



General Bid Bulletin No. 8
16 June 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"** – Clarifications 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

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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	Volume II Section VI / c), ERT-641; ERT-644, 7.8.1.1 a): 7.8.1.7 a), maintained service life	Please clarify these apparently conflicting requirements of 30 years and 10 years.		Clause revised. Please refer to Annex B.
2	Volume II Section VI / c), ERT-669, 7.12.3.1, All the test plans and procedures with the exact time and date shall be submitted for the approval of the Employer at least 60 days prior to any test's conduction. The procedure needs to be Approved 14 days prior to the actual test.	60 days is mentioned in this AFC tech spec; whereas in other subsystems, 30 days was mentioned; bidder considers 30 days would be more appropriate for more accurate and exact test planning.		The clause shall remain.
3	Volume II, Section VI ©, ERT-1, 1.1.1 8), The track is the standard width 1435mm gauge with EN60E1 or JIS60 rail for the mainline and JIS-50N rail in the depot line.	Rail profile as JIS 60 is mentioned and can be used as alternative of EN60E1 for main line however in Clause 1.12.1, EN60E1 is mentioned for mainline. Bidder understand that JIS 60 rail profile can be used for the main line. Please clarify. In addition, for the standard rail, instead of EN Grade R260, Bidder would like to propose to use as JIS E1101. Please confirm.		JIS 60 is used only for mainline turnouts with the operational speed of 160km/h. Compromised rail is used to connect between JIS60 and EN60E1 rails. EN Grade R260 shall be used for standard rail. EN60E1 shall be used for mainline track and turnouts with 120km/h operational speed.

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		<p>It is Bidder understanding that, standardizing to one code would be beneficial to design. In the main line, Bidder would like to standardize to use JIS code (Section as well as material) to the main line (Straight and curve), turnouts, compromise rail to avoid any kind of code mix between EN and JIS.</p> <p>It is also related to below clarification on clause 1.12.3/1) and 1.12.6/2 (as provided in below Bid Clarification item nos. 15 & 17).</p>		See Annex B for the updated clause of ERT 1.12.2 and 1.12.6
4	Volume II, Section VI ©, ERT-5, 1.4.1, Maximum operational speed shall be 160 km/h	The ER requirement contradicts with the clause given in 1.6.1 2) where design speed is mentioned as 160 km/h for main line. Bidder understand the maximum speed as 160 km/h applied in the main line is design speed not operational speed. Please clarify.		Please refer to GBB 4 page 288 for the updated operational criteria.
5	Volume II, Section VI ©, ERT-10, 1.5.2 3), ... The Contractor shall provide a translation into English of any standard proposed to adopt which is	Some documents written in Japanese language could not be directly translated to English due to copyright problem. Bidder will try to translate with approval however if approval is not received, Bidder will submit reference documents in Japanese with		The Bidder's request is accepted. However, the Contractor shall provide the approved translation copy during the project implementation stage.

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	written in other language other than English.	maximum English information possible, e.g. Translation by Bidder without official confirmation of the content from the original authority. Bidder requests Employer to understand the situation.		
6	Volume II, Section VI ©, ERT-14, 1.7.1 8) and 10),	Clause no. 8) indicates rail expansion joint's components design life from 10 to 15 years. However, clause no. 10) request Expansion joint and turnout design life to be 30 years. Please clarify which requirement Bidder shall follow.		Rail expansion joint components design life is from 10 to 15 years. However, the expansion joint rail is designed for 30 years life span.
7	Volume II, Section VI ©, ERT-15, 1.8.1 1), ... fasteners spaced at 625 to 714 mm centers. The standard value is 666 mm.	Bidder would like to understand why fastening spaced range is given. Can bidder use max. spacing as 714 mm? In addition, standard value is given as 666 mm. Is it the maximum spacing that is allowed? The standard spacing 666mm is contradict to the clause No. 1.10.3 where nominal spacing is mentioned as 667 mm or less. Please clarify.		The fastening space range from 625 to 714 which includes tangent, curves, and transitions. The standard value spacing of 666mm is from the maximum 8m track slab length. The contractor shall propose during detailed design stage subject to Engineer's approval. Please refer to Annex B for the change in spacing value.

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8	Volume II, Section VI ©, ERT -15, 1.8.1 2) a) Third bullet, In areas where the civil contractor has not been provided by the civil contractor shear connectors shall be installed by the Contractor.	Bidder understand the given condition, however the installation cost for such shear connection shall be compensated by Employer. In contrast, it is Bidder understanding that such shear connectors shall be installed by the Civil Contractor based on track bed requirements. Please clarify Bidder's understanding.		The Bidder's understanding is incorrect. The additional shear connector is installed by Civil Contractor. In areas where the shear connector has not been provided by the Civil Contractor, the Contractor shall install the shear connector as per Clause 1.8.1. The cost of any additional shear connector that is not provided by Civil Contractor, the Contractor shall shoulder the cost.
9	Volume II, Section VI ©, ERT-15, 1.8.1 3), The track bed concrete shall be laid on a thickness 300 mm for the road bed which is to be installed by the civil contractors.	If Bidder found that track bed thickness need to be increased due to Embankment settlement or road bed construction error (i.e. road bed thickness is less than 300mm). An additional cost for such increase in volume of concrete shall be compensated by Employer. Please clarify Bidder's understanding.		The bidder can estimate based on the required minimum height of 650mm. It is bidder's responsibility as part of Design and Built Contract to estimate the possible maximum height from top of rail to unformed concrete finish.
10	Volume II, Section VI ©, ERT-18, 1.10.1 2), The Contractor will be responsible for construction of the first stage concrete to a level 650 mm minimum) below proposed top of rail level to an unformed concrete finish.	If Bidder found the thickness is more than 650 mm (top of the RL and unformed concrete finish), an additional concrete volume cost shall be compensated by Employer. Or maximum thickness shall be provided for Bidder's estimation. E.g. if height difference found is 700mm (top of		The Bidder can estimate based on the required minimum height of 650mm. It is bidder's responsibility as part of Design and Built Contract to estimate the possible maximum height from top of rail to unformed concrete finish.

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		the RL and unformed concrete finish) at site, an additional 50mm thick concrete volume shall be requested as compensation.		
11	Volume II, Section VI ©, ERT-19, 1.10.1 8), The concrete laitance shall be removed from the 'foot print' of the track bed and the surface scraped to increase the bond between the track bed pour concrete and the supporting structure.	Bidder believes surface roughness shall be provided by civil contractor. Bidder requests to provide wavy finishing at the road bed concrete area. Please clarify.		The viaduct shall be broom finished upon handover from Civil to Trackwork contractor. The contractor shall locally scabble the surface of the deck to ensure a sound joint is maintained between the deck and trackform concrete.
12	Volume II, Section VI ©, ERT-19, 1.10.1 9), The minimum strength of concrete shall be 27 MPa.	Bidder could not find the type of strength measurement. Is it cube or cylinder test to achieve minimum concrete strength as 27MPa? Bidder understands as cube test specimens as defined in Cl. 1.10.1.13).		Please refer to Annex B for the updated clause 1.10.1 13)
13	Volume II, Section VI ©, ERT-19, 1.10.2 1), The safety guard device is not required in the depot area. It is required only for the depot access track and test track, only if the radius of the curve is less than 200m. In the depot area a cant will not be	Safety guard devices are not provided as per this clause however in Cl 1.12.12 1), guard rails are requested for depot where $R \leq 200m$. Please clarify whether safety guard devices are required at Depot area? In addition, Bidder would like to understand		The safety guard device is not required in the depot area. It is required only for the depot access track and test track, only if the radius of the curve is less than 200m as stated in ERT 1.10.2. Test Track are for testing of trains and maintenance vehicles. It is also used for

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	required. In the test track a cant will be required	what is test track. Bidder could not find the definition and location of test track. Please explain detail requirements.		training purposes. See MCRP-DWG-ALT05-PL-0001 of Volume III Part 2-Employers Requirements Drawings (b) page 146 for the location of Test and Training Track.
14	Volume II, Section VI ©, ERT-20, 1.10.3 3), Prior to welding, all joints over which a construction train may pass shall be firmly clamped with fishplates and at least two clamps installed.	What is construction train? Is it construction trolley or vehicles running in the rail during construction? Please clarify.		The Bidder's understanding is correct
15	Volume II, Section VI ©, ERT-23, 1.12.3, 1), Standard rails shall be EN Grade R260 rail steel according to table 1 of EN13674-1 with hardness of not less than 260 HBW.	Bidder would like to confirm whether Bidder can use the material conformed to JISE1101 and JIS60 Profile. On standardization with JIS code, Bidder would like to use JIS code (Shape and material) for the turnout also, so that there would be no any code mix (EN and JIS, either material or shape) occur. Please confirm our proposal.		JIS 60 is used only for mainline turnouts with the operational speed of 160km/h. Compromised rail is used to connect between JIS60 and EN60E1 rails. EN60E1 shall be used for mainline track and turnouts with 120km/h operational speed. Please refer to Annex B for the updated clause of ERT 1.12.2 and 1.12.6
16	Volume II, Section VI ©, ERT-23, 1.12.5, End hardened rail shall be used for jointed section in the	Is End hardened rail required to the main line as welding will be provided to connect rails? Please confirm.		The Bidder's understanding is correct

