



General Bid Bulletin No. 39
15 November 2021

**THE MALOLOS-CLARK RAILWAY PROJECT AND THE NORTH-SOUTH RAILWAY
PROJECT SOUTH LINE COMMUTER PACKAGE CP NS-01: PROCUREMENT OF
ELECTRICAL AND MECHANICAL SYSTEMS AND TRACK WORKS (IFB No: 21-040-3)**

TO ALL PROSPECTIVE BIDDERS:

This General Bid Bulletin is issued to amend/clarify certain provisions in the Bidding Documents for the above-mentioned Project. Please refer to the attached Annexes of this General Bid Bulletin for details:

1. **Annex "A"** – Clarification to the Bidding Documents
2. **Annex "B"** – Addendum to the Bidding Documents with "**Attachment 1**"
3. **Annex "C"** – Not Applicable

All other portions of the Bidding Documents not affected by these revisions, amendments and/or clarifications shall remain unchanged.

Revisions/amendments/clarifications made herein shall be conserved as an integral part of the Bidding Documents of this Project.

For your guidance and information.

For the Bids and Awards Committee

SIGNATURE REDACTED

ENGR. JAIME M. NAVARRETE, JR
Chairperson

Annex A

PACKAGE CP NS-01: E&M SYSTEMS AND TRACK WORKS
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Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
1	<p>GBB 35, Sr. No. 16, Query: As per our understanding, 69kV & 115kV Outdoor SF6 conventional GIS switchgear is acceptable. Please confirm.</p> <p>DOTr Reply: The stated IEC standard refers to Guidance on quantifying greenhouse gas emission reductions. SF6 free technology (eco-friendly) has been introduced to the market more than five years ago as an alternative to the conventional SF6 GIS Switchgear. We presume that the bidder will comply for environmental reasons.</p>	<p>SF6 gas, which is of excellent arc-extinguishing and insulation properties, is widely used as insulation between phase-to-phase and phase-to-earth.</p> <p>Prominent suppliers like GE, ABB, etc. have regretted to offer SF6 free technology for 60Hz application.</p> <p>Another prominent Japanese supplier, who offers Dry Air Insulated Switchgear (which is also SF6 free technology), has also regretted to supply the same for 115kV switchgear as its not in their manufacturing range. Also the same supplier has informed that, for 69kV, Insulation capacity of dry air is lower than SF6 gas type. Hence, switchgear dimension is bigger and there may be issues in locating it below viaduct due to space constraints.</p> <p>Also, IEC does not specify SF6 free technology. It only mentions about greenhouse effect reduction, which also means that the offered</p>		<p>SF6 gas GIS can be adopted for 115 kV and 69 kV. (See attached amendments for Annex B in attached)</p>

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		<p>switchgear should be efficient and with min. losses, which will in turn reduce greenhouse gases emission.</p> <p>In view of the above, bidder requests to allow SF6 gas insulated HV switchgear.</p>		
2	<p>Volume I Part 1 Bidding Procedures Invitation for Bids (IFB), IFB-2, Clause No. 7, Bids must be delivered to the address above on or before 10:00AM on 17 June 2021 and must be accompanied by a Bid Security of Japanese Yen Two Thousand Seven Hundred Fifty Million (JPY 2,750,000,000).</p>	<p>Acknowledging the GBB Number 31 where the bid submission date was extended to 10 November 2021, with the significant changes to the program shortened for the whole of work from 76 months to 73 months with Key Dates and Access Dates of Section 3 and 4 changed accordingly, we would like to again request an extension of time until 17 November 2021.</p>		<p>Please refer to GBB38 for information on bid submission extension.</p>
3	<p>Volume I. Section. II., BDS-10, ITB 24.1, The deadline for Bid submission is: Date: 10 November 2021 Time: 10:00 AM”</p>	<p>GBB 34 was issued on October 7, 2021. In such GBB 34, there were critical & drastic changes which has huge impact to the cost and planning on this tender; i.e. The completion of whole of work was shorten from 76 months to 73 months. Furthermore, most of the Key Dates (KD) and Access Dates (AD) of Section 3 and 4 were also changed. Due to these changes, project planning and costing</p>		<p>Please refer to GBB38 for information on bid submission extension.</p>

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		<p>for the execution of the Project shall be reconsidered and re-assessed. We also need to re-discuss the cost and delivery period with our most of subcontractors. Having said that, although we would do our best to expedite our preparation work, it will take much time to set up bid proposal.</p> <p>In addition to the above, with consideration of the guidelines of the Inter-Agency Task Force on Emerging Infectious Disease and the Department of Health, uncertainties are posed by the issuance of the Community Quarantine. It is still remained to oblige for 10 days quarantine.</p> <p>In this light, we humbly request for an extension of the deadline for Bid submission be moved to 30 November 2021.</p>		
4	Volume I. Section. II., BDS-10, ITB 24.1, The deadline for Bid submission is: Date: 29 November 2021 Time: 10:00 AM”	We are pleased to request your good office to extend bid submission by the end of November. Because, we recently received various critical changes for tender conditions as follows.		<p>1. Please refer to GBB38 for information on bid submission extension.</p> <p>2. SF6 gas GIS can be adopted for 115 kV and 69 kV. (See attached amendments for</p>

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		<p>1. GBB 34 was issued on October 7, 2021. In such GBB 34, there were critical & drastic changes which has huge impact to the cost and planning on this tender; i.e. The completion of whole of work was shorten from 76 months to 73 months. Furthermore, most of the Key Dates (KD) and Access Dates (AD) of Section 3 and 4 were also changed. Due to these changes, project planning and costing for the execution of the Project shall be reconsidered and re-assessed. We also need to re-discuss the cost and delivery period with our most of subcontractors. Having said that, although we would do our best to expedite our preparation work, it will take much time to set up bid proposal.</p> <p>2. We find from Global manufacturers that the products for eco-friendly / SF6 free type GIS are developed only for 50Hz system. Those products are not suitable for the Philippines which uses 60Hz system.</p> <p>As per the information we have, only Siemens,</p>		<p>Annex B in attached)</p> <p>3. An area of 4000 sq mtr will be provided which is sufficient for 2500 numbers of 1.6 sq mtr panels. As each panel produces around 300 kWa the required power output can be achieved.</p> <p>4. The responses to the Bidder's clarifications (Request for Clarification No. 9, dated October 18, 2021 and Request for Clarification No. 11, dated October 23, 2021) was responded in the Annex A of General Bid Bulletin No. 36 and General Bid Bulletin No. 37 respectively.</p>

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		<p>Germany has developed the product for 60Hz system,</p> <p>Therefore, such requirement of SF6 free technology will lead to a monopolistic scenario and limit the Bidders from making a competitive proposal.</p> <p>In view of the same, we request to kindly accept the proposal of Conventional SF6 gas GIS for 115kV as well as for 69kV.</p> <p>Please kindly be informed that we issued and dispatched the above 2 clarifications on October 19, 2021, but not yet received reply from your good office. Hence, it will take a time to study the best solution for it.</p> <p>3. With reference GBB No. 30, we would like to bring it to your notice that to achieve these revised values of peak solar power output requirement of 750kWp, the available area on the Station rooftops will not be adequate and it requires a much bigger area (min. 6,000 sq.mtr rooftop area) to achieve the required power output requirement as per GBB 30. Hence, we</p>		

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		<p>request you to revise the peak solar output requirement to lesser value as per available rooftop area for the Stations list in Clause 4.4.7, (2), vi.</p> <p>4. We submitted clarifications for taxes incurred in Philippine, such as VAT for import portion and Local Business Tax. Despite of our issuance of clarifications on October 18 and 23, 2021, we have not yet received replies from your good office.</p> <p>It is quite critical information for us to estimate bidding price. So even if we will receive replies against the clarifications within a few days, it will take some days to evaluate and estimate total bidding price.</p> <p>In this light, we humbly request for an extension of the deadline for Bid submission be moved to 30 November 2021.</p>		
5	<p>Vol. I. Sec. II., BDS-10, ITB 24.1, "XXXX</p> <p>The deadline for Bid submission is:</p>	<p>Time shall not be sufficient considering the following activities that will be done in succession:</p> <ul style="list-style-type: none"> • Processing of travel requirements for foreign 		<p>Please refer to GBB38 for information on bid submission extension.</p>

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	Date: 10 November 2021 Time: 10:00 AM"	<p>entities</p> <ul style="list-style-type: none"> • Modification of our bid proposal to follow revisions on key requirements found on GBB 34-36 such as reduction in duration of completion of works (76 months to 73 months) and changes in key dates and access dates • Studying and preparing a most competitive bid proposal <p>In this light, we humbly request for an extension of the deadline for Bid submission be moved to 10 December 2021</p>		
6	<p>Volume IV / PART 3 – CONDITIONS OF CONTRACT AND CONTRACT FORMS, PC-8 to PC-9, Table: Summary of Sections, Note: * The Amount for each Section will be the Accepted Contract Amount multiplied by the percentage for each Section as given in Contract Data Sub-Clause 14.9.</p> <p>The Damages for Delay will be calculated on a daily basis using the</p>	<p>We understand from the referred clause that:</p> <ol style="list-style-type: none"> 1) LD is applicable @0.05% of the outstanding portion of the work for the overall delay. 2) For failure to achieve a specific Key date, LD is applicable @0.05% of the outstanding portion of the price of the respective element of work (pertaining to the specific Key date) <p>Kindly confirm our understanding.</p>		The Bidder's understanding is correct.

