NATIONAL CAPITAL REGION TRANSPORT CORPORATION LIMITED

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Addendum and Corrigendum No. 05B

Name of Work: - Bid No. DM/ST/COR-OF/100, Package 24: Design, Supply, Installation, Testing and Commissioning of Signalling &Train Control, Platform Screen Doors and Telecommunication Systems for Delhi – Ghaziabad – Meerut RRTS Corridor of NCRTC

S. N.	Bid Document Section / Clause No.	Existing Document/Form/Clause/ Sub Clause	Modified Document/Form/Clause/Sub Clause
1	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control	Part 2 / Section 6B / Particular Specification-Signalling and Train control uploaded on e-Procurement portal with the Bidding Documents dated 17.04.2020.	**The existing Employer's Requirement Part -2, Section 6B: Particular Specification-Signalling and Train control including amendment in Clauses related to Section 6B made in Addendum and Corrigendum 01B & 02B has been revised, please refer revised Section 6B: Particular Specification - Signalling and Train control - R1, enclosed as Attachment No. 1 with this Addendum & Corrigendum-05B. Bidders may kindly note that they should use the revised Section 6B: Particular Specification - Signalling and Train control - R1.** **(Following Addendums and Corrigendums pertaining to Section 6B have been incorporated in Section 6B: Particular Specification - Signalling and Train control - R1)**

2	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, LIST OF DEFINITION	**Operating hours** | Operating hours shall be 06:00 to 24:00, 7 days per week.	**Operating hours** | Operating hours shall be ~~06:00~~ 05:00 **AM** to ~~24:00~~ 01:00 **AM (Next day),** 7 days per week.
3	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-3, Clause No. 3.2.1.3 Point No. 1 & 2	Procurement of following items shall be done only from local suppliers**:** 1). Depot Point Machine with other accessories: High thrust, trailable Point machine. 2). 3 aspect, Shunt, Buffer light and route indicator signals with accessories	Procurement of following items shall be done only from local suppliers **if required to meet Employer's requirement:** 1). Depot Point Machine with other accessories: ~~High~~ thrust, trailable Point machine, **Non trailable Point machine.** 2). 3 aspect**/2 aspect/1 aspect**, Shunt, Buffer light and route indicator signals with accessories
4	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-3, Clause No. 3.4.2	Services Provided by Project Contractors The services detailed in Paragraphs 3.4.2.3 to 3.4.2.7 will be provided by Project Contractors and the S&TC Contractor will use these services where appropriate.	Services Provided by Project Contractors The services detailed in Paragraphs 3.4.2.3 to 3.4.2.**6**~~7~~ will be provided by Project Contractors and the S&TC Contractor will use these services where appropriate.
5	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-3, New Sub Clause No. 3.2.1.4		**[Add the following New Sub Clause No. 3.2.1.4 in PS]** **Vendor Approval and Subcontractor approval shall be done as per Appendix T and Appendix U respectively.**
6	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control,	The Signalling and Telecom Contractor will be provided a space of about 1200 sqm and 600 Sqm respectively at each of the two (02) suitable places for constructing	The Signalling, Telecom and **PSD** ~~Telecom~~ Contractor, **each** will be provided a space of about 1200 sqm, 600 Sqm and **600 Sqm** respectively at ~~each of the~~ two (02) suitable places for constructing temporary storage facilities for