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	mainline with a radius larger than or equal to 800 meters.			
17	Volume II, Section VI ©, ERT-23, 1.12.6 2), Compromise rails connecting EN60E1 to JIS60 may be laid in the mainline and EN60E1 to JIS50N shall be laid in the depot access line separated from the main line.	<p>Design for connecting EN60E1 and JIS60, EN60E1 and JIS50N is based on which code? Bidder could not find any code to design such code mix profiles. Can bidder follow the dimensions given in ITB drawings for this compromise rail?</p> <p>In addition, if rail profile as JIS 60 to be used main line, it would be simplifying to use in mainline, turnouts, depot and governing code will be JIS. Therefore, instead of EN60E1 rail profile, Bidder proposed to use JIS60 in main line including turnout, expansion joint and all. Please confirm.</p>		<p>JIS 60 is used only for mainline turnouts with the operational speed of 160km/h. Compromise rail is used to connect between JIS60 and EN60E1 rails. The contractor shall propose during detailed design stage on the dimensions of the Compromise rail subject to Engineer's approval.</p> <p>EN60E1 shall be used for mainline track and turnouts with 120km/h operational speed.</p> <p>Please refer to Annex B for the updated clause of ERT 1.12.2 and 1.12.6</p>
18	Volume II, Section VI ©, ERT-23, 1.12.7,	<p>What is the maximum thermal stress for CWR to considered? From Bidder experience, it is 785 kN. Please confirm.</p>		<p>The Bidder's understanding is correct. Maximum thermal stress is 785kN.</p>
19	Volume II, Section VI ©, ERT-32, 1.14.1, 4) The coefficient of elasticity shall be 25-30MN/m.	<p>These two clauses contradict each other. Bidder understands the coefficient of elasticity to be used as 25-30 MN/m.</p>		<p>The 25-30MN/m is the bottom elasticity of the material at the sleeper rail location. While the 250-300MN/m is the side elasticity of the material.</p>

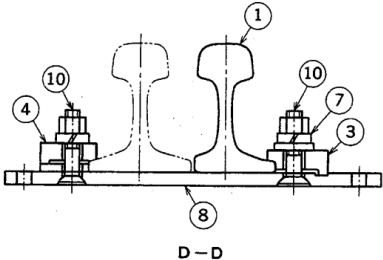
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	6) The coefficient of elasticity of the material shall be about 250-300MN/m.			
20	Volume II, Section VI ©, ERT-36, 1.17.2, For Depot Turnouts	Bidder cannot find the condition for the manual and electrical type of turnouts. Bidder requests to provide such information. Or should bidder follow the drawings in the ITB and propose as per Bidder's experience?		Please refer to Part 2, Section VI d) Employer's Drawings (ERD), 3) Signaling for depot drawings for type of electrical or manual turnouts.
21	Volume II, Section VI ©, ERT-49, 1.23 24), The walkway shall support any commercial telecommunication cables and leaky coaxial cables to be installed at a later date. In addition, the cable containment shall be designed to have 25% spare capacity for future cables.	Please clarify that weight and location of the cables including this commercial cables and its future parts must follow the weight requirement in table 1.23 of the ERT (i.e. total load <4.5 kN/m) in order to design the walkway.		The Bidder's understanding is correct
22	Volume II, Section VI, ERT-49, 1.23 14), a) The walkway frame and base plate to support the deck for walk surface shall be made of hot dipped galvanized steel according to ASTM A123/A123M and/or ASTM A153/A153M or an equivalent	Material for walk way along the track: base plates and handrails are hot dip galvanized steel. Bidder understands that deck for walk surface can be hot dip galvanized steel grating or concrete slab or FRP. Please confirm.		The Bidder's understanding is correct. However, any proposed material and coating shall meet the design life criteria.

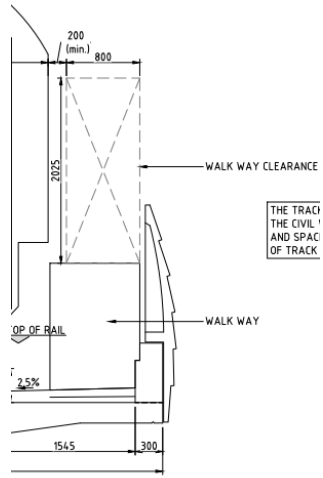
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	<p>standard which has been given a Notice of No Objection by the Engineer. The frames shall have base plates which shall be fixed to the viaduct deck using chemically anchors.</p> <p>c) The walkway deck shall be made of material given a Notice of No Objection by the Engineer. If FRP is used for the deck it shall have high anti-slip rating, and safe for walking in wet surface conditions.</p>			

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23	Part 2, Vol. 3, Section VI, d), Pdf 66/321, MCRP-DWG.GEN-TK-0215 (REV.03),	<p>According to Cl 1.17.1 14) and 1.17.2 5), Turnouts shall be based on JIS however the given drawing for depot and Mainline is not align with JIS. In JIS, there are no any rail pads beneath the rail and pads beneath the tie plate (Elastic pad or Intermediate Pad underneath the rail) are being used. Therefore, Bidder would like to clarify configuration/drawings shall be according to JIS. (JIS E1301, 1303, 1304, 1305, 1306 and 1307) without rail pads.</p> <p>In addition, synthetic material will behave as an elastic material, thus no any additional elastic material beneath the rail is required.</p> <p>For reference JIS E1307</p> 		The drawing in MCRP-DWG-GEN-TK-0215 is for reference only. For JIS 60 Turnouts, The Turnout fastening assembly should comply with JIS standard.

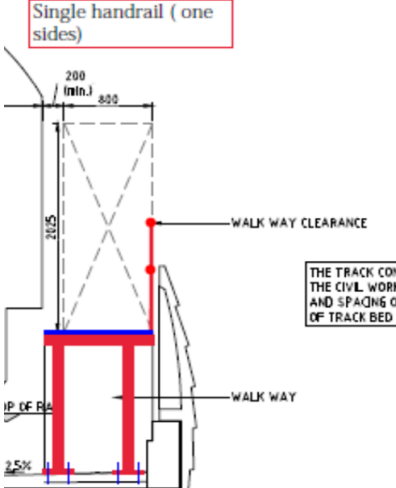
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24	<p>Volume II, Section VI, ERT-48, 1.23 12), The width of the walkway shall be nominally 1200 mm at the tangent sections. At OCS mast and telecommunication monopole locations the available usable width of the walkway will be reduced.</p>	<p>The width of walkway in Clause 1.23 12) is to be set as 1200mm, however in the ITB drawing, the width of walkway is around 900mm only. Bidder understands to follow drawing (to adopt 900 mm). Please confirm.</p> 		<p>The Bidder should comply with requirements of ERT Clause 1.23 12).</p>
25	<p>Volume II, Section VI, ERT-49, 1.23 14) c), The walkway deck shall be made of material given a Notice of No Objection by the Engineer. If FRP is used for the deck it shall have high</p>	<p>Bidder would like to propose walkway deck as a grating material. (These materials will be lighter too).</p>		<p>This is a Design and Build contract. The contractor can propose subject to Engineers approval.</p>

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	anti-slip rating, and safe for walking in wet surface conditions.	Please confirm Bidder's proposal or propose/suggest any alternative material.		
26	Volume II, Section VI, ERT-49, 1.23 14) d),	<p>Bidder would like to propose single handrail (One sided towards parapet wall) instead of providing at both sides. (For reference, please see the figure)</p> <p>During emergency evacuation, handrail towards the rolling stock will obstruct passenger to get off to the walkway deck.</p> <p>Please confirm our understanding.</p>		The handrail shall only be at the parapet side of the walkway as depicted in question.

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27	Vol 2, Section V1. Employer's Requirements, ERG-13, 4.4.1. / Programming Software and Structure of Programs, (1) Programming software to be used shall be Primavera P6 (Release 16 or later). The program submission shall be in both hard copy and soft copy. Electronic copy shall be in the compatible template with Primavera	<p>"Day" used throughout the contract shall mean "calendar day" and "Week" shall mean "calendar week".</p> <p>The statement seems to suggest a Seven-Day (7-day) Calendar setting on all the Programs. It is unclear what calendar setting we are to use for the Program. As standard practice, we would like to suggest to utilized three (3) types of calendars for the Program, these are:</p>		The Bidder's request is rejected.