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	percentage given for each Section multiplied by the Amount for each Section reduced as applicable for the part of each Section which remains outstanding.			
7	Volume II / PART 2 Employer's Requirements, ERT -1011, 9 TRAINING FACILITY AT TRAINING CENTER 9.2.1.6, Design Life The design life is eight (8) years after completion, visual devices and central processing unit shall be replaced to maintain its performance. 15 years after completion, all systems shall be replaced. The Contractor shall use parts which match the above design life.	Please, confirm that the contractor does not have to replace: Visual devices and central processing unit 8 years after completion and all systems 15 years after completion. Instructions are only considered as a criteria for selection of parts that matches with the expected design life. Kindly confirm our understanding.		The Bidder's understanding is correct.
8	Section II Bid Data Sheet, Page BDS-2 New Page BDS-19, New ITB6.5	It is difficult to enter into NDA as per Attached 4 in New ITB6.5. Please share AFC National Standard without NDA.		The Bid condition shall prevail for the NDA on AFC National Standard. Please refer to GBB38 for information on bid submission extension.

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Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
	New Attached 4, "A copy of the AFC National Standard (Confidential Information) may be obtained by prospective Bidders upon formal written application, accompanied by a photocopy of two (2) valid Government Issued IDs attached with Notarized Non-Disclosure and Confidentiality Agreement (NDA).....	In order to study AFC National Standard, we need to take further days. Please also accept to extend bid submission date to November 29, 2021		

Annex B

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ITEM NO.	REFERENCE/CLAUSE/ SECTION	REVISIONS / AMENDMENTS
Volume I Part 1 – Bidding Procedures		
1	Section IV Bidding Forms Schedule 1 - Price Schedules Schedule 1.2-2: Track Works Page BF-63 and BF-64	Milestone No. 201.5 was added to Schedule 1.2-2: Track Works and subsequent milestone was renumbered. Please refer to the attachment for the amendment.
2	Section IV Bidding Forms Schedule 1 - Price Schedules Schedule 1.2-2: Track Works Page BF-66 and BF-67	Milestone No. 202.9, 202.10 and 202.11 was added to Schedule 1.2-2: Track Works. Please refer to the attachment for the amendment.
3	Section IV Bidding Forms Schedule 1 - Price Schedules Schedule 1.2-2: Track Works Page BF-68	Milestone No. 203.2 was added to Schedule 1.2-2: Track Works. Please refer to the attachment for the amendment.
4	Section IV Bidding Forms	Amended from Sub-total for “Milestone No. 203” to “Sub-total for Milestone No. 204”.

	Schedule 1 - Price Schedules Schedule 1.2-2: Track Works Page BF-69	
5	Section IV Bidding Forms Schedule 1 - Price Schedules Schedule 1.3-2: Track Works Page BF-125 and BF-126	Milestone No. 201.5 was added to Schedule 1.3-2: Track Works and subsequent milestone was renumbered. Please refer to the attachment for the amendment.
6	Section IV Bidding Forms Schedule 1 - Price Schedules Schedule 1.3-2: Track Works Page BF-128 and BF-129	Milestone No. 202.9, 202.10 and 202.11 was added to Schedule 1.3-2: Track Works. Please refer to the attachment for the amendment.
7	Section IV Bidding Forms Schedule 1 - Price Schedules Schedule 1.3-2: Track Works Page BF-130	Milestone No. 203.2 was added to Schedule 1.3-2: Track Works. Please refer to the attachment for the amendment.
8	Section IV Bidding Forms Schedule 1 - Price Schedules	Milestone No. 201.5 was added to Schedule 1.4-2: Track Works and subsequent milestone was renumbered. Please refer to the attachment for the amendment.

	Schedule 1.4-2: Track Works Page BF-180 and BF-181	
9	Section IV Bidding Forms Schedule 1 - Price Schedules Schedule 1.4-2: Track Works Page BF-183 and BF-184	Milestone No. 202.9, 202.10 and 202.11 was added to Schedule 1.4-2: Track Works. Please refer to the attachment for the amendment.
10	Section IV Bidding Forms Schedule 1 - Price Schedules Schedule 1.4-2: Track Works Page BF-185	Milestone No. 203.2 was added to Schedule 1.4-2: Track Works. Please refer to the attachment for the amendment.
11	Section IV Bidding Forms Schedule 1 - Price Schedules Schedule 1.2-2: Track Works Page BF-186	Amended from Sub-total for "Milestone No. 203" to "Sub-total for Milestone No. 204".
Volume II Part 2 – Employer’s Requirements		
12	ERT 369 Clause 4.1.3 (10)(i)	deleted; "(eco-friendly type)".
13	ERT 376, Clause 4.4.1 (2)(3)	deleted; "(eco-friendly type)".

14	ERT 419, Clause 4.1.3 (9)(1)	deleted; “(eco-friendly type)”.
15	ERT 426 Clause 4.4.1 (2)(3)	deleted; “(eco-friendly type)”.
16	ERT 52 Clause 1.23 30)	Chainage of non standard walkway amended
17	Clause 6.4.2. e) 2)	Chainage of area for non standard supports amended
18	ERT-360- 2.1 General Power Supply Scope of Works. 9)	Deleted Statements: “Power supply to the CCTV cameras mounted on the lighting poles in the Depot areas shall be provided by the Power distribution system. The power supply to the antenna along the trackway between stations shall be provided by the Power distribution system.”
19	ERT 59- 1.27.6 Rail Profile Grinding Vehicle 5 (c)	<u>Amended Clause:</u> 5) Operating equipment (c) Rail grinding velocity approximately 0.7-5 ~0.8-15km/h; approx. 500m/track Due to the grinding speed is vital for the operation productivity of the grinding works, the faster the speed will able to coup with the needs of trackwork maintenance regime (Preventive Maintenance of Rail). With the short windows of engineering hours, higher grinding speed required.

Annex B – Attachment 1

Schedule 1.2-2: Track Works

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
201	Design						
201.1	Preparation, submission of the design submission program and obtaining acceptance thereof from the Engineer.	sum	1				
201.2	Preparation, submission of the preliminary, pre-final, and final design, and obtaining Notice of No Objection thereof from the Engineer.	sum	1				
201.3	Preparation, submission of the manufacturing and installation drawings and documents, and obtaining acceptance thereof from the Engineer.	sum	1				
201.4	Preparation, submission of the preliminary, pre-final, and final design and manufacturing/fabrication drawings for the Maintenance Vehicles, and obtaining Notice of No Objection thereof from the Engineer.	sum	1				
201.5	Preparation, submission of the preliminary, pre-final, and final design and manufacturing/fabrication drawings for the walkway and its subcomponent, and obtaining Notice of No Objection thereof from the Engineer.	sum	1				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
201.6	Compilation, submission of the as-built documents and obtaining acceptance thereof from the Engineer.	sum	1				
	(Payment for Milestones 201.1 to 201.6 will be made upon completion of each.)	-	-	-	-	-	-
	Sub-total for Milestone No. 201						
202	Manufacture, Transportation, Delivery and Storage						
202.1	Manufacture of rails and associated components (including, fastenings, turnouts, elastic pads, joints and other associated accessories).	sum	1				
	(Payment for each batch of rails and associated components loaded for shipment to the Philippines will be made in proportion to the total quantities required.)	-	-	-	-	-	-
202.2	Transportation of rails and associated components from the place of manufacture to the Philippines.	sum	1				
	(Payment for each shipment arriving safely at the port of unloading in the Philippines will be made in proportion to the total quantities required for the Project.)	-	-	-	-	-	-
202.3	Delivery to the Contractor’s secure storage area of rails and associated components.	sum	1				

Schedule 1.2-2: Track Works

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
201	Design						
201.1	Preparation, submission of the design submission program and obtaining acceptance thereof from the Engineer.	sum	1				
201.2	Preparation, submission of the preliminary, pre-final, and final design, and obtaining Notice of No Objection thereof from the Engineer.	sum	1				
201.3	Preparation, submission of the manufacturing and installation drawings and documents, and obtaining acceptance thereof from the Engineer.	sum	1				
201.4	Preparation, submission of the preliminary, pre-final, and final design and manufacturing/fabrication drawings for the Maintenance Vehicles, and obtaining Notice of No Objection thereof from the Engineer.	sum	1				
<u>201.5</u>	<u>Preparation, submission of the preliminary, pre-final, and final design and manufacturing/fabrication drawings for the walkway and its subcomponent, and obtaining Notice of No Objection thereof from the Engineer.</u>	<u>sum</u>	<u>1</u>				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
201. 65	Compilation, submission of the as-built documents and obtaining acceptance thereof from the Engineer.	sum	1				
	(Payment for Milestones 201.1 to 201. 65 will be made upon completion of each.)	-	-	-	-	-	-
	Sub-total for Milestone No. 201						
202	Manufacture, Transportation, Delivery and Storage						
202.1	Manufacture of rails and associated components (including, fastenings, turnouts, elastic pads, joints and other associated accessories).	sum	1				
	(Payment for each batch of rails and associated components loaded for shipment to the Philippines will be made in proportion to the total quantities required.)	-	-	-	-	-	-
202.2	Transportation of rails and associated components from the place of manufacture to the Philippines.	sum	1				
	(Payment for each shipment arriving safely at the port of unloading in the Philippines will be made in proportion to the total quantities required for the Project.)	-	-	-	-	-	-

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
	(Payment for each batch delivered to the Contractor's storage area and accepted by the Engineer will be made in proportion to the total quantities required, but only if specifically designated as being items owned by the Employer.)	-	-	-	-	-	-
202.7	Manufacture of Maintenance Vehicles incorporating all onboard systems equipment.	sum	1				
202.8	Delivery of Maintenance Vehicles to Depot.	sum	1				
	(Payment for the Maintenance Vehicles will be made after delivery to the Depot and acceptance thereof by the Engineer.)	-	-	-	-	-	-
202.9	Manufacture/supply of walkway, its subcomponent, and associated accessories.	sum	1				
	(Payment for each batch of precast walkway, its subcomponent and associated accessories loaded for shipment to the Philippines will be made in proportion to the total quantities required.)	-	-	-	-	-	-
202.10	Transportation of walkway, its subcomponent and associated accessories from the place of manufacture to the Philippines.	sum	1				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
	(Payment for each shipment arriving safely at the port of unloading in the Philippines will be made in proportion to the total quantities required.)	-	-	-	-	-	-
202.11	Delivery to the Contractor’s secure storage area of walkway, its subcomponent and associated accessories.	sum	1				
	(Payment for each batch delivered to the Contractor’s storage area and accepted by the Engineer will be made in proportion to the total quantities required, but only if specifically designated as being items owned by the Employer.)	-	-	-	-	-	-
	Sub-total for Milestone No. 202						
203	Construction, Installation and Testing						
203.1	Delivery to the Site, construction, installation and testing of Track Works (including any ballast or sub-ballast requirements, pre-installation tests, post-installation tests and partial acceptance tests for all subsystems).	sum	1				
	(Payment for fully tested portions of installed Track Works that have been accepted by the Engineer will be made in proportion to the total length required.)	-	-	-	-	-	-