	Chapter-3, Clause No. 3.6.3.1	temporary storage facilities for Contractor as mentioned in Appendix A. The Contractor will construct the storage facility within 4 months of possession of land given by NCRTC. The space will be available to the Contractor till end of Defect Liability Period.	Contractor as mentioned in Appendix A. The Contractor will construct the storage facility within 4 months of possession of land given by NCRTC. The space will be available to the Contractor till end of Defect Liability Period.
7	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-4, Clause No. 4.3.4	For the purposes of availability calculations, the Contractor shall assume that the service operating hours are 18 hours per day (06:00 to 24:00) for 365 days a year. The total test duration will be taken accordingly.	For the purposes of availability calculations, the Contractor shall assume that the service operating hours are **20** hours per day [~~06:00~~ **05:00 AM** to ~~24:00~~ **01:00 AM (Next day)]** for 365 days a year. The total test duration will be taken accordingly.
8	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-4, Clause No. 4.3.6	Complete RBC or EPC failure, during DLP period shall call for imposition of penalty on the Signalling Contractor, equal to Rs. Twenty Lakh per such event.	~~Complete~~ RBC or EPC failure **(service affecting failure)**, during DLP period shall call for imposition of penalty on the Signalling Contractor, equal to Rs. Twenty Lakh per such event.
9	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-4, Clause No. 4.3.9	Wayside LTE equipment failure, two or more adjacent RRU or BBU failure shall call for imposition of penalty on the LTE contractor, equal to Rs. Two Lakh per such event. This provision will become effective section wise after 6 months of revenue operation of that section.	Wayside LTE equipment failure **(service affecting failure) other than EPC failure**, two or more adjacent RRU (Remote Radio Unit) or BBU (Base Band Unit) failure shall call for imposition of penalty on the LTE contractor, equal to Rs. Two Lakh per such event. This provision will become effective section wise after 6 months of revenue operation of that section**.** **CBI failure (service affecting failure), during DLP period shall call for imposition of penalty on the Signalling Contractor, equal to Rs. Two Lakh per such event.**

10	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 4, Clause No. 4.4.2.3		**[Add the following new Sub Clause No. (5) in Clause No. 4.4.2.3 in PS]** **(5) The following MTTR shall be achieved in case of LTE equipments:** **a. 30 minutes for train-borne equipment.** **b. 30 minutes for trackside equipment; and** c. **30 minutes for equipment located in equipment rooms or control rooms**
11	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-4, Clause No. 4.7.1 Point No. 1	1). SKK and Modipuram terminals, including turnback operation at these two terminal stations and at few intermediate stations. This headway shall be measured on the line using the respective EMU performance for 6 and 9-car trains with 30-second dwells at intermediate stations and a minimum 2-minute layover at the terminal stations. The headway calculation will include PSD operation time. The contractor shall develop all software for both 6- car and 9-car RRTS trains. Infrastructure shall be installed to cater mixed fleet of 6-car and 9-car RRTS trains.	1). SKK and Modipuram terminals, including turnback operation at these two terminal stations and at few intermediate stations. This headway shall be measured on the line using the respective EMU performance for 6 and 9-car trains with 30-second dwells at intermediate stations and a minimum 2-minute layover at the terminal stations. The headway calculation will include PSD operation time. The contractor shall develop all software for both 6- car ~~and~~, 9-car RRTS trains **and 3-car MRTS trains including station stopping points**. Infrastructure shall be installed to cater mixed fleet of 6-car, ~~and~~ 9-car RRTS trains **and 3-car MRTS trains**.
12	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-4, Clause No. 4.10.5.2	4.10.5.2 The bi-directional running requirement shall be demonstrated by the Contractor.	4.10.5.2 The bi-directional running requirement shall be demonstrated by the Contractor **for both ETCS Level 1 and ETCS Level 2.**
13	Employer's Requirement Part-2, Section 6B: PS-	ETCS Level 1, ATP/FS Mode shall be available in both the Depots except in the Depot maintenance area, as	ETCS Level 1, ATP/FS Mode shall be available in both the Depots except in the Depot maintenance area, as indicated in the Employer's Drawings.