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	<p>Cloud. All Programs shall be prepared in terms of durations of days and weeks from the Commencement. "Day" used throughout the contract shall mean "calendar day" and "Week" shall mean "calendar week". All programs shall be developed as critical path networks, and the Critical Path shall be clearly shown in the bar charts or networks. All programs should be submitted with standard Activity Reports (showing Times, Floats, etc.) and Narrative statements, explaining the programs. A Time Chainage Program shall be prepared using Tilos 7.0 (or latest version) or similar which allows import and export of linear works program with Primavera P6.</p>	<p>1. Five-day (5-day) calendar for Engineering Phase and Procurement Phase 2. Six-day (6-day) calendar for Construction Phase Seven-day (7-day) Calendar for Testing and Commissioning (including Transportation)</p>		
28	<p>Vol 2, Section V1. Employer's Requirements, ERG-13, 4.4.1. / Programming Software and Structure of Programs, (4) The</p>	<p>"Teaching programming software", means Contractor will be providing training for Primavera P6 software use? If so, how many Employer's staff will be</p>		<p>The Bidder's understanding is correct. Training shall be provided by the Contractor for all type of software packages supplied to the Employer/Engineer. Employer will</p>

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	Contractor shall be responsible for teaching programming software to the Employer's staff who are monitoring the progress of the Works.	required for this teaching/training? Training cost will be included in the Bid. Please confirm if our understanding is correct.		nominate the personnel who will be attending the training session during project implementation stage.
29	Vol 2, Section V1. Employer's Requirements, ERG-13, 4.4.1. / Programming Software and Structure of Programs, (5) During the initial mobilization period, the Contractor shall provide the Engineer with four (4) complete sets for each of these software packages (refer to item (1) shown above) together with all documentation, standalone licenses, and maintenance contracts covering the full duration of the Project from Commencement Date to the issue of the Performance Certificate. The Contractor shall arrange the installation of these software packages as directed by the Engineer.	The four (4) complete sets of software packages to be provided to the Engineer is only the Primavera P6. Please confirm if our understanding is correct.		The Bidder's understanding is incorrect.

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30	Vol 4, Section VIII. Particular Conditions, PC-28, Attachment 2, <table border="1" data-bbox="322 619 757 703"> <tr> <td rowspan="2">CP S-03b</td> <td>AD 3.3b.1: Railway Electrical Room</td> <td></td> </tr> <tr> <td>a. FTI</td> <td>68</td> </tr> <tr> <td rowspan="2"></td> <td>AD 3.3b.1: Railway Signal and Telecommunications Room</td> <td></td> </tr> <tr> <td>a. FTI</td> <td>68</td> </tr> </table>	CP S-03b	AD 3.3b.1: Railway Electrical Room		a. FTI	68		AD 3.3b.1: Railway Signal and Telecommunications Room		a. FTI	68		AD number should be, AD 3.3b.2 : Railway Signal and Telecommunications Room Please confirm if our understanding is correct.	The Bidder's understanding is correct. Please refer to GBB6 Annex B Item 12.						
CP S-03b	AD 3.3b.1: Railway Electrical Room																			
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31	Vol 4, Section VIII. Particular Conditions, PC-28, Attachment 2, <table border="1" data-bbox="322 1054 757 1182"> <tr> <td rowspan="2">S-03c</td> <td>AD 3.3c.1: Railway Electrical Room</td> <td></td> </tr> <tr> <td>a. Bicutan,</td> <td>49</td> </tr> <tr> <td></td> <td>b. Sucat</td> <td>49</td> </tr> <tr> <td rowspan="2"></td> <td>AD 3.3c.2: Railway Signal and Telecommunications Room</td> <td></td> </tr> <tr> <td>a. Bicutan,</td> <td>49</td> </tr> <tr> <td></td> <td>b. Sucat</td> <td>49</td> </tr> </table>	S-03c	AD 3.3c.1: Railway Electrical Room		a. Bicutan,	49		b. Sucat	49		AD 3.3c.2: Railway Signal and Telecommunications Room		a. Bicutan,	49		b. Sucat	49		S-03c should be CP S-03c Please confirm if our understanding is correct.	The Bidder's understanding is correct. Please refer to GBB6 Annex B Item 12.
S-03c	AD 3.3c.1: Railway Electrical Room																			
	a. Bicutan,	49																		
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	b. Sucat	49																		
32	Part 2, Section VI, , ERT-255, 4.4, For the interface of MCRP, NSCR and NSRP-South an additional two (2) x 96 core single-mode fiber optic shall be installed by	Referring to GBB No.2, Item 76, Employer confirmed that there are no Telecom provisions between Solis to Malolos Stations, this is N1 Section and part of Contract CP04. Please confirm additional FO cables specified in		The understanding of the bidder is correct. The 2x96 core single mode fiber optic cable between Solis and Malolos will be installed by the CP04 Contractor. Please refer to Annex B.																

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	the Contractor from Malolos to Solis station.	the reference clause shall be supplied, installed and tested by CP04 contractor, not by NS01 contractor.		
33	Part 2, Section VI, , SOW-1, 1, It should be noted that the power supply and distribution systems as well as the overhead contact line system shall be sized based on the ultimate rolling stock fleet and timetable. The sizes of the equipment, cables, and conductors, etc. stated within the ERT are for indication only and shall be supplied to suit the actual operational requirements established by detailed simulations.	Referring to GBB No.2, Item 98, the bidder understood that Employer’s response “The requested data will be shared once finalize and submitted by interfacing parties” is during not bidding stage but implementation stage. While the reference clause said that the size in ERT is for indication only. Please confirm the bidder shall refer to the sizing information in ERT for bid estimation purpose, if no data such as rolling stock, timetable is provided during the bid stage.		The Bidder is responsible for sizing all equipment. If the Bidder wishes to adopt the figures stated in the tender documentation they are used at the Bidder's own risk.
34	Part 2, Section VI, , ERT-471, 5.3.1 (5), (5) Applicable Standards The contractor can propose alternative standards which shall be submitted to the Engineer for Approval.	To expand eligible sources of Japanese ODA loans and to select the most suitable application from Japanese and international market, please confirm the bidder can also propose JIS/JEM/JEC standard products in addition to IEC standard for power distribution system equipment.		Yes. The Bidder may propose an alternative or relevant standard for review and approval by the Engineer.

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35	Vol. I, Part I, Section II, BDS-5, ITB 18.7 1.(i),	<p>Please clarify if our following understand about importation correct?</p> <p>a) Import Permanent Materials: Consignee is Employer. The Masterlist with the details must be approved by the Employer.</p> <p>b) Re-export Equipment: Consignee is the Contractor. The Contractor does not pay import duty nor submit Bond (Bond amount Net of VAT).</p>		<p>a) Yes, the Consignee would be the Employer i.e. Department of Transportation (DOTr). Such matters as a Master List may be discussed at the time of contract negotiation to finalize any outstanding issues.</p> <p>b) No, the Bidders understanding is incorrect. For importation the Consignee shall be DOTr. To re-export the equipment the Consignor shall be the Japanese Prime Contractor or JV lead Partner.</p> <p>BDS ITB 18.7, sub-item 1. i. stipulated that the executing agency (DOTr) shall assume all duties and fiscal charges imposed on Japanese companies with respect to the import and re-export of their own materials and equipment.</p> <p>BDS ITB 18.7, sub-item 2. stipulated that in connection with such tax assumption, the Government of the Philippines or its executing agency (DOTr) shall be</p>

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				<p>responsible for the liquidation or settlement of such fiscal levies, duties, taxes and other similar charges which, with regard to import and re-export of equipment, would be settled government agency to government agency.</p> <p>The foregoing paragraphs provide that such taxes shall be assumed by the executing agency (DOTr). The Contractor does not pay import duty, therefore, in this case a Bond would not be applicable.</p>
36	Vol. I, Part I, Section II, BDS-5, ITB 18.7 1.(ii),	We understand that the Employer will not withhold Corporate Income Tax Withheld At Source for the Services and Goods. Is our understanding correct?		The Bidder's understanding is correct. However, it will be the responsibility of the Contractor to file with the BIR for the Corporate Tax requirements in the Philippines related only for this Project.
37	Vol. I, Part I, Section II, BDS-5, ITB 18.7 3.(iv),	Please confirm whether the Contract amount includes VAT and it shall be paid by the Employer to the Contractor.		For taxes, duties, fiscal charges and levies related to the JICA funded Project, assumed by the Employer on behalf of Japanese companies and their Japanese employees, Bidders shall refer to the following: i) The "Bureau of Internal Revenue (BIR) Memorandum Circular (RMC) No. 8-2017