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
	(Payment for each batch delivered to the Contractor's storage area and accepted by the Engineer will be made in proportion to the total quantities required, but only if specifically designated as being items owned by the Employer.)	-	-	-	-	-	-
202.7	Manufacture of Maintenance Vehicles incorporating all onboard systems equipment.	sum	1				
202.8	Delivery of Maintenance Vehicles to Depot.	sum	1				
	(Payment for the Maintenance Vehicles will be made after delivery to the Depot and acceptance thereof by the Engineer.)	-	-	-	-	-	-
<u>202.9</u>	<u>Manufacture/supply of walkway, its subcomponent, and associated accessories.</u>	<u>sum</u>	<u>1</u>				
	<u>(Payment for each batch of precast walkway, its subcomponent and associated accessories loaded for shipment to the Philippines will be made in proportion to the total quantities required.)</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>
<u>202.10</u>	<u>Transportation of walkway, its subcomponent and associated accessories from the place of manufacture to the Philippines.</u>	<u>sum</u>	<u>1</u>				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
	<u>(Payment for each shipment arriving safely at the port of unloading in the Philippines will be made in proportion to the total quantities required.)</u>	=	=	=	=	=	=
<u>202.11</u>	<u>Delivery to the Contractor's secure storage area of walkway, its subcomponent and associated accessories.</u>	<u>sum</u>	<u>1</u>				
	<u>(Payment for each batch delivered to the Contractor's storage area and accepted by the Engineer will be made in proportion to the total quantities required, but only if specifically designated as being items owned by the Employer.)</u>	=	=	=	=	=	=
	Sub-total for Milestone No. 202						
203	Construction, Installation and Testing						
<u>203.1</u>	Delivery to the Site, construction, installation and testing of Track Works (including any ballast or sub-ballast requirements, pre-installation tests, post-installation tests and partial acceptance tests for all subsystems).	sum	1				
	(Payment for fully tested portions of installed Track Works that have been accepted by the Engineer will be made in proportion to the total length required.)	-	-	-	-	-	-

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
203.2	Delivery to the Site, construction, installation and testing of walkway and its subcomponent (including any pre-installation tests, post-installation tests and partial acceptance tests for all subsystems).	sum	1				
	(Payment for fully tested portions of installed walkway and its subcomponent that have been accepted by the Engineer will be made in proportion to the total length required.)	-	-	-	-	-	-
	Sub-total for Milestone No. 203						
204	System Acceptance Tests, Integrated Testing and Commissioning						
204.1	Conducting, and obtaining the Engineer’s acceptance of, the System Acceptance Tests, Integrated Testing and Commissioning, and Completion of Test Running and Trial Running, and obtaining the Safety Certificate from the relevant Authority for the commercial operation of the railway.	sum	1				
204.2	Conducting, and obtaining the Engineer’s acceptance of, the System Acceptance Tests, Integrated Testing and Commissioning for the Maintenance Vehicles.	sum	1				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
<u>203.2</u>	<u>Delivery to the Site, construction, installation and testing of walkway and its subcomponent (including any pre-installation tests, post-installation tests and partial acceptance tests for all subsystems).</u>	<u>sum</u>	<u>1</u>				
	<u>(Payment for fully tested portions of installed walkway and its subcomponent that have been accepted by the Engineer will be made in proportion to the total length required.)</u>	=	=	=	=	=	=
	<u>Sub-total for Milestone No. 203</u>						
204	System Acceptance Tests, Integrated Testing and Commissioning						
204.1	Conducting, and obtaining the Engineer’s acceptance of, the System Acceptance Tests, Integrated Testing and Commissioning, and Completion of Test Running and Trial Running, and obtaining the Safety Certificate from the relevant Authority for the commercial operation of the railway.	sum	1				
204.2	Conducting, and obtaining the Engineer’s acceptance of, the System Acceptance Tests, Integrated Testing and Commissioning for the Maintenance Vehicles.	sum	1				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
	(Payment for each of the above two Milestones will be made upon completion of all required tests and commissioning.)	-	-	-	-	-	-
	Sub-total for Milestone No. 204						
205	Spare Parts, Special Tools, Testing Equipment						
	Delivery to the Site of spare parts, consumables, special tools, testing equipment and measurement instruments, including drawings and catalogues in English (original plus 5 hard copies), and obtaining acceptance thereof from the Engineer.	sum	1				
	(Payment will be made upon completion of the delivery of all spare parts, tools and testing equipment.)	-	-	-	-	-	-
206	Training, and Operation and Maintenance Manuals						
206.1	Preparing and delivering Operating Manuals and Maintenance Manuals together with record drawings/catalogues in English (original plus 5 hard copies and 2 copies in electronic (soft) format), and obtaining acceptance thereof from the Engineer.	sum	1				
	(Payment will be made upon completion of the delivery of all the above documentation and data.)	-	-	-	-	-	-

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
	(Payment for each of the above two Milestones will be made upon completion of all required tests and commissioning.)	-	-	-	-	-	-
	Sub-total for Milestone No. 2043						
205	Spare Parts, Special Tools, Testing Equipment						
	Delivery to the Site of spare parts, consumables, special tools, testing equipment and measurement instruments, including drawings and catalogues in English (original plus 5 hard copies), and obtaining acceptance thereof from the Engineer.	sum	1				
	(Payment will be made upon completion of the delivery of all spare parts, tools and testing equipment.)	-	-	-	-	-	-
206	Training, and Operation and Maintenance Manuals						
206.1	Preparing and delivering Operating Manuals and Maintenance Manuals together with record drawings/catalogues in English (original plus 5 hard copies and 2 copies in electronic (soft) format), and obtaining acceptance thereof from the Engineer.	sum	1				
	(Payment will be made upon completion of the delivery of all the above documentation and data.)	-	-	-	-	-	-

Schedule 1.3-2: Track Works

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
201	Design						
201.1	Preparation, submission of the design submission program and obtaining acceptance thereof from the Engineer.	sum	1				
201.2	Preparation, submission of the preliminary, pre-final, and final design, and obtaining Notice of No Objection thereof from the Engineer.	sum	1				
201.3	Preparation, submission of the manufacturing and installation drawings and documents, and obtaining acceptance thereof from the Engineer.	sum	1				
201.4	Preparation, submission of the preliminary, pre-final, and final design and manufacturing/fabrication drawings for the Maintenance Vehicles, and obtaining Notice of No Objection thereof from the Engineer.	sum	1				
201.5	Preparation, submission of the preliminary, pre-final, and final design and manufacturing/fabrication drawings for the walkway and its subcomponent, and obtaining Notice of No Objection thereof from the Engineer.	sum	1				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
201.6	Compilation, submission of the as-built documents and obtaining acceptance thereof from the Engineer.	sum	1				
	(Payment for Milestones 201.1 to 201.6 will be made upon completion of each.)	-	-	-	-	-	-
	Sub-total for Milestone No. 201						
202	Manufacture, Transportation, Delivery and Storage						
202.1	Manufacture of rails and associated components (including, fastenings, turnouts, elastic pads, joints and other associated accessories).	sum	1				
	(Payment for each batch of rails and associated components loaded for shipment to the Philippines will be made in proportion to the total quantities required.)	-	-	-	-	-	-
202.2	Transportation of rails and associated components from the place of manufacture to the Philippines.	sum	1				
	(Payment for each shipment arriving safely at the port of unloading in the Philippines will be made in proportion to the total quantities required for the Project.)	-	-	-	-	-	-
202.3	Delivery to the Contractor’s secure storage area of rails and associated components.	sum	1				

Schedule 1.3-2: Track Works

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
201	Design						
201.1	Preparation, submission of the design submission program and obtaining acceptance thereof from the Engineer.	sum	1				
201.2	Preparation, submission of the preliminary, pre-final, and final design, and obtaining Notice of No Objection thereof from the Engineer.	sum	1				
201.3	Preparation, submission of the manufacturing and installation drawings and documents, and obtaining acceptance thereof from the Engineer.	sum	1				
201.4	Preparation, submission of the preliminary, pre-final, and final design and manufacturing/fabrication drawings for the Maintenance Vehicles, and obtaining Notice of No Objection thereof from the Engineer.	sum	1				
<u>201.5</u>	<u>Preparation, submission of the preliminary, pre-final, and final design and manufacturing/fabrication drawings for the walkway and its subcomponent, and obtaining Notice of No Objection thereof from the Engineer.</u>	<u>sum</u>	<u>1</u>				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
201. 65	Compilation, submission of the as-built documents and obtaining acceptance thereof from the Engineer.	sum	1				
	(Payment for Milestones 201.1 to 201. 65 will be made upon completion of each.)	-	-	-	-	-	-
	Sub-total for Milestone No. 201						
202	Manufacture, Transportation, Delivery and Storage						
202.1	Manufacture of rails and associated components (including, fastenings, turnouts, elastic pads, joints and other associated accessories).	sum	1				
	(Payment for each batch of rails and associated components loaded for shipment to the Philippines will be made in proportion to the total quantities required.)	-	-	-	-	-	-
202.2	Transportation of rails and associated components from the place of manufacture to the Philippines.	sum	1				
	(Payment for each shipment arriving safely at the port of unloading in the Philippines will be made in proportion to the total quantities required for the Project.)	-	-	-	-	-	-

