16.9 Wire and Cable Installation

1.16.9.1 Electrical wires and cables shall be run in cleats, conduit, 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.

1.16.9.2 The Contractor shall provide adequate and stress-relieving provisions for the cabling of the racks and the equipment after these are mounted to ensure that cables are not fouling other equipment, chafing or unduly stressed.

1.16.9.3 Electrical cables for propulsion system and auxiliary power system shall keep the minimum spacings and run-in ducts made of aluminum alloy, metal conduits or closed ducts for separating the cables as the countermeasure for EMC.

7.1.11 The Contractor shall indicate the amount of time required to replace a door leaf in-situ including the adjustment and testing during the design review.

7.1.12 The doors shall be designed and tested that when normally installed, one leaf can sustain a concentrated load of 900 N applied to the plane of the door, at the center of the front edge, with a maximum deflection of not more than 6 mm, but with no permanent deformation; and shall not exceed a force of 250N when closing.

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

7.1.14 All doors shall open and close simultaneously. Doors shall fully open within 4 ± 0.5 s~~2.0 to 2.5 s~~ of the door open command and shall fully close within 4 ± 0.5 s ~~2.5 to 3.0 s~~ of the door close command. During normal door operation, the maximum velocity of each door leaf shall not exceed ~~1.5 m/s~~0.35 m/s for closing and 0.5 m/s for opening. When closed, all passenger side entrance doors shall be automatically and mechanically locked in the fully closed position, preventing the doors being opened beyond a limited push back facility. When closing, the force shall not exceed 250N.

7.1.15 The doors shall be manufactured from the same material used in the construction of the carbody shell, with a honeycomb core or equivalent, 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 trapped between closing doors. Doors shall be pressed to body to hinder airflow from outside so that airtight shall be achieved when door closed.

7.1.16 The bottom of the doors shall be provided with stainless steel kick plates and 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.

7.1.17 The doors shall be glazed with a fixed glazed window of toughened glass to current railway transport standards (JIS R3213 or other equivalent standards). The glass tinting shall be according to Sub-Clause 5.11. The window assembly shall be free from rattles, and the mounting shall be capable of withstanding the pressure differentials associated with head-on pressure, passing trains, prevailing winds, etc.

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

7.1.19 One set of passenger side entrance door production hardware (door leave, 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 shipping and must ensure that the specified reliability is met.

7.1.20 Doors for gangway shall be provided at each end of each vehicle. A door for gangway shall have heat and fire -resistant tempered glass and structure and function to prevent scattering at breakage shall be applied. It shall be used stainless steel for the rim and applied a collision prevention film to the glass surface. The gangway shall be a self-

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operation ratio. For this control, train line or transmission of TMS may be utilized.

10.3 **Pneumatic System**

10.3.1 The Contractor shall submit details of stainless-steel pneumatic system piping or an equivalent service-proven material such as copper for ~~for Engineer~~the Engineer review. Joints shall be rail industry approved compression fittings. Joints shall not be made to connect straight runs of pipe work, unless reviewed and approved by the Engineer. Inaccessible runs of pipe work shall not utilize joints. All piping shall be installed to keep fittings to an absolute minimum.

10.3.2 Cut-out valve handles shall be installed so that in the open position they are parallel to the flow of air, and in the closed position they are perpendicular to the flow of air. Cut-out cock handles shall be readily accessible for use in an emergency. All cut-out cocks shall be of the vented type, unless the function prohibits their use. The function of all cut-out cocks shall be clearly identified by means of engraved stainless-steel plates riveted to structure adjacent to the valve, the lettering on which shall be filled with black epoxy paint and suitable color coded.