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				<p>dated 9 January 2017 Clarifying the Tax Treatment of Value-Added Tax (VAT) on Government Money Payments for OECF Funded Projects under Exchange of Notes Between Republic of the Philippines and the Government of Japan"; and</p> <p>ii) Bidding Documents Volume I. Section II. Bid Data Sheet (BDS) ITB 18.7.</p> <p>In accordance with RMC No. 8-2017 article 1., the VAT registered suppliers and subcontractors of the Japanese companies, shall bill and pass on the twelve percent (12%) to the Japanese companies/contractors. In turn, the Japanese Contractor shall include in their billing and pass on the 12% VAT to the concerned executing agency (DOTr). Therefore, VAT (excluding that on imports) shall be incorporated into the Local Unit Prices (PhP) and Local Amounts (PhP) of the Bid Price.</p>

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				However, in accordance with RMC No. 8-2017 article 2., it will be the responsibility of the Japanese Contractor to file the prescribed VAT returns on gross receipts derived from the Project, claim their input taxes from their purchase of goods, properties and services from their suppliers or subcontractors and shall pay the output tax or VAT thereon, after offsetting the creditable or allowable input taxes, considering that the amount intended for payment of the VAT has already been collected and received by the Japanese Contractor or nationals from the executing agency (DOTr) as part of the total billing/invoice price.
38	Vol. I, Part I, Section II, BDS-5, ITB 18.7 3.(vi),	Will Personal Income Tax on foreign employees other than Japanese under a Japanese Contractor not be exempted?		The Employer's assumption of Personal Income Tax shall not applicable to the foreign employees other than Japanese Nationality employed by Japanese Contractor.
39	Vol. I, Part I, Section II, BDS-5, ITB 18.7 3.(vi),	Will Local staff employed by Japanese Main Contractor's Personal Income Tax also not be exempted?		The Employer's assumption of Personal Income Tax shall not applicable to Local (Philippine) staffs. Personal Income Tax of

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Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
				Japanese Nationals employed by Japanese Contractor, derived from the implementation of this JICA funded Project, could be assumed by the Employer.
40	Vol. I, Part I, Section II, BDS-5, ITB 18.7 3.(vi),	Please advise us the details of the personal tax exemption procedure for Japanese.		The details or procedure of the personal tax assumption by the Employer will be the responsibility of the Contractor to coordinate and establish with the Bureau of Internal Revenue (BIR) following award of Contract.
41	Part 2 – Employer’s Requirements Section VI. Employer’s Requirements Technical Requirements -Depot Facilities, ERT - 871, N20.12 Wheel Fitting Press 3.5., The wheel press shall be equipped with a single acting hydraulic cylinder for pressing.	Your specification is understood. Could the Contractor also offer a state-of-the-art wheel press equipped with two hydraulic cylinders for pressing fully compliant to the other items of the specification? With such a machine the need of turning the axle/ wheelset for pressing the other side would be eliminated.		This is a design and build contract. Bidder can suggest suitable alternatives to meet or exceed the employer's requirement for superior performance at design stage for approval of the Engineer.
42	Part 2 – Employer’s Requirements Section VI. Employer’s Requirements Technical Requirements -Depot Facilities, ERT - 871, N20.12 Wheel Fitting Press 2.2., The wheels and the axle or	Please clarify if the wheel press shall be provided with a crane to carry the wheelsets or if the workshop crane(s) specified under N20.01 “3t Overhead Traveling Crane” shall be used to carry the wheelsets into the press.		Shop Crane N20.01 can be used to carry the wheelsets.

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	wheelset will be carried to the press by using the overhead travelling crane			
43	Part 2 – Employer’s Requirements Section VI. Employer’s Requirements Technical Requirements -Depot Facilities, ERT – 758 to ET-760 , N04.01 AUTOMATIC CAR BODY WASHER 2.2, 3.2, The automatic car body washer shall be provided for the external washing of rolling stock entering from the stabling yard. The equipment shall be arranged at a proper position in the allocated space of the Depot	Does the Building Contractor provide a dedicated building/ housing for the automatic car body washer? Please note the same question apply to the south depot		Dedicated building/ housing for automatic car body washer is not in the scope of Building contractor (CP N-05). This is a design and build contract. If the contractor feels the need of a dedicated building/housing for the automatic carbody washer, it can be proposed at design stage for approval of the Engineer and same shall be in the scope of NS-01 contractor at his own cost.
44	Part 2 – Employer’s Requirements Section VI. Employer’s Requirements Technical Requirements -Depot Facilities, ERT – 758 to ET-760 , N04.01 AUTOMATIC CAR BODY WASHER 3.6, Planned size of the foundation	Does the Building Contractor provide the mentioned operation/ control room and mechanical room (for pumps, filters, water treatment system ect..)? Please note the same question apply to the south depot		Building contractor does not provide for any operation room or mechanical room. Interface requirements for the work is given in para 3.5 and para 4 of the ERT 759. Contractor shall do the necessary interfaces with all the interfacing parties at suitable stage of the Project.

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	and drainage slab for this machine is around 7.0 m width (excl. operation room and mechanical room) and maximum 50 m length for drainage slab			
45	Part 2 – Employer’s Requirements Section VI. Employer’s Requirements Technical Requirements -Depot Facilities, ERT – 758 to ET-760 , N04.01 AUTOMATIC CAR BODY WASHER 2.10, The machine shall be provided with recycling water system and wastewater treatment System including Wastewater shall be treated to meet Philippine Environmental Standards	Does the wastewater from the car body washer shall be drained to an overall depot wastewater treatment plant or shall it be sent to a public drain? Does the Building Contractor provide the drainage pipes to connect to depot wastewater treatment facility or to the public drainage system? Please note the same question apply to the south depot.		This is an interface requirement and shall be dealt by the contractor with all interfacing parties at appropriate stage of the Project.
46	Part 2 – Employer’s Requirements Section VI. Employer’s Requirements Technical Requirements -Depot Facilities, ERT – 935 , N30.01 Weatherproof Testing Equipment 3.1, The weatherproof testing equipment shall include the water	The function is understood. Please clarify if the water shall be reused for weatherproofing test and subsequently filtered before re-sue.		Water can be recycled for reuse after suitable water treatment and filtration. Suitable interface shall be carried out with Building contractor.

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	pump with a pump room and if required, water tank.			
47	Part 2 – Employer’s Requirements Section VI. Employer’s Requirements Technical Requirements -Depot Facilities, ERT- 762ff, N12 Bogie Removal / installation shop, The floor Plan of the MCRP North Depot Workshop drawing MCRP-DWG-WS-AR-3101, MCRP-DWG-DEP-DEF-0006 indicates 4 Bogie Turntables, however the Specification doesn’t mention them.	Please clarify if the bogie turntables indicated in the floor drawing of the workshop are to be provided under this contract or provided by others.		Bogie turntable shown in the N12 shop floor plan are not in the scope of NS-01 contractor. Item is not to be supplied as instead Bogie transport unit will be used for transportation of bogies.
48	Part 2 – Employer’s Requirements Section VI. Employer’s Requirements Technical Requirements -Depot Facilities, ERT- 864ff, N20.08 Surface Wheel Lathe, A wheelset is to be manually placed on the receiving position of the lathe, after that automatic sequentially machining process is to be performed.	The design requirements are understood. Please clarify if the machine shall be designed that during the reprofiling process, the driving torque shall be provided by driving rollers? If so, it is proposed that the drivers shall provide safe torque transmission by slip monitoring and anti-slip control. Please comment.		This is a design and build contract. Contractor shall propose detail machine design for approval of the Engineer at design stage.
49	CP NS-01 BD Draft Part 1 Vol.1 EM Version 11.0 FINAL Rev A	Contradicting as in Employers Requirements 14.5.3 (page ERG-68)		The Consignee would be the Employer i.e. Department of Transportation (DOTr). The

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Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
	Vol I, Part I, Section I , BDS-5, ITB 18.7.3(v) , Import VAT and Import Duties will be assumed by the Employer, following the tax assumption scheme	and General Conditions 14.1(b) (page 101) the Contractor shall be responsible for payment of import taxes, duties, fees. We understand that the Employer will be responsible for the import VAT and Import Duties, following the tax assumption scheme and that all imports ae being made under the name of the Consignee (= Employer) and not the Contractor.		import tax and duties will be assumed by the Employer. Please refer to the Section VIII Particular Conditions (PC) item 14.1 for the detail. The provisions in PC shall prevail.
50	Part 2 – Employer’s Requirements Section V1. Employer’s Requirements Technical Requirements – Signaling, ERT-128, 2.17.6, Constant Headway regulation and manual regulation shall be available to regulate the train in the event that a failure causes the loss of Central Control functionality.	Please confirm that constant headway in this requirement is to follow the pre-defined timetable provided every morning with the headway as per the timetable?		The Bidder's understanding is correct.
51	Part 2 – Employer’s Requirements – Drawings – 3) Signaling System, Page 122, 3) Signaling System, the section provides track layout for only the	Kindly note we have no details received for track layout for the main line. Without this input estimation of all elements at Mainline will be very difficult.		Please refer to Volume III, Part 2, Section VI Employer's requirements d) Employer's drawings (ERD) - 2) Track works and 9)