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
	(Payment for each batch delivered to the Contractor's storage area and accepted by the Engineer will be made in proportion to the total quantities required, but only if specifically designated as being items owned by the Employer.)	-	-	-	-	-	-
202.7	Manufacture of Maintenance Vehicles incorporating all onboard systems equipment.	sum	1				
202.8	Delivery of Maintenance Vehicles to Depot.	sum	1				
	(Payment for the Maintenance Vehicles will be made after delivery to the Depot and acceptance thereof by the Engineer.)	-	-	-	-	-	-
202.9	Manufacture/supply of walkway, its subcomponent, and associated accessories.	sum	1				
	(Payment for each batch of precast walkway, its subcomponent and associated accessories loaded for shipment to the Philippines will be made in proportion to the total quantities required.)	-	-	-	-	-	-
202.10	Transportation of walkway, its subcomponent and associated accessories from the place of manufacture to the Philippines.	sum	1				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
	(Payment for each shipment arriving safely at the port of unloading in the Philippines will be made in proportion to the total quantities required.)	-	-	-	-	-	-
202.11	Delivery to the Contractor’s secure storage area of walkway, its subcomponent and associated accessories.	sum	1				
	(Payment for each batch delivered to the Contractor’s storage area and accepted by the Engineer will be made in proportion to the total quantities required, but only if specifically designated as being items owned by the Employer.)	-	-	-	-	-	-
	Sub-total for Milestone No. 202						
203	Construction, Installation and Testing						
203.1	Delivery to the Site, construction, installation and testing of Track Works (including any ballast or sub-ballast requirements, pre-installation tests, post-installation tests and partial acceptance tests for all subsystems).	sum	1				
	(Payment for fully tested portions of installed Track Works that have been accepted by the Engineer will be made in proportion to the total length required.)	-	-	-	-	-	-

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
	(Payment for each batch delivered to the Contractor's storage area and accepted by the Engineer will be made in proportion to the total quantities required, but only if specifically designated as being items owned by the Employer.)	-	-	-	-	-	-
202.7	Manufacture of Maintenance Vehicles incorporating all onboard systems equipment.	sum	1				
202.8	Delivery of Maintenance Vehicles to Depot.	sum	1				
	(Payment for the Maintenance Vehicles will be made after delivery to the Depot and acceptance thereof by the Engineer.)	-	-	-	-	-	-
<u>202.9</u>	<u>Manufacture/supply of walkway, its subcomponent, and associated accessories.</u>	<u>sum</u>	<u>1</u>				
	<u>(Payment for each batch of precast walkway, its subcomponent and associated accessories loaded for shipment to the Philippines will be made in proportion to the total quantities required.)</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>
<u>202.10</u>	<u>Transportation of walkway, its subcomponent and associated accessories from the place of manufacture to the Philippines.</u>	<u>sum</u>	<u>1</u>				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
	<u>(Payment for each shipment arriving safely at the port of unloading in the Philippines will be made in proportion to the total quantities required.)</u>	=	=	=	=	=	=
<u>202.11</u>	<u>Delivery to the Contractor’s secure storage area of walkway, its subcomponent and associated accessories.</u>	<u>sum</u>	<u>1</u>				
	<u>(Payment for each batch delivered to the Contractor’s storage area and accepted by the Engineer will be made in proportion to the total quantities required, but only if specifically designated as being items owned by the Employer.)</u>	=	=	=	=	=	=
	Sub-total for Milestone No. 202						
203	Construction, Installation and Testing						
<u>203.1</u>	Delivery to the Site, construction, installation and testing of Track Works (including any ballast or sub-ballast requirements, pre-installation tests, post-installation tests and partial acceptance tests for all subsystems).	sum	1				
	(Payment for fully tested portions of installed Track Works that have been accepted by the Engineer will be made in proportion to the total length required.)	-	-	-	-	-	-

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
203.2	Delivery to the Site, construction, installation and testing of walkway and its subcomponent (including any pre-installation tests, post-installation tests and partial acceptance tests for all subsystems).	sum	1				
	(Payment for fully tested portions of installed walkway and its subcomponent that have been accepted by the Engineer will be made in proportion to the total length required.)	-	-	-	-	-	-
	Sub-total for Milestone No. 203						
204	System Acceptance Tests, Integrated Testing and Commissioning						
204.1	Conducting, and obtaining the Engineer’s acceptance of, the System Acceptance Tests, Integrated Testing and Commissioning and Completion of Test Running and Trial Running, and obtaining the Safety Certificate from the relevant Authority for the commercial operation of the railway.	sum	1				
204.2	Conducting, and obtaining the Engineer’s acceptance of, the System Acceptance Tests, Integrated Testing and Commissioning for the Maintenance Vehicles.	sum	1				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
<u>203.2</u>	<u>Delivery to the Site, construction, installation and testing of walkway and its subcomponent (including any pre-installation tests, post-installation tests and partial acceptance tests for all subsystems).</u>	<u>sum</u>	<u>1</u>				
	<u>(Payment for fully tested portions of installed walkway and its subcomponent that have been accepted by the Engineer will be made in proportion to the total length required.)</u>	=	=	=	=	=	=
	<u>Sub-total for Milestone No. 203</u>						
204	System Acceptance Tests, Integrated Testing and Commissioning						
204.1	Conducting, and obtaining the Engineer’s acceptance of, the System Acceptance Tests, Integrated Testing and Commissioning and Completion of Test Running and Trial Running, and obtaining the Safety Certificate from the relevant Authority for the commercial operation of the railway.	sum	1				
204.2	Conducting, and obtaining the Engineer’s acceptance of, the System Acceptance Tests, Integrated Testing and Commissioning for the Maintenance Vehicles.	sum	1				

Schedule 1.4-2: Track Works

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
201	Design						
201.1	Preparation, submission of the design submission program and obtaining acceptance thereof from the Engineer.	sum	1				
201.2	Preparation, submission of the preliminary, pre-final, and final design, and obtaining Notice of No Objection thereof from the Engineer.	sum	1				
201.3	Preparation, submission of the manufacturing and installation drawings and documents, and obtaining acceptance thereof from the Engineer.	sum	1				
201.4	Preparation, submission of the preliminary, pre-final, and final design and manufacturing/fabrication drawings for the Maintenance Vehicles, and obtaining Notice of No Objection thereof from the Engineer.	sum	1				
201.5	Preparation, submission of the preliminary, pre-final, and final design and manufacturing/fabrication drawings for the walkway and its subcomponent, and obtaining Notice of No Objection thereof from the Engineer.	sum	1				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
201.6	Compilation, submission of the as-built documents and obtaining acceptance thereof from the Engineer.	sum	1				
	(Payment for Milestones 201.1 to 201.6 will be made upon completion of each.)	-	-	-	-	-	-
	Sub-total for Milestone No. 201						
202	Manufacture, Transportation, Delivery and Storage						
202.1	Manufacture of rails and associated components (including, fastenings, turnouts, elastic pads, joints and other associated accessories).	sum	1				
	(Payment for each batch of rails and associated components loaded for shipment to the Philippines will be made in proportion to the total quantities required.)	-	-	-	-	-	-
202.2	Transportation of rails and associated components from the place of manufacture to the Philippines.	sum	1				
	(Payment for each shipment arriving safely at the port of unloading in the Philippines will be made in proportion to the total quantities required for the Project.)	-	-	-	-	-	-
202.3	Delivery to the Contractor’s secure storage area of rails and associated components.	sum	1				

Schedule 1.4-2: Track Works

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
201	Design						
201.1	Preparation, submission of the design submission program and obtaining acceptance thereof from the Engineer.	sum	1				
201.2	Preparation, submission of the preliminary, pre-final, and final design, and obtaining Notice of No Objection thereof from the Engineer.	sum	1				
201.3	Preparation, submission of the manufacturing and installation drawings and documents, and obtaining acceptance thereof from the Engineer.	sum	1				
201.4	Preparation, submission of the preliminary, pre-final, and final design and manufacturing/fabrication drawings for the Maintenance Vehicles, and obtaining Notice of No Objection thereof from the Engineer.	sum	1				
<u>201.5</u>	<u>Preparation, submission of the preliminary, pre-final, and final design and manufacturing/fabrication drawings for the walkway and its subcomponent, and obtaining Notice of No Objection thereof from the Engineer.</u>	<u>sum</u>	<u>1</u>				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
201. 65	Compilation, submission of the as-built documents and obtaining acceptance thereof from the Engineer.	sum	1				
	(Payment for Milestones 201.1 to 201. 65 will be made upon completion of each.)	-	-	-	-	-	-
	Sub-total for Milestone No. 201						
202	Manufacture, Transportation, Delivery and Storage						
202.1	Manufacture of rails and associated components (including, fastenings, turnouts, elastic pads, joints and other associated accessories).	sum	1				
	(Payment for each batch of rails and associated components loaded for shipment to the Philippines will be made in proportion to the total quantities required.)	-	-	-	-	-	-
202.2	Transportation of rails and associated components from the place of manufacture to the Philippines.	sum	1				
	(Payment for each shipment arriving safely at the port of unloading in the Philippines will be made in proportion to the total quantities required for the Project.)	-	-	-	-	-	-