10.3.3 All pneumatic tanks or reservoirs shall have drain valve to remove condensates.

10.3.4 All pneumatic tanks shall be in accordance with EN286-C or EN286-4 or other equivalent standard.

10.3.5 A cut-off valve shall be provided at a place required for maintenance or abnormality.

10.3.6 Separate systems within the pneumatic system shall be supplied via a vented cut-out valve and a strainer, ~~and shall be provided with separate air reservoirs,~~ supplied through a check valve to protect against sudden loss of air pressure. The air brake reservoir shall be sized to provide at least three emergency brake operations under W2 loading conditions. Reservoirs shall be set to assist moisture collection and shall include automatic/manual drain valves.

10.3.7 The main air reservoir shall have sufficient capacity for the simultaneous operation of all pneumatic devices. Calculations for the capacity of all reservoirs shall be submitted to the Engineer for review.

10.3.8 All air reservoir structure shall comply with EN286-C or EN286-4. or other equivalent standards.

10.3.9 All flexible hoses shall be date stamped, and its full life indicated, unless otherwise proposed by the Contractor during the design stage and reviewed by the ~~.~~Engineer. All flexible hose connections on removable assemblies shall be of railway service proven, quick connect coupling or compatible to ISO 8434, unless otherwise proposed by the Contractor during the design stage and reviewed by the Engineer~~.~~

10.3.10 The device and air pipe from the last tank as the source of the braking force to brake cylinder used to service brake and emergency brake shall be placed within the width of bogie.

10.3.11 The device and air pipe from the last tank as the source of the braking force to brake cylinder used to security brake shall be placed within the width of bogie frame.

10.3.12 Pneumatic air supply distribution system shall be designed in such a way that any single point failure can be readily isolated to ensure that the affected train can be continued in service in a safe manner.

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14.7.5 The battery shall be designed to withstand the shock and vibration conditions associated with a rugged rail service environment.

14.7.6 The battery shall always have been floating charge by the DC output from APSE. In such usage, the battery shall operate normally with normal maintenance experience for over 8 years. The Contractor shall select such a service-proven battery and APS.

14.7.7 In floating charging, the output voltage of the APS and the charging characteristics of the battery shall be completely compliant, and insufficient charging and overcharging shall not occur.

14.7.8 The Contractor shall submit the required capacity calculation considering 10 cars train-sets in the future extension and reviewed by the Engineer.

14.7.9 Battery Installation

14.7.9.1 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. Alkali-resistant paint is applied to the battery box ~~and tray~~.

14.7.9.2 All underfloor boxes/containers shall have indicators visible from more than 5m that confirm outside cover of the box is locked and any slide out sections are locked within to prevent sliding out.

14.7.9.3 The roll-out tray shall have resinous wheel so as to insulate the box and the carriage, or other proven roll-out design (slide rail type, etc.).

14.7.9.4 Wiring in the box, even if the carriage is moved, shall be considered so that unnecessary slack does not occur. Especially when the carriage is moved or the lid is closed; wiring in the box shall be fixed appropriately so as not to be sandwiched.

14.7.9.5 Fall prevention stopper shall be provided so as not to fall when the carriage pulls out.

14.7.10 Battery Contactor (Main Battery Switch)

14.7.11 The device is a non-contact contactor for opening and closing control the DC100V circuit from the storage battery in the control voltage DC100V and shall be composed of control unit, the main circuit unit in which a semiconductor is incorporated and the circuit that can be operated from both the cabin.

14.7.12 The circuit to confirm whether storage battery contactor is ON or OFF shall be incorporated, and the actual condition of storage battery contactor shall be displayed in the driver's cabin. The contactor switch and status (on/0ff) shall be visible from the outside of the train.

14.7.13 Battery Circuit Open Switch

14.7.14 Battery circuit open switch shall be equipped to work safety for maintenance, replacement or construction, etc. When this switch is opened, it is necessary to make it clear that the state is highly visible.