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	Depots vide drawing nos. • MCRP-DWG-DEP-SIG-001 • NSRP-DWG-DEP-SIG-001 • NSRP-DWG-DEP-SIG-002	We request you to kindly provide the Mainline Track Layout for both MCRP and NSRP.		Track Alignment Drawings for information related to Track layout on mainline.
52	Part I Section II, BDS-10, ITB24.1 Deadline for Bid Submission, The deadline for Bid submission is: Date: 17 June 2021 Time: 10:00 AM	We would like to request for extension of the bid submission deadline until the middle of December 2021 from the current due date. The Bidder will be required to engage into various tasks, like Site survey, Design development, Design validations & re-validations, Quantity estimation, Price discovery, Vendor correspondences, Discussions & re-discussions, pre-bid negotiations, Technical proposal preparations etc. in order to prepare a fully compliant and competitive proposal under limitation due to current COVID-19 pandemic scenario. Your kindly understanding is highly appreciated.		Please refer to GBB No.7. Please refer to Annex B for the revised pages.
53	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	Due to the complexity of the fully integrated systems and the limited time provided to prepare the bid, we would like to request an extension of time until 17 November 2021.		Please refer to GBB No.7. Please refer to Annex B for the revised pages.

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	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).			
54	Vol. I. Sec. II, BDS-10, ITB 24.1 "XXXX The deadline for Bid submission is: Date: 17 June 2021 Time: 10:00 AM"	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 Enhanced Community Quarantine. In addition to this, two (2) months shall not be sufficient considering the following activities that will be done in succession: <ul style="list-style-type: none"> • Seeking out and finalizing a partnership • Processing of travel requirements for foreign entities • Studying and preparing the documents In parallel, resources are also allocated to the simultaneous tenders of the South Commuter Railway Project. In this light, we humbly request for an extension of the deadline for Bid submission be moved to 17 December 2021.	"XXXX The deadline for Bid submission is: Date: 17 December 2021 Time: 10:00 AM"	Please refer to GBB No.7. Please refer to Annex B for the revised pages.

Annex B

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ITEM NO.	REFERENCE/CLAUSE/ SECTION	REVISIONS / AMENDMENTS
Volume I Part 1 – Bidding Procedures		
1	Invitation for Bids (IFB) Page no. IFB-2 Item no. 7	Reference to the General Bid Bulletin No. 7, please refer to the amended pages in Attachment 1.
2	Section II Bid Data Sheet (BDS) ITB 24.1 Page no. BDS-10	Reference to the General Bid Bulletin No. 7, please refer to the amended pages in Attachment 1.
3	Section II Bid Data Sheet (BDS) ITB 27.1 Page no. BDS-11	Reference to the General Bid Bulletin No. 7, please refer to the amended pages in Attachment 1.
4	Section II Bid Data Sheet (BDS) ITB 27.1 Page no. BDS-11	Reference to the General Bid Bulletin No. 7, please refer to the amended pages in Attachment 1.
Volume II Part 2 – Employer’s Requirements		
5	ERT-1071-Section 12.2.1	Added Statement: “13. Backbone requirements for all operational systems for N1, N2 and SC to be connected to IOCC.”
6	ERT-255-Section 4.4	Revised Statement:” For the interface of MCRP, NSCR and NSRP-South an additional two (2) x 96 core single-mode fiber optic shall be installed by the <u>CP04</u> Contractor from Malolos to Solis station. <u>All optical fiber connections from Solis Station to NSCR-SC and</u>

		<u>Malolos Station to NSCR-N2 shall be carried out by NS01 Contractor of NSCR N2/SC Sections”</u>
7	Part 2 Section VI Technical Requirements - AFC ERT 641 7.8.1.1 a)	Revised clause 7.8.1.1 a)
8	ERT-22 Clause 1.12.2 1)	Revised clause 1.12.2 1)
9	ERT-20 Clause 1.10.3 1)	Revised value 1.10.3 1) 667 to “666”
10	ERT-24 Clause 1.12.6 2)	Revised text 1.12.6 2)
11	ERT-19 Clause 1.10.1 13)	Added text “or cylinder strength”
12	ERT-368, Clause 4.1.3 (10) (ii)	Added: “or cable connection” 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.
13	ERT-417, Clause 4.1.3 (9) (2)	Added: “or cable connection” 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.
14	ERT-428, Clause 4.4.2 (2) (7)	Added: “with an enclosed bus ducting or cable connection to the rectifier cubicle”.

Annex B – Attachment 1

In addition to the over the counter payment at Procurement Service Cashier and due to the extraordinary circumstance and consistent with the effort of the Philippine Government to curb the further spread of the contagion, **payments may also be made via online domestic and international bank transaction through the following account:**

Bank:	Land Bank of the Philippines – UN Branch
Account Name:	Procurement Service – DBM
Account No:	001442-1012-10
Swift Code:	TLBPPHMMXX

Important Notes:

- i. Due to 72-hours standard wire transfer clearing process for online transfers, bidders are strictly advised to ensure transfer of payment not later than 14 June 2021.
- ii. Bidders who choose to transfer payments online shall ensure that the amount transferred shall be sufficient to cover the transfer fees of correspondent banks upon conversion of the original currency to Philippines Pesos.
- iii. Bidder shall send proof of payment to the official BAC email on the same day of transfer.
- iv. Please refer to Annex A-1 for the list of Depository Bank.

The Bidding Documents (without the General Conditions of Contract) may also be downloaded by the Bidders free of charge from the websites of PS, DOTr and PNR (indicated in item 5 above), but Bidders must pay the said non-refundable fee for the Bidding Documents before the submission of their Bids.

7. Bids must be delivered to the address above on or before 10:00AM on ~~2 August 2021~~ **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).
8. The Technical Bids will be opened in the presence of Bidders' representatives who choose to attend at the address given in item 5 above, immediately after the deadline for the submission of bids.

ENGR. JAIME M. NAVARRETE, JR.
Chairperson
Bids and Awards Committee for CP NS-01

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ENGR. JAIME M. NAVARRETE, JR.
Chairperson
Bids and Awards Committee for CP NS-01

	<p>For a Japanese Company bidding as a Corporation, an SPA may be substituted for a Board Resolution with Board Secretary Certificate.</p> <p>However, in the case of a JV, evidence shall be provided to demonstrate that the person(s) signing the SPA is authorized to sign for and on behalf of each member of the JV.</p>
D. Submission and Opening of Bids	
ITB 24.1	<p>For <u>Bid submission purposes</u> only, and acting on behalf of the Employer, the Procuring Agent’s address is:</p> <p>Attention: Engr. Jaime M. Navarrete, Jr. The Chairperson Bids and Awards Committee for CP NS-01</p> <p>Address: Procurement Service PS Complex, RR Road, Cristobal Street Paco, Manila 1007, Philippines</p> <p>The deadline for Bid submission is:</p> <p>Date: 2 August 2021 17 June 2021</p> <p>Time: 10:00 AM</p>
ITB 27.1	<p>The opening of the Technical Bids shall take place immediately after the deadline for submission of Bids in the presence of Bidders’ representatives who choose to attend at:</p> <p>Address: Procurement Service PS Complex, RR Road, Cristobal Street Paco, Manila 1007, Philippines</p> <p>Date: 2 August 2021 17 June 2021</p> <p>Time: 10:00 AM</p>
E. Evaluation and Comparison of Bids	
ITB 37.1	<p>The currency that shall be used for Bid evaluation and comparison purposes to convert all Bid Prices expressed in various currencies into a single currency is: Philippine Peso.</p>