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
	(Payment for each batch delivered to the Contractor's storage area and accepted by the Engineer will be made in proportion to the total quantities required, but only if specifically designated as being items owned by the Employer.)	-	-	-	-	-	-
202.7	Manufacture of Maintenance Vehicles incorporating all onboard systems equipment.	sum	1				
202.8	Delivery of Maintenance Vehicles to Depot.	sum	1				
	(Payment for the Maintenance Vehicles will be made after delivery to the Depot and acceptance thereof by the Engineer.)	-	-	-	-	-	-
202.9	Manufacture/supply of walkway, its subcomponent, and associated accessories.	sum	1				
	(Payment for each batch of precast walkway, its subcomponent and associated accessories loaded for shipment to the Philippines will be made in proportion to the total quantities required.)	-	-	-	-	-	-
202.10	Transportation of walkway, its subcomponent and associated accessories from the place of manufacture to the Philippines.	sum	1				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
	(Payment for each shipment arriving safely at the port of unloading in the Philippines will be made in proportion to the total quantities required.)	-	-	-	-	-	-
202.11	Delivery to the Contractor’s secure storage area of walkway, its subcomponent and associated accessories.	sum	1				
	(Payment for each batch delivered to the Contractor’s storage area and accepted by the Engineer will be made in proportion to the total quantities required, but only if specifically designated as being items owned by the Employer.)	-	-	-	-	-	-
	Sub-total for Milestone No. 202						
203	Construction, Installation and Testing						
203.1	Delivery to the Site, construction, installation and testing of Track Works (including any ballast or sub-ballast requirements, pre-installation tests, post-installation tests and partial acceptance tests for all subsystems).	sum	1				
	(Payment for fully tested portions of installed Track Works that have been accepted by the Engineer will be made in proportion to the total length required.)	-	-	-	-	-	-

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
	(Payment for each batch delivered to the Contractor's storage area and accepted by the Engineer will be made in proportion to the total quantities required, but only if specifically designated as being items owned by the Employer.)	-	-	-	-	-	-
202.7	Manufacture of Maintenance Vehicles incorporating all onboard systems equipment.	sum	1				
202.8	Delivery of Maintenance Vehicles to Depot.	sum	1				
	(Payment for the Maintenance Vehicles will be made after delivery to the Depot and acceptance thereof by the Engineer.)	-	-	-	-	-	-
<u>202.9</u>	<u>Manufacture/supply of walkway, its subcomponent, and associated accessories.</u>	<u>sum</u>	<u>1</u>				
	<u>(Payment for each batch of precast walkway, its subcomponent and associated accessories loaded for shipment to the Philippines will be made in proportion to the total quantities required.)</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>
<u>202.10</u>	<u>Transportation of walkway, its subcomponent and associated accessories from the place of manufacture to the Philippines.</u>	<u>sum</u>	<u>1</u>				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
	<u>(Payment for each shipment arriving safely at the port of unloading in the Philippines will be made in proportion to the total quantities required.)</u>	=	=	=	=	=	=
<u>202.11</u>	<u>Delivery to the Contractor’s secure storage area of walkway, its subcomponent and associated accessories.</u>	<u>sum</u>	<u>1</u>				
	<u>(Payment for each batch delivered to the Contractor’s storage area and accepted by the Engineer will be made in proportion to the total quantities required, but only if specifically designated as being items owned by the Employer.)</u>	=	=	=	=	=	=
	Sub-total for Milestone No. 202						
203	Construction, Installation and Testing						
<u>203.1</u>	Delivery to the Site, construction, installation and testing of Track Works (including any ballast or sub-ballast requirements, pre-installation tests, post-installation tests and partial acceptance tests for all subsystems).	sum	1				
	(Payment for fully tested portions of installed Track Works that have been accepted by the Engineer will be made in proportion to the total length required.)	-	-	-	-	-	-

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
203.2	Delivery to the Site, construction, installation and testing of walkway and its subcomponent (including any pre-installation tests, post-installation tests and partial acceptance tests for all subsystems).	sum	1				
	(Payment for fully tested portions of installed walkway and its subcomponent that have been accepted by the Engineer will be made in proportion to the total length required.)	-	-	-	-	-	-
	Sub-total for Milestone No. 203						
204	System Acceptance Tests, Integrated Testing and Commissioning						
204.1	Conducting, and obtaining the Engineer’s acceptance of, the System Acceptance Tests, Integrated Testing and Commissioning and Completion of Test Running and Trial Running, and obtaining the Safety Certificate from the relevant Authority for the commercial operation of the railway.	sum	1				
204.2	Conducting, and obtaining the Engineer’s acceptance of, the System Acceptance Tests, Integrated Testing and Commissioning for the Maintenance Vehicles.	sum	1				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
<u>203.2</u>	<u>Delivery to the Site, construction, installation and testing of walkway and its subcomponent (including any pre-installation tests, post-installation tests and partial acceptance tests for all subsystems).</u>	<u>sum</u>	<u>1</u>				
	<u>(Payment for fully tested portions of installed walkway and its subcomponent that have been accepted by the Engineer will be made in proportion to the total length required.)</u>	=	=	=	=	=	=
	<u>Sub-total for Milestone No. 203</u>						
204	System Acceptance Tests, Integrated Testing and Commissioning						
204.1	Conducting, and obtaining the Engineer’s acceptance of, the System Acceptance Tests, Integrated Testing and Commissioning and Completion of Test Running and Trial Running, and obtaining the Safety Certificate from the relevant Authority for the commercial operation of the railway.	sum	1				
204.2	Conducting, and obtaining the Engineer’s acceptance of, the System Acceptance Tests, Integrated Testing and Commissioning for the Maintenance Vehicles.	sum	1				

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
	(Payment for each of the above two Milestones will be made upon completion of all required tests and commissioning.)	-	-	-	-	-	-
	Sub-total for Milestone No. 204						
205	Spare Parts, Special Tools, Testing Equipment						
	Delivery to the Site of spare parts, consumables, special tools, testing equipment and measurement instruments, including drawings and catalogues in English (original plus 5 hard copies), and obtaining acceptance thereof from the Engineer.	sum	1				
	(Payment will be made upon completion of the delivery of all spare parts, tools and testing equipment.)	-	-	-	-	-	-
206	Training, and Operation and Maintenance Manuals						
206.1	Preparing and delivering Operating Manuals and Maintenance Manuals together with record drawings/catalogues in English (original plus 5 hard copies and 2 copies in electronic (soft) format), and obtaining acceptance thereof from the Engineer.	sum	1				
	(Payment will be made upon completion of the delivery of all the above documentation and data.)	-	-	-	-	-	-

Milestone No.	Work Description (Milestone)	Unit	Quantity	Unit Rate/Price		Amount	
				Local	Foreign	Local	Foreign
	(Payment for each of the above two Milestones will be made upon completion of all required tests and commissioning.)	-	-	-	-	-	-
	Sub-total for Milestone No. 2043						
205	Spare Parts, Special Tools, Testing Equipment						
	Delivery to the Site of spare parts, consumables, special tools, testing equipment and measurement instruments, including drawings and catalogues in English (original plus 5 hard copies), and obtaining acceptance thereof from the Engineer.	sum	1				
	(Payment will be made upon completion of the delivery of all spare parts, tools and testing equipment.)	-	-	-	-	-	-
206	Training, and Operation and Maintenance Manuals						
206.1	Preparing and delivering Operating Manuals and Maintenance Manuals together with record drawings/catalogues in English (original plus 5 hard copies and 2 copies in electronic (soft) format), and obtaining acceptance thereof from the Engineer.	sum	1				
	(Payment will be made upon completion of the delivery of all the above documentation and data.)	-	-	-	-	-	-

- noticeable impact on service.
- vi. The BP system shall have flexible control of charge-discharge cycles in accordance to the battery’s State-of- Charge.
 - vii. The BP system shall provide power to the Overhead Contact line System with DC traction supply at a nominal 1500V DC and return shall be via the running rails.
 - viii. The instantaneous voltage at any train along the route shall not fall below 1100V DC during normal operations with all substations in rated service and shall not fall below 1000V DC with any abnormal operating condition under any single outage condition.
 - ix. The exact number, the location and the required capacity of the battery post shall be determined during the traction power simulation study. The simulation shall determine the optimum quantity and position of the battery posts to maximize the overall energy efficiency of the system. The quantity of battery posts as stated in Clause 4.1.1 is for reference purposed only.
 - x. Most suitable power storage system in terms of high energy density, high power density and economic efficiency.
 - xi. Housing for substation battery panel for substation battery post shall be suitable for indoor or outdoor installation depending on space available.
- 8) Supervisory Control and Data Acquisition (SCADA)
- i. The power supply system and the distribution system shall normally be controlled remotely from the SCADA system and monitored at the SCADA system in the OCC.
 - ii. Telephone sets shall be installed at each TSS, BP and SP and provided by the Communication Contractor. The Contractor shall coordinate with the Communication Contractor about the type of telephone set, location, numbers of line and so forth.
- 9) 6.6kV distribution system for power supply system
- i. Looped 6.6kV parallel power distribution system (ordinary use side and standby use side) shall be designed and provided. One system shall be connected to a north bound substation and another is connected a south bound substation.
 - ii. The reciprocal support circuit shall be connected between the above two substations of each system. In case ordinary use distribution line from a substation stops, electric power can supply through other side line.
 - iii. One circuit for each direction in looped system distribution line is prepared for Electric rooms.
 - iv. Distribution transformer 69kV/6.6kV are prepared in the substations and listed in Chapter 5, and in depot exclusive use two Distribution transformers are designed.
- 10) TSS equipment
- i. 69kV Switch gears:
69kV outdoor type, metal enclosed gas insulated or air insulated switchgear
 - ii. Rectifier equipment
69kV/1180V gas insulated self-cooling or oil insulated transformer self-cooling

- iv. Distribution transformer 69kV/6.6kV are prepared in the substations and listed in Chapter 5, and in depot exclusive use two Distribution transformers are designed.