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15 Train Management System

15.1 General

15.1.1 This system improves functions by integrally controlling the control functions of each device on the vehicle using software logic and serial transmission line function, and centrally manages the information used in those devices. TMS centrally shall manage information and shall have functions such as transmission of operation control commands such as powering and service braking, failure monitoring, function inspection, crew

21 Material and Workmanship

21.1 General

21.1.1 All materials entering into the construction of this project shall be new, of first-class quality, consistent with materials commonly used in rail vehicle manufacture. All workmanship shall be high quality and shall conform to the best manufacturing practices in all respects.

21.1.2 All materials, specialties, equipment component parts, and accessories shall be manufactured in accordance with, and shall comply with, the standard or specification of the appropriate professional society or national technical or trade association or Government Agency.

21.1.3 All materials shall be marked or stored to be readily identified and shall be adequately protected during handling and storage.

21.1.4 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:

1) Ozone depleting Freons,
2) PCB,
3) Brominated Flame retardant,
4) Formaldehyde,
5) Halon,
6) Beryllium,
7) Lead
8) Cadmium (except in recyclable batteries),
9) Isocyanates,
10) Asbestos, and
11) Urethane foam.

21.2 Fasteners

21.2.1 All screws, bolts, nuts and washers shall be in metric and conform to applicable standards and shall be zinc plated, unless stainless steel.

21.2.2 All fasteners of 4 mm diameter or larger shall have coarse threads, except as specified. Exceptions may be permitted but require review and consent by the Engineer.

21.2.3 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 Engineer.

21.2.4 Bolts used with nuts shall be the shortest standard size that will provide at least two full threads through the nut.

21.2.5 All bolts and cap screws shall have the head marked to indicate grade unless otherwise proposed by the Contactor during design review which shall be reviewed by the Engineer. All nuts shall be marked to indicate grade, unless otherwise proposed by the Contactor during design review which shall be reviewed by the Engineer.~~.~~

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21.2.6 The threads of stainless-steel fasteners shall be suitably treated to prevent galling upon installation.

21.2.7 All wire ties used shall be of the weather-resistant (black) variety.

21.2.8 Locking washers or other devices to prevent loosening of fasteners shall be used.

21.2.9 For equipment suspended from the underframe, the load of the equipment on each bolt shall not the clamp load of the bolt. Set screws shall not be used. Where practical, load on the bolts shall be no greater that that exerted when the bolt is tightened to its recommended torque. When practical loads shall be on structural cross beams etc. Huck bolts can be used according to their strength specification.

21.3 Parts

21.3.1 Components, plates, shields, or other parts, which may be removed for repair or maintained, shall be interchangeable with others identical item.

21.3.2 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 component is less than 30 years, the component must be redesigned and replaced on every vehicle.

21.3.3 All parts shall be free from sharp edge and burrs that might injure persons or damage clothing.

21.4 Electrical Components

21.4.1 Terminals

21.4.1.1 Solderless terminals shall be submitted for the review of the Engineer and given the Statement of No Objection on equivalent and shall have sufficient current carrying capacity, de-rated to the anticipated maximum operating temperature.

21.4.1.2 The use of quick connect ("FASTON") terminals shall not be allowed, except subject to review by the Engineer. When allowed, quick connect terminals must be of brass or phosphor bronze.

21.4.1.3 Only ring tongue terminals shall be used, except as specifically reviewed and commented by the Engineer.

21.4.2 Wire Insulation

21.4.2.1 Cables shall comply with EN standards or Japanese regulations/standards.~~conform to EN50264 or other equivalent standards~~.

21.4.2.2 Unless otherwise specified, wire insulation shall be one of the following types, unless specifically reviewed and commented by the Engineer:

1) Ethylene Tetrafluoroethylene (ETFE) fluoropolymer having a continuous temperature rating of 150 °C,

2) Abrasion resistant, filled Tetrafluoroethylene (TFE) with a temperature rating of 260 °C

3) Cross-linked Polyolefin (XLPO),

4) All wire insulation, except carbody wiring, shall be rated at 300/300V or 600 V

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