	Signalling and Train control, Chapter-5, Clause No. 5.1.3.5	indicated in the Employer's Drawings. However, Depot test tracks shall be equipped with both ETCS Level 1 and ETCS Level 2.	However, **both** Depot test tracks shall be equipped with ~~both~~ ETCS Level 1 and ETCS Level 2.
14	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-5, Clause No. 5.3.7.2	5.3.7.2 Train detection ……... areas in the depot. The axle counter …… configuration. Axle counter type shall be MSDAC (Multi Section Digital Axle counter). Duplicated axle ……. during the design phase.	5.3.7.2 Train detection ……... areas in the depot. The axle counter …… configuration. Axle counter type shall be MSDAC (Multi Section Digital Axle counter) **with mounting through clamps.** Duplicated axle ……. during the design phase.
15	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-5, Clause No. 5.3.13	5.3.13 Staff Protection Key 5.3.13.1 Function of Staff Protection Key shall be provided to authorize movement of Rolling Stocks from protected area to unprotected area.	5.3.13 ~~Staff Protection Key~~ **Authorization Push Button** 5.3.13.1 Function of ~~Staff Protection Key~~ **Authorization Push Button** shall be provided to authorize movement of Rolling Stocks from protected area to unprotected area.
16	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 5, Clause No. 5.41 sub clause 5.41.4	There shall be a minimum of 29 IP based camera per train which could be increased. Provision shall be made for displaying a minimum one live stream from a train at OCC. In case where more than one camera from a train is required for live streaming, throughput generated by each camera shall be proportionately reduced (increasing image compression). The display system at OCC should be capable of displaying as many live streams from different trains on the line as the operator wants to see by selecting multiple windows on one or more MMI. The signalling contractor shall provide the CCTV management software for selection	There shall be a minimum of 29 IP based camera**s** per train which could be increased. Provision shall be made for displaying ~~a~~ minimum one live stream ~~from a~~ **per** train, at OCC**/BCC and DCC using NCRTC's Captive LTE Network and remaining from Wireless Network**. ~~In case where more than one camera from a train is required for live streaming, throughput generated by each camera shall be proportionately reduced (increasing image compression)~~. The display system at OCC should be capable of displaying as many live streams from different trains on the line as the operator wants to see by selecting multiple windows on one or more MMI. The signalling contractor shall provide the CCTV management software for selection and decoding of the incoming data stream for onboard CCTV

		and decoding of the incoming data stream for onboard CCTV	
17	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-6, Clause No. 6.4.3.4	Software Development process of TMS and ATO systems shall follow Safety Integrity Level 2 as defined in the CENELEC standard EN50126, EN50128 and EN50129. All potentially unsafe effects of safety-related functions performed by TMS and ATO shall be mitigated by mandatory interaction with SIL4 subsystems (ATP and CBI). Contractor shall provide SIL level of each proposed subsystem in Section 4A, Annexure to Technical Proposal along with other information.	Software Development process of TMS and ATO systems shall follow Safety Integrity Level 2 as defined in the CENELEC standard**s** ~~EN50126, EN50128 and EN50129~~. All potentially unsafe effects of safety-related functions performed by TMS and ATO shall be mitigated by mandatory interaction with SIL4 subsystems (ATP and CBI). Contractor shall provide SIL level of each proposed subsystem in Section 4A, Annexure to Technical Proposal along with other information.
18	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-6, Clause No. 6.10.1, Point No. 2	(2) Preliminary ……... but is not limited to: • System and Sub-system Overview, • System ……... specification, • System safety plan, • System Verification & Validation Plan • System …… Plan and Quality Plan • ATC ……. for ATP etc.	(2) Preliminary ……... but is not limited to: • System and Sub-system Overview, **Catalogue of Sub-systems/ Systems spare parts etc.,** • System ……... specification, • System safety plan, • System Verification & Validation Plan • System …… Plan and Quality Plan • ATC ……. for ATP etc.