10) TSS equipment

- i. 69kV Switch gears:
69kV outdoor type, metal enclosed gas insulated or air insulated switchgear (~~eco-friendly type~~)
- ii. Rectifier equipment
69kV/1180V gas insulated self-cooling or oil insulated transformer self-cooling Rectifier transformer (eco-friendly type);
Rectifier, 1500V 6000kW, 12 pulses pure water heat pipe cooling type,
AC Bus duct or cable connection between Rectifier Transformer and Rectifier
DC 1500V outdoor type metal enclosed air insulated switchgear with high-speed circuit breaker and disconnecting switches
- iii. Distribution Transformer
The 69kV/6.6kV distribution transformers shall be gas insulated or oil insulated self-cooling.
- iv. DC 1500V Indoor type air insulated switchgear with disconnecting switches.
DC 1500V Switch gears
DC 1500V Indoor type air insulated switchgear for Rectifier positive protection.
DC 1500V Indoor type air insulated switchgear for Rectifier Negative separation.
DC 1500V Indoor type air insulated switchgear for DC feeder protection
- v. Guidance on quantifying greenhouse gas emission reductions from the baseline for electrical and electronic products and systems shall be considered in accordance with IEC TR 62726.

11) Harmonics

- i. The power supply design shall comply with the maximum of total permissible voltage distortion of electric companies’ requirements for limitation of higher harmonics at the 69 kV termination points to the electric companies’ grid.
- ii. Harmonic distortion of output current shall be not more than 5% in total, not more than 3% each (at rated output). The exact requirements shall be determined by each power utility company

4.2 Definitions and Abbreviations

4.2.1 Definitions

In This Specification, the following defined terms shall have the meanings ascribed to them below:

and

69kV circuit breaker units for protecting rectifier transformer.

- 2) Each of 69kV switchgear with circuit breaker shall be designed with adequate current ratings and short circuit braking duty according to its intended function.
 - 3) The 69kV switchgear shall be compact module type in design, metal enclosed and suitable for outdoor installation, the 69kV switchgear shall comprise any of the following.
 - a. Air insulated vacuum circuit breakers withdrawable type.
 - b. Gas insulated vacuum circuit breakers withdrawable type.
 - 4) The 69kV switchgear shall be designed for the following minimum ratings and not exceed 2.5 p.u. overvoltage for any switching or breaking duty:
 - a. Rated voltage: 69kV
 - b. Number of phases: 3
 - c. Rated frequency: 60Hz
 - d. Rated short circuit breaking and making capacity: to meet the 69kV/6.6kV system fault level not less than 50kA
 - e. Rated current: 630A
 - f. Auxiliary power supply voltage for operating device: 105V DC
 - g. Auxiliary power supply voltage for auxiliary circuit: 400/230V AC
 - 5) The 69kV switchgear shall include the following equipment:
 - a. Circuit breaker which can withdraw or fix mounted circuit breakers;
 - b. Earthing switches;
 - c. Current transformers of suitable ratings and temperature class for protection and measuring; and
 - d. Voltage transformers of suitable ratings and temperature class for protection and measuring.
 - e. Lightning arrestor shall be installed with adequate specification in accordance with the Philippine Electrical Code.
 - 6) Protection and measuring facilities shall include the following:
 - a. 69kV bus zone protection relays shall be provided;
 - b. Voltmeter and under-voltage protection for bus sections shall be provided; and
 - c. Ammeter, kilowatt meter, over-current and earth fault protection for rectifier circuits.
 - 7) Guidance on quantifying greenhouse gas emission reductions from the baseline for electrical and electronic products and systems shall be considered in accordance with IEC TR 62726.
- (3) DC Switchgear
- 1) DC switchgear comprising DC high speed circuit breakers shall be provided for switching off the rectifier DC incoming feeds and outgoing feeds to overhead contact

4.4 Technical Requirements

4.4.1 Switchgear

(1) Standards

All 69kV and high voltage switchgear shall be designed and manufactured in accordance with the requirements of applicable Philippine Standards equivalent to IEC 62271, High-Voltage Switch gear and Control gear or equivalent as appropriate.

(2) 69kV Switchgear

1) 69kV switchgear for TSS shall include the following:

69kV incoming circuit breaker units for ordinary feeders and/or for standby feeders, and

69kV circuit breaker units for protecting rectifier transformer.

2) Each of 69kV switchgear with circuit breaker shall be designed with adequate current ratings and short circuit braking duty according to its intended function.

3) The 69kV switchgear shall be compact module type in design, metal enclosed and suitable for outdoor installation, the 69kV switchgear shall comprise any of the following.

a. Air insulated vacuum circuit breakers withdrawable type ~~(eco-friendly type)~~.

b. Gas insulated vacuum circuit breakers withdrawable type ~~(eco-friendly type)~~.

4) The 69kV switchgear shall be designed for the following minimum ratings and not exceed 2.5 p.u. overvoltage for any switching or breaking duty:

a. Rated voltage: 69kV

b. Number of phases: 3

c. Rated frequency: 60Hz

d. Rated short circuit breaking and making capacity: to meet the 69kV/6.6kV system fault level not less than 50kA

e. Rated current: 630A

f. Auxiliary power supply voltage for operating device: 105V DC

g. Auxiliary power supply voltage for auxiliary circuit: 400/230V AC

5) The 69kV switchgear shall include the following equipment:

a. Circuit breaker which can withdraw or fix mounted circuit breakers;

b. Earthing switches;

c. Current transformers of suitable ratings and temperature class for protection and measuring; and

d. Voltage transformers of suitable ratings and temperature class for protection and measuring.

e. Lightning arrester shall be installed with adequate specification in accordance with the Philippine Electrical Code.

6) Protection and measuring facilities shall include the following:

- (9) TSS equipment
- 1) 115kV Switchgear
115kV Outdoor type, metal enclosed gas insulated or air insulated switchgear;
 - 2) Rectifier equipment
115kV/1180V Gas insulated or oil insulated self-cooling type Rectify transformer;
1500V 6000kW, 12 pulses pure water heat pipe cooling type,
AC Bus duct or cable connection between Rectifier Transformer and Rectifier DC
1500V outdoor type metal enclosed air insulated switchgear with high-speed circuit
breaker and disconnecting switches
115kV/1180V rectifier transformer for TSS No.1 Substation shall be Gas insulated
transformer or non-flammable oil insulation transformer, in-door type and eco-friendly
type.
1500V 6000kW Rectifier for TSS No.1 Substation shall be natural cooling type or
heat pipe cooling type, 12 pulses, in-door type and eco-friendly type.
 - 3) Distribution Transformer
The 115kV/6.6kV distribution transformers shall be gas insulated or oil insulated self-
cooling, out-door type and eco-friendly type whilst the 115kV/6.6kV distribution
transformers for TSS No.1 Substation shall be Gas insulated or non-flammable oil
insulation transformer, in-door type and eco-friendly type.
AC 6.6kV power distribution equipment to NSRP-South Substations shall be metal-
closed type, out-door type and eco-friendly type whilst the AC 6.6kV power
distribution equipment for TSS No.1 Substation shall be metal-closed type, in-door
type and eco-friendly type.
 - 4) DC 1500V Indoor type air insulated switchgear.
DC 1500V Switch gears Indoor type air insulated switchgear with disconnecting
switches.
DC 1500V Indoor type air insulated switchgear for Rectifier positive protection.
DC 1500V disconnecting switches for Rectifier Negative separation.
DC 1500V Indoor type air insulated switchgear for Re-Generating Resistor.
 - 5) Re-generating power absorbing equipment
The power absorbing equipment shall be consisting of the following;
 - a) Resistor compartment
 - b) Regenerative chopper (IGBT based) and smoothing capacitor compartment
 - c) DC reactor, high speed DC circuit breaker and disconnection switch compartment.
 - 6) Guidance on quantifying greenhouse gas emission reductions from the baseline for
electrical and electronic products and systems shall be considered in accordance with
IEC TR 62726.
- (10) Harmonics
- 1) The power supply design shall comply with the maximum of total permissible voltage
distortion of MERALCO requirements for limitation of higher harmonics at the 115
kV termination points to the MERALCO’s grid.

supply through other side line.

- 3) One circuit for each direction in looped system distribution line is prepared for Electric rooms.
- 4) Distribution transformer 115kV/6.6kV are prepared in the substations and listed in Chapter 5, and in depot exclusive use two Distribution transformers are designed.

(9) TSS equipment

- 1) 115kV Switchgear

115kV Outdoor type, metal enclosed gas insulated or air insulated switchgear ~~(eco-friendly type)~~;

- 2) Rectifier equipment

115kV/1180V Gas insulated or oil insulated self-cooling type Rectify transformer;
 1500V 6000kW, 12 pulses pure water heat pipe cooling type,

AC Bus duct or cable connection between Rectifier Transformer and Rectifier DC 1500V outdoor type metal enclosed air insulated switchgear with high-speed circuit breaker and disconnecting switches

115kV/1180V rectifier transformer for TSS No.1 Substation shall be Gas insulated transformer or non-flammable oil insulation transformer, in-door type and eco-friendly type.

1500V 6000kW Rectifier for TSS No.1 Substation shall be natural cooling type or heat pipe cooling type, 12 pulses, in-door type and eco-friendly type.

- 3) Distribution Transformer

The 115kV/6.6kV distribution transformers shall be gas insulated or oil insulated self-cooling, out-door type and eco-friendly type whilst the 115kV/6.6kV distribution transformers for TSS No.1 Substation shall be Gas insulated or non-flammable oil insulation transformer, in-door type and eco-friendly type.

AC 6.6kV power distribution equipment to NSRP-South Substations shall be metal-closed type, out-door type and eco-friendly type whilst the AC 6.6kV power distribution equipment for TSS No.1 Substation shall be metal-closed type, in-door type and eco-friendly type.

- 4) DC 1500V Indoor type air insulated switchgear.

DC 1500V Switch gears Indoor type air insulated switchgear with disconnecting switches.

DC 1500V Indoor type air insulated switchgear for Rectifier positive protection.

DC 1500V disconnecting switches for Rectifier Negative separation.

DC 1500V Indoor type air insulated switchgear for Re-Generating Resistor.

- 5) Re-generating power absorbing equipment

The power absorbing equipment shall be consisting of the following;

- a) Resistor compartment
- b) Regenerative chopper (IGBT based) and smoothing capacitor compartment
- c) DC reactor, high speed DC circuit breaker and disconnection switch compartment.