<p>ITB 22.2</p>	<p>The written confirmation of authorization to sign on behalf of the Bidder shall, corresponding to whether the Bidder is a Corporation, Partnership, Joint Venture (JV) or Sole Proprietorship, consist of the applicable document, as follows:</p> <table border="1" data-bbox="475 465 1442 810"> <thead> <tr> <th></th> <th>TYPE OF ENTITY</th> <th>DOCUMENT</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Corporation</td> <td>Board Resolution with Board Secretary Certificate</td> </tr> <tr> <td>2</td> <td>Partnership</td> <td>Articles of Partnership</td> </tr> <tr> <td>3</td> <td>Joint Venture (JV)</td> <td>Certified Authorization or Resolution from each member</td> </tr> <tr> <td>4</td> <td>Sole Proprietorship</td> <td>Special Power of Attorney (SPA)</td> </tr> </tbody> </table> <p>For a Japanese Company bidding as a Corporation, an SPA may be substituted for a Board Resolution with Board Secretary Certificate.</p> <p>However, in the case of a JV, evidence shall be provided to demonstrate that the person(s) signing the SPA is authorized to sign for and on behalf of each member of the JV.</p>		TYPE OF ENTITY	DOCUMENT	1	Corporation	Board Resolution with Board Secretary Certificate	2	Partnership	Articles of Partnership	3	Joint Venture (JV)	Certified Authorization or Resolution from each member	4	Sole Proprietorship	Special Power of Attorney (SPA)
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E. Evaluation and Comparison of Bids	
ITB 37.1	<p>The currency that shall be used for Bid evaluation and comparison purposes to convert all Bid Prices expressed in various currencies into a single currency is: Philippine Peso.</p> <p>The source of exchange rate shall be: Bangko Sentral ng Pilipinas (BSP, the Central Bank of the Philippines)</p> <p>The date for the exchange rate shall be: 19 May 2021. In the event of non-availability of exchange rate in the BSP website due to non-working days, the Bidder shall apply the exchange rate of the following working day.</p>

be combined and consolidate to the IOCC. The Contractor shall also consolidate any of the Control and Monitoring Systems that can be combined like the P-SCADA and BMS and shall integrate it also to the IOCC.

12.PABX and Landline telephones for communication with all stations, Depots and adjacent railway/MRTS lines

13.Backbone requirements for all operational systems for N1, N2 and SC to be connected to IOCC.

- 12.2.2 The contractor shall comply with the requirements covered in other chapters of ERT.
- 12.2.3 The Contractor shall prepare and implement the requirements of a detailed Migration Plan covering strategy, timeline, testing, and decommissioning during the transfer of the OCC functions to the IOCC.
- 12.2.4 All migration works shall be coordinated and agreed with the O&M Concessionaire. Redundant equipment from the decommissioned OCC’s shall be returned to the Employer. The migration plan shall be submitted to the Engineer for approval.
- 12.2.5 Following the migration, the integrated combined consoles and displays shall cover the complete railways from Clark to Calamba.
- 12.2.6 Effective inter-disciplinary checks will be required to ensure the objectives for integration are realized.
- 12.2.7 Provisions of the space and associated works should be planned, to accommodate various equipment in the IOCC. Ergonomic studies will be required as part of the design of the IOCC which shall cover the likes of desk layout, lighting levels, and environment designs. These studies and all designs shall be submitted to the Engineer for approval.
- 12.2.8 Provisions shall be made in the IOCC to accommodate the future requirements for the extension to New Clark City.
- 12.2.9 The System equipment, rooms and E&M facilities design and installation shall also be in line and complaint with the RAMS Project requirements as defined in the ERG.
- 12.2.10 The functionality of the operating systems shall be driven by operational requirements. This Technical Specifications for IOCC systems equipment have been developed to international norms and standards. Other Equivalent standards shall also be allowed subject to review by the Engineer.

The Contractor shall propose all designs and functionality required to effectively operate the line. The Contractor shall submit suitable designs and plans for undertaking this work, at detail design stage, for the review of the Engineer.

The contractor shall design and supply all furniture, accessories, finishes as detailed in the document.

- 12.2.11 The contractor shall comply to requirements of DCC for managing operations within the Depot for all Depot operations.

12.3 Design Requirements

The Contractor shall assemble an interdisciplinary team, including competence in ergonomics and shall ensure an appropriate balance and representation of skills. The ergonomics input shall encourage a user-friendly approach within the Control Room Design Process.

Suitable time and resources shall be made available for iterative ergonomics input throughout the Control Room Design Process lifecycle.

be combined and consolidate to the IOCC. The Contractor shall also consolidate any of the Control and Monitoring Systems that can be combined like the P-SCADA and BMS and shall integrate it also to the IOCC.

12.PABX and Landline telephones for communication with all stations, Depots and adjacent railway/MRTS lines

13.Backbone requirements for all operational systems for N1, N2 and SC to be connected to IOCC.

- 12.2.2 The contractor shall comply with the requirements covered in other chapters of ERT-
- 12.2.3 The Contractor shall prepare and implement the requirements of a detailed Migration Plan covering strategy, timeline, testing, and decommissioning during the transfer of the OCC functions to the IOCC.
- 12.2.4 All migration works shall be coordinated and agreed with the O&M Concessionaire. Redundant equipment from the decommissioned OCC’s shall be returned to the Employer. The migration plan shall be submitted to the Engineer for approval.
- 12.2.5 Following the migration, the integrated combined consoles and displays shall cover the complete railways from Clark to Calamba.
- 12.2.6 Effective inter-disciplinary checks will be required to ensure the objectives for integration are realized.
- 12.2.7 Provisions of the space and associated works should be planned, to accommodate various equipment in the IOCC. Ergonomic studies will be required as part of the design of the IOCC which shall cover the likes of desk layout, lighting levels, and environment designs. These studies and all designs shall be submitted to the Engineer for approval.
- 12.2.8 Provisions shall be made in the IOCC to accommodate the future requirements for the extension to New Clark City.
- 12.2.9 The System equipment, rooms and E&M facilities design and installation shall also be in line and complaint with the RAMS Project requirements as defined in the ERG.
- 12.2.10 The functionality of the operating systems shall be driven by operational requirements. This Technical Specifications for IOCC systems equipment have been developed to international norms and standards. Other Equivalent standards shall also be allowed subject to review by the Engineer.
- The Contractor shall propose all designs and functionality required to effectively operate the line. The Contractor shall submit suitable designs and plans for undertaking this work, at detail design stage, for the review of the Engineer.
- The contractor shall design and supply all furniture, accessories, finishes as detailed in the document.
- 12.2.11 The contractor shall comply to requirements of DCC for managing operations within the Depot for all Depot operations.

12.3 Design Requirements

The Contractor shall assemble an interdisciplinary team, including competence in ergonomics and shall ensure an appropriate balance and representation of skills. The ergonomics input shall encourage a user-friendly approach within the Control Room Design Process.

Suitable time and resources shall be made available for iterative ergonomics input throughout the Control Room Design Process lifecycle.

4.3 Hardware Requirement

The BTS network shall be designed to minimize system breakdowns, or reductions in the level of service, caused by a single point failure. It shall also be designed to facilitate easy extensions and additions.

The BTS network shall be based on a highly modular, diverse redundant architecture to facilitate easy maintenance and upgrading, and to minimize the chances of a breakdown occurring due to common-mode failures or effects.

4.4 Optical Fiber Cable

The scope of supply shall include, but not be limited to, the following:

1. Single-mode optical cables;
2. Splice boxes and remake loops, joint closures;
3. Distribution frames and patch panels;
4. Equipment cabinets, racks, and cubicles;
5. All required connectors and patch cords, pigtails, attenuators; and
6. All installation materials.

The Optic Fiber Cable (OFC) infrastructure shall be formed by two single-mode optical fiber cables, laid along two physically distinct routes. The normal and protected routes shall be routed through different fiber cables with path diversity and meeting only at CER locations.

For the interface of MCRP, NSCR and NSRP-South an additional two (2) x 96 core single-mode fiber optic shall be installed by the CP04 Contractor from Malolos to Solis station. All optical fiber connections from Solis Station to NSCR-SC and Malolos Station to NSCR-N2 shall be carried out by NS01 Contractor of NSCR N2/SC Sections”

The Contractor shall propose a cable that supports the specific railway constraints and requirements and shall determine the exact total number of fibers needed by all systems required to connect to the backbone and reserve at least 20% of fibers, within each cable, as spares for future use

An optical distribution frame shall be installed in each CER. Optical fiber cables terminated at the optical distribution frame shall be either spliced through or spliced with optical pigtails or terminated at the optical patch panels including the spare fibers. The strand tubes, of the optical cable, shall be connected to allow all kinds of topologies and links needed; point-to-point, direct, or bus.

At least 15 meters of cable slack shall be reserved at all CER for future network modification and expansion. Furthermore, fiber loops shall be provided at intervals agreed by the Engineer. No cable joints shall be allowed along the trackside. The Contractor shall survey the cable route and ensure that cable lengths supplied are such as to avoid possible wastage of cable and additional joints. The laying of fibers shall conform to the manufacturer’s recommendation concerning the mechanical constraints, such as the minimum bending radius.

The Contractor shall ensure that the optical budget, of the end-to-end longest connections, is minimum adequately satisfied for the optical specifications of high capacity transmission equipment. The cable attenuation values shall not exceed the values advocated in the standard G 652, ITU-T Non-Dispersion-Shifted Fiber, or an equivalent standard.