19	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-11, Clause No. 11.1.3	The DLP of a section or part of work shall start from the date of opening of the section for revenue services and shall continue until 3 years from the date of opening of the section for revenue services of that relevant section or part of the work. For the equipment and software supplied of OCC/BCC, the DLP shall start from the date of opening of taking over of OCC/BCC and shall continue until 3 years from the date of taking over of the OCC/BCC.	The DLP of a section or part of work shall start from the date of opening of the section for revenue services and shall continue until 3 years from the date of opening of the section for revenue services of that relevant section or part of the work. For the equipment and software supplied of OCC/BCC, the DLP shall start from the date ~~of opening~~ of taking over of OCC/BCC and shall continue until 3 years from the date of ~~taking over of the OCC/BCC~~ **opening of Stage -4 for revenue service.** **Note: For the time period during which Temporary OCC is operational, Contractor has to manage the equipments.**
20	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-11, Clause No. 11.5.1.1	The …….. staff of the Operator. Four weeks before the commencement date of Service trials, the Contractor shall deliver to the Employer the Operation and Maintenance manuals. The Final updated manuals shall be delivered to the Employer four weeks before the Commencement of Integrated Testing & Commissioning. These manuals shall have been submitted to and reviewed with No Objection by the Employer's Engineer prior to delivery to the Employer. Each and every …… readily effected.	The …….. staff of the Operator. Four weeks before the commencement date of Service trials, the Contractor shall deliver to the Employer the Operation and Maintenance manuals. The ~~Final~~ updated manuals shall be delivered to the Employer four weeks before the Commencement of Integrated Testing & Commissioning. These manuals shall have been submitted to and reviewed with No Objection by the Employer's Engineer prior to delivery to the Employer. Each and every …… readily effected.

21	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-12, Clause No. 12.1.1	12.1.1 The Contractor shall provide spare parts for the DLP in accordance with the requirements of Chapter 12 of GS. Contractor shall ……. Defect Liability period for that section.	12.1.1 The Contractor shall provide spare parts for the DLP in accordance with the requirements of Chapter **13** ~~12~~ of GS. Contractor shall …….. Defect Liability period for that section.
22	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-12, Clause No. 12.8.4	Troubleshooting and Maintenance simulator.	Troubleshooting and Maintenance simulator **(Test Lab).**
23	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-13, Clause No. 13.2.1	The contractor shall provide the training to the Employer's personnel in design, manufacturing process, testing, system architecture, and installation practices. This will form the part of offshore training. Contractor shall also provide training to the operations and maintenance staff in India.	The contractor shall provide the training to the Employer's personnel in design, ~~manufacturing process~~, testing, system architecture**, Hardware and Software installation, Maintenance (System Configuration, Software Installation and Alarm Management as a minimum), troubleshooting, Test Lab(s) simulators & equipment and** installation practices **as a minimum**. Contractor shall also provide training to the operations and maintenance staff ~~in India~~.
24	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-13, Clause No. 13.2.2	Offshore Training i. Contractor shall submit an offshore training programme for Train control and Signalling system in the areas of design and configuration of ATP/ ATO system and TMS sub-systems.	Offshore Training i. Contractor shall submit an offshore training programme for Train control and Signalling system including ATP/ ATO system**, IXL system** and TMS~~Sub System~~. ii. The contractor shall provide overall 20 days of training **for S&TC system**. Number of trainees shall be decided as per employer's discretion.

		ii. The contractor shall provide overall 20 days of training. Number of trainees shall be decided as per employer's discretion.	iii. **The contractor shall provide overall 15 days of training for LTE system. Number of trainees shall be decided as per employer's discretion. The training shall also include RF planning and Maintenance (User Management, Provisioning, Policy Management, QoS Management, tunneling, Bearer Management as a minimum).**
25	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-13, Clause No. 13.2.3	Onshore Training - Training to Operations & Maintenance staff i. The Contractor shall conduct courses for the operations aspects of the Train Control and Signalling. ii. The Contractor shall conduct courses on the maintenance aspects of the Train Control and signalling system. iii. The contractor shall provide overall 60 days of training. Minimum one expat trainer along with another trainer shall come for each training module. Number of trainees shall be decided as per employer's discretion.	Onshore Training ~~- Training to Operations & Maintenance staff~~ i. The Contractor shall conduct courses for the operations **and Maintenance** aspects **along with other training** of Train Control and Signalling. ii. **Deleted.** iii. The contractor shall provide overall 60 days of training. Minimum one expat trainer along with another trainer shall **conduct** ~~come for~~ each training module. Number of trainees shall be decided as per employer's discretion. iv. **The contractor shall provide overall 30 days of training for LTE system. Minimum one expat trainer along with another trainer shall conduct** ~~come for~~ **each training module. Number of trainees shall be decided as per employer's discretion. The training shall also include RF planning and Maintenance (User Management, Provisioning, Policy Management, QoS Management, tunnelling, Bearer Management as a minimum).**