Philippine Distribution Code

Philippine Grid Code

National Structural Code of The Philippines

National Building Code of The Philippines

Proposals for the adoption of alternative standards shall be submitted to the Engineer for review.

4.4 Technical Requirements

4.4.1 Switchgear

(1) Standards

All high voltage switchgear shall be designed and manufactured in accordance with the requirements of applicable Philippine Standards equivalent to IEC 62271, High-Voltage Switch gear and Control gear or equivalent as appropriate.

(2) 115kV Switchgear

- 1) 115kV switchgear for TSS shall include the 115kV incoming circuit breaker units for ordinary feeders and/or for standby feeders.
- 2) Each of 115kV switchgear with circuit breaker shall be designed with adequate current ratings and short circuit braking duty according to its intended function.
- 3) The 115kV switchgear shall metal enclosed and suitable for outdoor installation. The 115kV switchgear shall comprise any of the following:
 - a. Air insulated vacuum circuit breakers withdrawable type.
 - b. Gas insulated vacuum circuit breakers which can withdraw type.
- 4) The switchgear shall be designed for the following minimum ratings and not exceed 2.5 p.u. overvoltage for any switching or breaking duty:
 - a. Rated voltage: 115kV
 - b. Number of phases: 3
 - c. Rated frequency: 60Hz
 - d. Rated short circuit breaking and making capacity: to meet the 115kV system fault level not less than 40kA
 - e. Rated current: 1,250A
 - f. Auxiliary power supply voltage for operating device: 105V DC
 - g. Auxiliary power supply voltage for auxiliary circuit: 400/230V AC
- 5) The 115kV switchgear shall include the following equipment:
 - a. Circuit breaker which can withdraw or fix mounted circuit breakers;
 - b. Earthing switches

IEC 62278 (Clause 3.2.2)	Railway Applications-Specifications and demonstration of reliability, availability, maintainability and safety (RAMS)
IEC TR 62726	Guidance on quantifying greenhouse gas emission reductions
IEEE 519 (Clause 5.3.5, 5.4.5)	IEEE recommended practices and Requirements for Harmonic Control in Electrical Power Systems
BS 6651 (Clause 5.7.4)	Code of practice for protection of structures against lightning
EN 50122-1	Railway applications Fixed installations Electrical safety, Earthing and the return circuit.

Philippine Electrical Code

Philippine Distribution Code

Philippine Grid Code

National Structural Code of The Philippines

National Building Code of The Philippines

Proposals for the adoption of alternative standards shall be submitted to the Engineer for review.

4.4 Technical Requirements

4.4.1 Switchgear

(1) Standards

All high voltage switchgear shall be designed and manufactured in accordance with the requirements of applicable Philippine Standards equivalent to IEC 62271, High-Voltage Switch gear and Control gear or equivalent as appropriate.

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- 1) 115kV switchgear for TSS shall include the 115kV incoming circuit breaker units for ordinary feeders and/or for standby feeders.
- 2) Each of 115kV switchgear with circuit breaker shall be designed with adequate current ratings and short circuit braking duty according to its intended function.
- 3) The 115kV switchgear shall metal enclosed and suitable for outdoor installation. The 115kV switchgear shall comprise any of the following:
 - a. Air insulated vacuum circuit breakers withdrawable type ~~(eco-friendly type)~~.
 - b. Gas insulated vacuum circuit breakers which can withdraw type ~~(eco-friendly type)~~.
- 4) The switchgear shall be designed for the following minimum ratings and not exceed

- 29) The Contractor shall provide a suitable earthing system for the walkway taking into consideration safety and stray currents.
- 30) In the CP-S-03a and CP-S-03b contract areas between approximate chainages 13+566 to 13+906, and 15+546 to 18+550 due to clearance restrictions bespoke walkway with cable support arrangements shall be adopted.

1.24 Access Platform and Stairs

The contractor shall design, supply and install access platform for drivers and cleaning staff in the depot stabling areas. These platforms shall be positioned to allow access to the nearest passenger train doors and designed based on the following parameters:

- 1) A steel structure for the platforms with reinforced concrete foundation plinths adopting I-shaped sections except for bracing and handrails;
- 2) The structure shall have suitable corrosion protection to meet the design life requirements of this specification.
- 3) Suitable for uniformly distributed live load of at least 200 kg/m²;
- 4) Height of the platform shall be approximately 1m to allow safe access to the train doorway with a width to fit between the trains with adequate clearance. The structure is envisaged as a succession of steel portals 1 m-high, 1 m- wide, spaced 3m between each other, longitudinally connected with lateral beams with diagonal bracing;
- 5) The walking surface shall be of anti-slip material;
- 6) The parapets stanchions shall be I-shaped columns spaced at 3m with tubular handrails;
- 7) Provision of LV Power outlets on the platform;
- 8) The platform shall be suitably earthed to minimize step and touch potential.
- 9) The platform shall be protected against corrosion to be proposed by the Contractor;
- 10) Length of the platform should facilitate easy entry and exit into the Trainset for 2 Car length;
- 11) Platforms shall be located at the buffer end of the stabling yard on both side of the line in U shape; and
- 12) Suitable ramp access for platform to be made for easy entry of the O&M personals with trolleys/carts.

1.25 Depot Line Load Gauge

- 1) The Contractor shall design, test, commission and install a construction vehicle load gauge in each Depot to check that the Works Trains are within the ‘gauge’ before leaving the infrastructure maintenance area.
- 2) The contractor shall propose for Approval his construction vehicle load gauge design, which shall be in accordance with the construction vehicle load gauge shown on the Drawings.
- 3) The Contractor shall propose the installation location for each Depot.
- 4) The load gauge main frame shall be fabricated from structural steel, e.g., RHS, with a sub-frame and chains or similar, as proposed by the contractor, for the actual load

walkway to enable cables to be laid.

- ~~25)~~26) For the at grade areas concrete footings shall be provided for the walkway.
- ~~26)~~27) The contractor shall design and assemble a mock-up of the proposed walkway system for the worst case of horizontal curvature and applied cant. This mockup shall be prepared during the design phase and before the commencement of manufacture.
- ~~27)~~28) Emergency lighting shall be provided in accordance with NFPA 130 in tunnel and covered areas and other dark areas where there is no or limited ambient lighting. The lighting shall be controlled from switches located at portals, access locations, at the nearest station, and via the BMS system. In the case of the emergency lighting in the CIA approach tunnels, this shall be supplied from the generator as back up.
- 29) The Contractor shall provide a suitable earthing system for the walkway taking into consideration safety and stray currents.
- ~~28)~~30) In the CP-S-03a and CP-S-03b contract areas between approximate chainages 13+566 to 13+906, and 15+546 to 18+550 due to clearance restrictions bespoke walkway with cable support arrangements shall be adopted.

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The contractor shall design, supply and install access platform for drivers and cleaning staff in the depot stabling areas. These platforms shall be positioned to allow access to the nearest passenger train doors and designed based on the following parameters:

- 1) A steel structure for the platforms with reinforced concrete foundation plinths adopting I-shaped sections except for bracing and handrails;
- 2) The structure shall have suitable corrosion protection to meet the design life requirements of this specification.
- 3) Suitable for uniformly distributed live load of at least 200 kg/m²;
- 4) Height of the platform shall be approximately 1m to allow safe access to the train doorway with a width to fit between the trains with adequate clearance. The structure is envisaged as a succession of steel portals 1 m-high, 1 m- wide, spaced 3m between each other, longitudinally connected with lateral beams with diagonal bracing;
- 5) The walking surface shall be of anti-slip material;
- 6) The parapets stanchions shall be I-shaped columns spaced at 3m with tubular handrails;
- 7) Provision of LV Power outlets on the platform;
- 8) The platform shall be suitably earthed to minimize step and touch potential.
- 9) The platform shall be protected against corrosion to be proposed by the Contractor;
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- 11) Platforms shall be located at the buffer end of the stabling yard on both side of the line in U shape; and
- 12) Suitable ramp access for platform to be made for easy entry of the O&M personals with trolleys/carts.

For the OCS in particular, a key interface was identified as the pole positions, whereby the civil works Contractors are required to have a PC box segment with a reinforcement to support the OCS poles. Thus, it became necessary to generate and supply these pole positions in order to allow the civil contractors to progress in their design of molds and fabrication of the segments.

- 1) Tangent track: poles erected at the end of each viaduct with a maximum span of 40 meters;
- 2) Tangent track: viaduct more than 40 meters span, one additional pole erected at the middle of the viaduct span;
- 3) Traction Substations (TSS): additional two (2) poles erected for feeder cables immediately above the TSS;
- 4) Turnout / Crossover Locations: One additional OCS pole erected at the middle of the viaduct span;
- 5) Horizontal Curve Sections: For a radius 650m or less an additional pole shall be erected at the middle of the viaduct span;
- 6) Gradient Changing Sections: Shorter pole spans to ensure the contact wire adapts to the change in gradient with standard of 3 ‰ to a maximum of 5 ‰ in the contact wire;
- 7) Station Locations: Nearest pole to the station no more than 20m from the station edge.
- 8) The following viaduct operation loads are taken as permanent loads in the design of the viaduct:

For the MCRP the mast, blackout and backstay locations have been identified by the Engineer and are detailed in Appendix A of this section. Should additional or revised mast, blackout or backstay locations be required the cost for which shall be borne by the NS-01 Contractor.

e) Key Design Constraints

- 1) Between chainages 16km+860m to 17km+200m on the NSRP the railway passes under the flight path for Ninoy Aquino International Airport. Within the section the maximum height of any overline equipment, including the overhead ground wire or alternative lightning protection solution, shall not exceed EGM 25.63m which is approximately 6m above rail. During construction no equipment shall exceed EGM2008 28.00m.
- 2) In the CP-S-03a and CP-S-03b contract areas between Chainages 13+566 to 13+906 and , 15+546 to 18+550 due to clearance restrictions the use of conventional straight circular hollow sectioned masts cannot be adopted and instead alternative arrangements such as cranked masts shall be used which will ensure that all overhead line equipment and supports remains outside of the structure gauge.
- 3) Between approximate chainages 13+746 to 13+900 on the NSRP the railway passes under the low structures in the vicinity of EDSA Stations where there is non-standard headroom. Within this section, it will be necessary to provide alternative arrangements to the specified

For the OCS in particular, a key interface was identified as the pole positions, whereby the civil works Contractors are required to have a PC box segment with a reinforcement to support the OCS poles. Thus, it became necessary to generate and supply these pole positions in order to allow the civil contractors to progress in their design of molds and fabrication of the segments.