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At least 15 meters of cable slack shall be reserved at all CER for future network modification and expansion. Furthermore, fiber loops shall be provided at intervals agreed by the Engineer. No cable joints shall be allowed along the trackside. The Contractor shall survey the cable route and ensure that cable lengths supplied are such as to avoid possible wastage of cable and additional joints. The laying of fibers shall conform to the manufacturer’s recommendation concerning the mechanical constraints, such as the minimum bending radius.

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7.8 System Requirements

7.8.1 General Requirements

7.8.1.1 Design approach

- a) The AFC system shall be of a mature and flexible, field proven design, but modern in appearance and updated with state-of-art technology, it shall be designed for a maintained service life (with periodic upgrades as required) of not less than ten (10) years, with minimum lifecycle cost.
- b) The AFC system shall be the product of at least ten (10) years of ongoing development and refinement, fully exploiting the benefits of full colour GUI’s and touchscreen technology to ensure intuitive ease of use by the O&M concessionaire’s non-technical employees and by passengers.
- c) The AFC system shall incorporate a flexible and user-friendly facility to create ticket products and loyalty products and to create associated business rules to determine validity rules for these.
- d) The AFC system shall be field-proven to operate in rail-based, closed systems where passengers can transfer between the services of different transit operators without the need to check out of one system and into another.
- e) All servers and other CPU’s deployed within the AFC system shall not exceed 50% loading of the processors under full load conditions.
- f) Where there are applicable International Standards, these shall be complied with.
- g) In order to avoid vendor lock-in, the AFC system shall deploy an open systems architecture that enables the Devices of competing vendors to be integrated into the AFC systems.
- h) All proprietary interfacing information shall be properly and fully documented and supplied by the Contractor for the express purpose of conveyance of such information to other suppliers, so that their components can be integrated into the AFC system at the level of an Line Replaceable Unit (LRU), AFC device or AFC workstation.
- i) All equipment shall operate without degradation of quality, performance or loss of function in the electromagnetic environment of the railway line.
- j) Black-and-white/color Laser printers shall be supplied by the Contractor for the purpose of normal operation, as deemed necessary by the Engineer.
- k) Devices shall be resilient against scratching, fingerprints, breaking and graffiti and, where necessary shall use stainless steel to resist deliberate and accidental damage and general wear and tear.
- l) Devices located on public concourses shall be able to withstand hosing down with water, without sustaining damage or creating any electrical hazard and shall meet IP 54.
- m) The design shall pay attention to safety, including the avoidance of creating a safety hazard during shipment, installation commissioning, operation and maintenance. The AFC equipment shall not create a safety hazard, even during fault conditions, and shall fulfil the design intent in respect of facilitating emergency evacuations.
- n) The AFC system shall be of good ergonomic design. An ergonomic study shall be included in the Preliminary Design and reviewed as part of the Preliminary Design Review.

7.8.1.2 Software Requirements

- a) The contractor shall submit to the Engineer a list of all software.
- b) The contractor shall consider software to be easy maintainable and re-configurable by the O&M Concessionaire.

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1.11.4 Ride Quality

To ensure ride comfort for the passengers, on completion of the trackwork installation the contractor shall carry out geometrical and location tolerances measuring using track geometry vehicle or similar equipment.

The results shall be submitted to the Engineer for review.

1.12 Rail

1.12.1 General

- 1) The Contractor may propose alternative installation methods to those described in this Specification however this proposal shall be given a Notice of No Objection by the Engineer, the Contractor must clearly demonstrate that his proposed method will deliver at least the same accuracy and durability.
- 2) Factory acceptance and subsequent material/testing inspections shall be carried out in accordance with the General Requirements.
- 3) The manufacturer shall carry out all relevant tests in accordance with JIS E1101:2001 or equivalent and JIS E1120:2007 or equivalent.

The manufacturer at his own expense shall supply all templates and gauges, prepare and supply test pieces and samples of steel, sample rails and supply labor and apparatus and equipment for testing which may be required by the inspecting agency for carrying out all tests.

And the manufacturer shall render reasonable assistance in execution of such tests as desired by the purchase/inspection Agency.

- 4) All rails shall be produced by one manufacturer.
- 5) The rail supplier shall satisfy the following requirements:
 - a) Shall have experience of manufacture and delivery of the rails over 10 years previously; and
 - b) Shall have manufacturing capacity of 15,000 tons or more of rails per month.
- 6) The Contractor shall submit all the necessary documents for the Engineer’s Approval prior to engaging any rail supplier.

1.12.2 Rail Section and Material

- 1) Rail EN60E1 for mainline, EN60E1 for mainline turnout with operational speed of 120km/h, JIS60 for mainline turnout with operational speed of 160km/h, and JIS50N for depot areas compliant to JIS E1101 or equivalent shall be utilized.
- 2) The production, straightening and testing shall conform in all aspects to EN13674-1 or JIS E1101 or equivalent on receiving a Notice of No Objection by the Engineer.

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- 2) The production, straightening and testing shall conform in all aspects to EN13674-

1.10.3 Track Components

- 1) Fastening assemblies shall be at nominal 666 mm or less centers for straight tracks, and 625 mm or less centers for curved tracks. They shall be perpendicular to the longitudinal track centerline.
- 2) Rail shall preferably be handled by mechanical means and shall not be dropped during unloading; dragging of rail shall be kept to a minimum with the Engineer Approving the methodology.
- 3) Prior to welding, all joints over which a construction train may pass shall be firmly clamped with fishplates and at least two clamps installed.
- 4) The rail gap shall not exceed 6 mm at neutral temperature and the speed of any construction train shall not exceed 10km/h.
- 5) All rail borne vehicles shall not pass over welded joints until trimming and rough grinding has been completed and the rail temperature is below 100°C. Speed shall be restricted to 10km/h until grinding has been performed to the specified final tolerances and the weld has been tested, inspected and accepted.
- 6) Rails shall be cut square and clean by means of either rail saws or abrasive cutting disks. Flame cutting shall not be permitted. Cuts shall be controlled using a purpose-made guide or template and shall be within 0.75 mm of the vertical axis of the rail measured over the overall height or within 0.50 mm of the transverse axis measured over the head width.
- 7) Records of rail temperature and air temperature shall be taken every one (1) hour as welding proceeds.

1.10.4 Cant

Cant shall be applied by rotation around the head of the lower rail. Maximum actual cant on the main line shall be 180 mm. Maximum cant deficiency shall be 70 mm.

1.10.5 Access for Cables and Drainage

The track bed on viaducts shall incorporate gaps 100 mm wide every 8 m; pipes shall be laid at the lower part to allow crossing for water drainage and power cables.

1.10.6 Viaduct Joints

On completion of the track work concreting screed shall be applied to the deck at the viaduct span end upstands to prevent ponding of water and to ensure water flows to the nearest drainage outlet.

1.11 Construction Tolerances

Regarding the allowable tolerance of track work, the Contractor shall follow the instructions of the Engineer of track work.

1.11.1 Positional Tolerances - Main Running Lines

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- 2) Compromise rails connecting EN60E1 to JIS60 shall be laid in the mainline and EN60E1 to JIS50N shall be laid in the depot access line separated from the main line.

1.12.7 Continuously Welding Rails

- 1) Continuous rail welding shall be made while the rail temperature is within the neutral temperature range.
- 2) The neutral rail temperature range shall be optimally defined such that rail temperature variations after closure will not exceed $\pm 35^{\circ}\text{C}$.
- 3) Unless the Contractor verifies the maximum and minimum rail temperatures, the following rail temperature limits shall be considered:
 - a) Maximum rail temperature in open air $+60^{\circ}\text{C}$; and
 - b) Minimum rail temperature is $+20^{\circ}\text{C}$.
- 4) Regarding the neutral rail temperature range, the Contractor shall decide after discussion with the Engineer.

1.12.8 Dimensions and Tolerances

- 1) The desirable nominal rail length shall be 25m. Rails shorter than 20m shall not be used in plain line unless their use has been given a Notice of No Objection by the Engineer. Should transport considerations dictate then the minimum length of 20m shall be acceptable.
- 2) Tolerances shall be in accordance with EN13674-1:2003 and two (2) sets of rail profile gauges shall be supplied to the Engineer upon first delivery of rail.
- 3) The profile tolerances of rails shall be class 'X' of Table 8 of the above standard.
- 4) The straightness tolerances of rails shall be class 'A' of Table 9 of the above standard.

1.12.9 Cutting Rails

- 1) Rails shall be cut square and clean by means of either rail saws or abrasive cutting disks. Flame cutting shall not be permitted. Cuts shall be controlled using a purpose-made guide or template and shall be within 0.75mm of the vertical axis of the rail measured over the overall height or within 0.50mm of the transverse axis measured over the head width.
- 2) Head hardened rails shall be cut using a suitable coolant. An appropriate cooling regime which is suitable to avoid increases in hardness of head hardened rail by more than 20HBW or diminishing hardness by more than 30 HBW within 10mm of the cut rail end shall be established by laboratory testing prior to any head hardened rails being cut on site. The Contractor shall strictly observe the conditions of this regime.