26	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-13, Clause No. 13.4.2	TOT shall be essential and shall include installation, and maintenance support.	TOT shall be essential and shall ~~include installation, and maintenance support~~ **cover until the end of the DLP**. **TOT shall include installation, testing, commissioning and maintenance support as a minimum. In case the Indian JV member or Indian specialist sub-contractor is responsible for above mentioned works, TOT along with MOU with Indian companies or company is not essential.**
27	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-13, New Clause No. 13.4.5		**[Add the following New Sub Clause No. 13.4.5 in Clause No. 13.4 in PS]** **In case of any conflict between PS & GS with regards to TOT clause, PS shall prevail.**
28	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter-14, Clause No. 14.1.2	All the submission shall normally be done in electronic form through a Common Data Environment; however, employer reserves the right to instruct contractor to submit any or all the submissions in hard copy(ies)	All the submission shall normally be done in electronic form through a Common Data Environment **with one hard copy**; however, employer reserves the right to instruct contractor to submit any or all the submissions in hard copy(ies)
29	Employer's Requirement Part-2, Section-6B: PS Signalling and Train control, Appendix-A1, Clause 3.1		**[Add the following New Sub Clause 3.1.10 in the Clause 3.1 in PS]** **3.1.10 The LTE system shall interface with the PAS system to permit selected Hand-portable radios to make public address announcement in the station without the intervention OCC.**
30	Employer's Requirement Part-2, Section 6B: PS-	The ATO system shall accept coasting commands from the TMS system. The ATO system shall operate the train within the parameters set by the ETCS Onboard	The ATO system shall accept ~~coasting~~ commands from the TMS system. The ATO system shall operate the train within the parameters set by the ETCS Onboard system. As a train approaches a station, the ATO system shall

	Signalling and Train control, Appendix D, Clause No. 10.4	system. As a train approaches a station, the ATO system shall reduce speed and control the stop to within ±300mm. When the train is properly berthed, the ATO system shall initiate a command to open the train doors.	reduce speed and control the stop to within ±300mm. When the train is properly berthed, the ATO system shall initiate a command to open the train doors.
31	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix M, Clause No. 4.1.1, Point no. 4	4) For longer duration transients (> 5ms) the variation approaches rectangular pulses with an initial rate of rise up to 5x104 Volts per second.	4) For longer duration transients (> 5ms) the variation approaches rectangular pulses with an initial rate of rise up to ~~5x104~~ **5x10⁴** Volts per second.
32	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix N, Clause No. 4.6, Point no. vii	vii. Staff Protection Key Switch (SPKS)/ Authorization Push Button;	vii. ~~Staff Protection Key Switch (SPKS)/~~ Authorization Push Button;
33	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix O, Clause No. 7.4 Point no. b and Sub Clause No. 7.4.1	b. On board ATP / ATO equipment (For MRTS and RRTS trains) 1) Two out of three hardware architecture with identical hardware and identical or diverse software Or 2) Two out of two hardware with identical or diverse hardware and common or diverse software or Single Electronic Structure based on reactive fail safety with diverse software. Redundancy shall be provided so that failure of one onboard ATP / ATO equipment does not prevent the train from being operated in ATP/ ATO	b. On board ATP ~~/ ATO~~ equipment (For MRTS and RRTS trains) 1) Two out of three hardware architecture with identical hardware and identical or diverse software Or 2) Two out of two hardware with identical or diverse hardware and common or diverse software or Single Electronic Structure based on reactive fail safety with diverse software. Redundancy shall be provided so that failure of one onboard ATP ~~/ ATO~~ equipment does not prevent the train from being operated in ATP**/FS**~~/ ATO~~ mode. The changeover in the event of failure of one unit shall