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- 2) Tangent track: viaduct more than 40 meters span, one additional pole erected at the middle of the viaduct span;
- 3) Traction Substations (TSS): additional two (2) poles erected for feeder cables immediately above the TSS;
- 4) Turnout / Crossover Locations: One additional OCS pole erected at the middle of the viaduct span;
- 5) Horizontal Curve Sections: For a radius 650m or less an additional pole shall be erected at the middle of the viaduct span;
- 6) Gradient Changing Sections: Shorter pole spans to ensure the contact wire adapts to the change in gradient with standard of 3 ‰ to a maximum of 5 ‰ in the contact wire;
- 7) Station Locations: Nearest pole to the station no more than 20m from the station edge.
- 8) The following viaduct operation loads are taken as permanent loads in the design of the viaduct:

For the MCRP the mast, blackout and backstay locations have been identified by the Engineer and are detailed in Appendix A of this section. Should additional or revised mast, blackout or backstay locations be required the cost for which shall be borne by the NS-01 Contractor.

e) Key Design Constraints

- 1) Between chainages 16km+860m to 17km+200m on the NSRP the railway passes under the flight path for Ninoy Aquino International Airport. Within the section the maximum height of any overline equipment, including the overhead ground wire or alternative lightning protection solution, shall not exceed EGM 25.63m which is approximately 6m above rail. During construction no equipment shall exceed EGM2008 28.00m.
- 2) In the CP-S-03a and CP-S-03b contract areas between Chainages 13+566 to 13+906 and 870, 15+546 to 89 to 16+046 and 16+564 to 18+550347 due to clearance restrictions the use of conventional straight circular hollow sectioned masts cannot be adopted and instead alternative arrangements such as cranked masts shall be used which will ensure that all overhead line equipment and supports remains outside of the structure gauge.

7) Grounding PVC Wire (with the size not melted by grounding fault current). Connection: from bonding points at the communications system to copper grounding bar in the EPS and/or electrical room provided by building electrical works.

8) Exception: Regardless of the above, the following power supply shall be provided by the Power Supply System

Power supply to the CCTV cameras mounted on the lighting poles in the Depot areas shall be provided by the Power distribution system.

Power supply to the AP and CTF on the antenna poles and the meteorological and seismic sensors along the viaduct shall also be provided by the power system.

9) The UPS Power Supply for AFC equipment and devices in the OCC building shall be fed from the communication UPS.

10) UPS specification:

The input of the UPS shall be protected from over voltages and surges of current. Additionally, it shall be protected from the effects of lightning. The UPS shall also function as a filter to remove transients and other electrical noise, which may affect the operation of electronic equipment.

A bypass switch shall also be provided to enable maintenance to be undertaken and to circumvent the UPS unit should a malfunction occur.

Batteries shall be maintenance-free.

The design and performance of the UPS shall be following the latest edition of IEC 60146 and IEC 62040 or an acceptable equivalent standard.

The UPS shall be equipped with fans and filters for air-cooling. The Contractor shall indicate whether any forced-air cooling or constant temperature control is required.

The UPS shall be provided with output current limiters, which afford short-circuit protection. The overload capacity of the inverter shall be 150% for one (1) minute and 125% for the next ten (10) minutes.

In addition to the above, the UPS shall be capable of monitoring and detecting potential malfunctions; these include:

- a) Overload;
- b) Overvoltage and current;
- c) Under voltage; and
- d) Temperature.

Should the battery temperature exceed the specified maximum during charging, the inverter shall terminate the charging to prevent the thermal runaway of the batteries.

The Contractor shall propose a suitable charging time for the batteries after being fully discharged.

An alarm shall be generated for each of the above-mentioned features should they occur.

The operational status of the UPS shall be capable of being exhibited using a Liquid Crystal Display (LCD) or a similar device. The differing features of the UPS shall be selectable using a keypad; these would include but not be limited to the following:

- a) Input voltage;

- Power Supply: via an inverter (in normal mode), via bypass circuit (in emergency mode).
- 2) Power interruption backup: 3 hour (station), 3 hour (OCC).
- 3) The exact rating of the UPS shall be calculated by the Contractor.
- 4) Wiring and cabling: XLPE/PVC installed on cable tray or in conduit and compliance with PEC 2017 edition.
- 5) Allowable voltage drops: within 2% from the UPS distribution board.
- 6) Allowable short circuit current: 15 kA (OCC and station).
- 7) Grounding PVC Wire (with the size not melted by grounding fault current). Connection: from bonding points at the communications system to copper grounding bar in the EPS and/or electrical room provided by building electrical works.
- 8) Exception: Regardless of the above, the following power supply shall be provided by the Power Supply System

Power supply to the CCTV cameras mounted on the lighting poles in the Depot areas shall be provided by the Power distribution system.

Power supply to the AP and CTF on the antenna poles and the meteorological and seismic sensors along the viaduct shall also be provided by the power system.

- 9) The UPS Power Supply for AFC equipment and devices in the OCC building shall be fed from the communication UPS.

~~Power supply to the CCTV cameras mounted on the lighting poles in the Depot areas shall be provided by the Power distribution system.~~

~~The power supply to the antenna along the trackway between stations shall be provided by the Power distribution system.~~

- 10) UPS specification:

The input of the UPS shall be protected from over voltages and surges of current. Additionally, it shall be protected from the effects of lightning. The UPS shall also function as a filter to remove transients and other electrical noise, which may affect the operation of electronic equipment.

A bypass switch shall also be provided to enable maintenance to be undertaken and to circumvent the UPS unit should a malfunction occur.

Batteries shall be maintenance-free.

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The UPS shall be equipped with fans and filters for air-cooling. The Contractor shall indicate whether any forced-air cooling or constant temperature control is required.

The UPS shall be provided with output current limiters, which afford short-circuit protection. The overload capacity of the inverter shall be 150% for one (1) minute and 125% for the next ten (10) minutes.

In addition to the above, the UPS shall be capable of monitoring and detecting potential malfunctions; these include:

- a) Overload;

- c) Vehicle to follow rolling stock and structure gauge;
 - d) Axle load under 16t;
 - e) Totally 12 Grinding Stones or Discs (6 Grinding stones or grinding discs ×2 sets);
 - f) Couplers shall be identical to couplers on motor car;
 - g) Wheels monoblock type, with same profile as passenger car wheels;
 - h) Pneumatic brakes and Mechanical parking brake shall be provided, applied via hand from either side of wheel; and
 - i) Grindstone under the floor rotation speed approximately 30m/s.
 - j) If maximum height of the equipment is over 3.6m, it is subject for the review and approval by the Engineer.
 - k) A vacuum system shall be supplied with the rail profile grinding car to fully collect rail grinding debris and deposit them in an onboard container. The container shall be removable from the vehicle by a forklift truck for discharging debris.
- 5) Operating equipment.
- a) Hauling or self-running speed on main line 60km/h;
 - b) Minimum curve radius 100 m in depot area;
 - c) Rail grinding velocity approximately 5 ~ 15 km/h; approx. 500m/track
 - d) Grinding depth 0.05mm/pass; and the center-line-average roughness of a worn rail is typically 0.5 to 2 microns. However, a ground surface is relatively rough because the grits in a grinding stone (like sand on a sanding disc) cut small grooves in the rail (the value of for a freshly ground rail is typically less than 12 microns).
 - e) Two chocks are attached to wheel tread at track working.

1.27.7 Ultrasonic Rail Inspection Equipment

- 1) Quantity: Four (4) Sets
- 2) Functional Requirements

Ultrasonic rail inspection equipment for the detection of surface or subsurface material defects with the aim of finding out flaws, shall be supplied.

- (3) Design and Performance

The rail inspection module(s) shall be mounted on a carriage which is pushed manually.

- a) The rail inspection equipment shall detect surface or subsurface defects in rails, including welding part.

- c) Vehicle to follow rolling stock and structure gauge;
 - d) Axle load under 16t;
 - e) Totally 12 Grinding Stones or Discs (6 Grinding stones or grinding discs ×2 sets);
 - f) Couplers shall be identical to couplers on motor car;
 - g) Wheels monoblock type, with same profile as passenger car wheels;
 - h) Pneumatic brakes and Mechanical parking brake shall be provided, applied via hand from either side of wheel; and
 - i) Grindstone under the floor rotation speed approximately 30m/s.
 - j) If maximum height of the equipment is over 3.6m, it is subject for the review and approval by the Engineer.
 - k) A vacuum system shall be supplied with the rail profile grinding car to fully collect rail grinding debris and deposit them in an onboard container. The container shall be removable from the vehicle by a forklift truck for discharging debris.
- 5) Operating equipment.
- a) Hauling or self-running speed on main line 60km/h;
 - b) Minimum curve radius 100 m in depot area;
 - c) Rail grinding velocity approximately 0.7–5 ~ 0.8–15km/h; approx. 500m/track
 - d) Grinding depth 0.05mm/pass; and the center-line-average roughness of a worn rail is typically 0.5 to 2 microns. However, a ground surface is relatively rough because the grits in a grinding stone (like sand on a sanding disc) cut small grooves in the rail (the value of for a freshly ground rail is typically less than 12 microns).
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