1.12.10 Minimum Length of Closure Rails

- 1) Compromise rails shall be used to join rails of two different cross sections.

These rails shall conform to the Japanese standards or equivalent industrial standards

- 2) Compromise rails connecting EN60E1 to JIS60 ~~shall~~ may be laid in the mainline and EN60E1 to JIS50N shall be laid in the depot access line separated from the main line.

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- 6) Formwork shall be used to ensure that the second stage concrete is set accurately to line and level, especially in the region of the bottom of the sleeper. Tolerances on the level of the secondary pour concrete shall be satisfied within the limits described within this Specification. The formwork design shall be given a Notice of No Objection by the engineer.
- 7) The track bed shall not extend over an expansion joint in the civil structure.
- 8) The concrete laitance shall be removed from the 'foot print' of the track bed and the surface scraped to increase the bond between the track bed pour concrete and the supporting structure.
- 9) The minimum strength of concrete shall be 27 MPa.
- 10) The track shall be adjusted precisely to the correct line and level and shall be securely propped and braced to ensure that it cannot move during the delivery, placing or vibration of the track bed concrete.
- 11) Track bed concrete shall not be placed until the alignment of the track has been accepted by the Engineer as being within the specified tolerances. The Contractor shall afford unrestricted access to the Engineer for checking the setting-out measurements and the alignment as and when the Engineer requires it.
- 12) The Contractor shall design the track bed to provide appropriate drainage so that water falls away from the rails and shall form adequate gullies and connections into the drainage pipe laid in the first stage concrete. The Contractor shall take all necessary steps to prevent any concrete or other material from entering and reducing the permanent cross section of any drainage pipes, gullies, manholes, etc.
- 13) No trains shall run over newly concreted track until the cube strength or cylinder strength of the concrete has reached a minimum of 27 MPa.
- 14) When each section of track bed concrete is completed, the rails shall be released from their fastenings to even out longitudinal stresses and refastened at a designated destressing temperature range when the concrete has assumed sufficient rigidity to carry the loads. The destressing temperature range shall be agreed with the Engineer before starting the process. The unfastening and refastening will overlap into the preceding section by not less than 50 m. Records of air temperature and rail temperature shall be taken at the beginning and end of each operation.
- 15) After destressing or stress equalization, the track shall be adjusted precisely to its design position and rail joints welded.

1.10.2 Depot

- 1) The safety guard device is not required in the depot area. It is required only for the depot access track and test track, only if the radius of the curve is less than 200m. In the depot area a cant will not be required. In the test track a cant will be required.
- 2) The minimum thickness in the ballast area shall be 200mm.

position.

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- 2) The minimum thickness in the ballast area shall be 200mm.

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 shall be selected from using the comparison table in detail design.
- 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 (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 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

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 shall be selected from using the comparison table in detail design.
- 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.
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- 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

- 7) Linked breaking system utilizes optical fiber cables shall be prepared for DC traction feeder circuit protection between mainline TSS.

(7) Supervisory Control and Data Acquisition (SCADA)

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.

Telephone sets shall be installed at each TSSs and SP 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.

(8) 6.6kV distribution system for power supply system

- 1) 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.
- 2) The reciprocal support circuit shall be connected between the above two TSS of each system. In case ordinary use distribution line from a TSS stops, electric power can 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;
- 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 between Rectifier Transformer and Rectifier DC 1500V outdoor type metal enclosed air insulated switchgear with high-speed circuit breaker and disconnecting switches, and
- 3) Distribution Transformer
The 115kV/6.6kV distribution transformers gas insulated or oil insulated self-cooling, out-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.

- 7) Linked breaking system utilizes optical fiber cables shall be prepared for DC traction feeder circuit protection between mainline TSS.

(7) Supervisory Control and Data Acquisition (SCADA)

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.

Telephone sets shall be installed at each TSSs and SP 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.

(8) 6.6kV distribution system for power supply system

- 1) 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.
- 2) The reciprocal support circuit shall be connected between the above two TSS of each system. In case ordinary use distribution line from a TSS stops, electric power can supply through other side line.
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(9) TSS equipment

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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, and
- 3) Distribution Transformer
The 115kV/6.6kV distribution transformers gas insulated or oil insulated self-cooling, out-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.

load (approximately 1%) to 100% full load and shall be as linear as technically feasible up to the 300% full load current. The inherent voltage regulation at 300% full load shall ensure that the voltage at the rectifier load terminals shall not be less than 1150V DC.

- 3) The output DC voltage for each rectifier transformer and rectifier set combination, at light transition load, shall not exceed 1-590V DC.
- 4) The DC traction supply system shall be designed to provide a voltage that is self-limiting to 1-650V DC at no load.
- 5) Each rectifier transformer and rectifier set combination shall be designed in accordance with Engineer’s requirements and to satisfy the requirements of this Performance Specification and following:
 - a. 100% Continuous
 - b. 130% to 150% overload – 120 minutes
 - c. 300% overload – 1 minute.
- 6) The Contractor shall consider how to carry in and install at each substation and plan rectifier transformer that can be divided if necessary.

(2) Rectifier Transformers

- 1) 115kV/1.18kV Rectifier transformers shall comply with relevant standards and regulations. Rectifier transformers shall be rated to supply the full DC traction system load within the continuous rating, with any one rectifier transformer out of service.
- 2) The overload ratings of rectifier transformers shall be utilized to accommodate any abnormal loading in the event of train bunching or due to any abnormal DC traction feeding arrangements.
- 3) Rectifier transformers shall be designed in accordance with relevant standards and regulations and shall incorporate an earthed metal screen between high voltage and low voltage windings, if necessary.
- 4) Off-load tapping links shall be provided on the high voltage winding to provide rated output at +5.0% to -5.0% of nominal supply voltage, in increments of 2.5%.
- 5) Two secondary windings shall be provided, one connected in star and the other one connected in delta, to provide double six phases supply to the rectifier.
- 6) Rectifier transformers shall be fitted with a temperature alarm device, and temperature tripping and pressure alarm and gas pressure tripping to be monitored by the SCADA.
- 7) Rectifier transformers shall be of gas insulated or oil insulated self-cooling type to have anti-flame-able characteristics and to prevent ingress of moisture.
- 8) The insulation shall conform as a minimum to temperature ‘Class B’ as defined with relevant standards and regulations.

(3) Rectifier Sets

- 1) Rectifier sets shall provide nominal 1500V DC traction supply to the Overhead Contact line System.
- 2) Rectifier sets shall accommodate the load cycle requirements as defined with relevant standards and regulations for “Extra Heavy Traction Duty Class D” as a minimum,

load (approximately 1%) to 100% full load and shall be as linear as technically feasible up to the 300% full load current. The inherent voltage regulation at 300% full load shall ensure that the voltage at the rectifier load terminals shall not be less than 1150V DC.

- 3) The output DC voltage for each rectifier transformer and rectifier set combination, at light transition load, shall not exceed 1-590V DC.
- 4) The DC traction supply system shall be designed to provide a voltage that is self-limiting to 1-650V DC at no load.
- 5) Each rectifier transformer and rectifier set combination shall be designed in accordance with Engineer’s requirements and to satisfy the requirements of this Performance Specification and following:
 - a. 100% Continuous
 - b. 130% to 150% overload – 120 minutes
 - c. 300% overload – 1 minute.
- 6) The Contractor shall consider how to carry in and install at each substation and plan rectifier transformer that can be divided if necessary.

(2) Rectifier Transformers

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- 4) Off-load tapping links shall be provided on the high voltage winding to provide rated output at +5.0% to -5.0% of nominal supply voltage, in increments of 2.5%.
- 5) Two secondary windings shall be provided, one connected in star and the other one connected in delta, to provide double six phases supply to the rectifier.
- 6) Rectifier transformers shall be fitted with a temperature alarm device, and temperature tripping and pressure alarm and gas pressure tripping to be monitored by the SCADA.
- 7) Rectifier transformers shall be of gas insulated or oil insulated self-cooling type to have anti-flame-able characteristics and to prevent ingress of moisture **with an enclosed bus ducting or cable connection to the rectifier cubicle.**
- 8) The insulation shall conform as a minimum to temperature ‘Class B’ as defined with relevant standards and regulations.

(3) Rectifier Sets

- 1) Rectifier sets shall provide nominal 1500V DC traction supply to the Overhead Contact line System.
- 2) Rectifier sets shall accommodate the load cycle requirements as defined with relevant standards and regulations for “Extra Heavy Traction Duty Class D” as a minimum,