		mode. The changeover in the event of failure of one unit shall be automatic, without train operator's intervention, with an indication in the cab. 3) Regardless of the onboard architecture, underframe ATC equipment and roof mounted S&T equipment shall be in hardware redundant configuration for both direction of movement. 7.4.1 No single component/card failure (viz input/output cards DMI, odometer, Balise antenna, radio antenna, radio modem etc) should cause the complete failure of the onboard or trackside ATP or ATO equipment.	be automatic, without train operator's intervention, with an indication in the cab. 3) Regardless of the onboard architecture, underframe ATC equipment and roof mounted S&T equipment shall be in hardware redundant configuration for both direction of movement. **For balise antenna hardware redundancy is not essential provided that MTBF of 100000 Hrs. is achieved.** 7.4.1 No single component/card failure (viz input/output cards DMI, odometer, ~~Balise antenna~~, radio antenna, radio modem etc) should cause the complete failure of the onboard or trackside ATP or ATO **functionality** ~~equipment.~~
34	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix P	APPENDIX P: LIST OF SPARES FOR TRAIN CONTROL & SIGNALLING SYSTEM	APPENDIX P: LIST OF **CONTRACT** SPARES FOR TRAIN CONTROL & SIGNALLING SYSTEM
35	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix S, Clause No. 1.2.1	The Signalling and Telecom Contractor will be provided a space of about 1200 sqm and 600 Sqm at each of the two suitable places for constructing site offices and storage facilities for contractor as mentioned in Appendix A. The contractor will construct the site office and storage facility within 4 months of possession of land given by NCRTC. The space will be available to the Contractor till end of maintenance contract.	The Signalling, Telecom and **PSD** Contractor**, each** will be provided a space of about 1200 sqm, 600 Sqm and **600 Sqm** at ~~each of the~~ two suitable places for constructing site offices and storage facilities for contractor as mentioned in Appendix A. The contractor will construct the site office and storage facility within 4 months of possession of land given by NCRTC. The space will be available to the Contractor till end of maintenance contract.

36	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix S, Clause No. 1.2.7	Contractor shall provide and maintain the following requirements for employer as well at each two site offices. a) 1 Chamber for Employer's Engineer of 20 sqm area. b) 2 Rooms of 15 sqm area for DY. HODS c) 1 Room of 30 sqm area for seating 5 Asst Engineers d) 1 Hall of area 50 sqm for seating of 10 supervisors and storage of documents apart from toilet and pantry. e) 1 Meeting room of 25 sqm area. Area mentioned above shall be furnished (including furniture, storage almirahs etc. excluding workstations) and air-conditioned.	Contractor shall provide and maintain the following requirements for employer ~~as well~~ at ~~each~~ **two** site offices. a) **2** ~~1~~ Chamber for **HODs** ~~Employer's Engineer~~ of 20 sqm area **with attached toilet**. b) **4** ~~2~~ Rooms of 15 sqm area for DY. HODS c) 1 Room of ~~30~~ **40** sqm area for seating ~~5~~ **6** Asst Engineers d) 1 Hall of area 50 sqm for seating of 10 supervisors and storage of documents apart from toilet and pantry. e) 1 Meeting room of 25 sqm area. **f) 1 Hall of area 50 sqm for Employer's Engineer.** Area mentioned above shall be furnished (including furniture, storage almirahs etc. excluding workstations) and air-conditioned.
37	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, New Appendix T & Appendix U	**New Appendix T and Appendix U has been added in Section 6B, Employer's Requirement Part-2 Particular Specification: Signalling and Train Control-R1 in Addendum and Corrigendum No. 05B. Bidders may kindly note the same.**	
38	Employer's Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-V	**The existing Appendix V: KEY & ACCESS DATES has been Revised. Please refer Section 6B, Employer's Requirement Part-2 Particular Specification: Signalling and Train Control-R1. Bidders may kindly note the same.**	
39	Employer's Requirement Part-2, Section 6F, General Alignment Drawing	**The General Alignment Drawings, Precast Standard Segments Drawings and Standard Box Girder General Arrangement Drawing is attached herewith as Attachment No. 2 in Addendum and Corrigendum No. 05B. Bidders may kindly note the same.**	

40	Employer's Requirement Part-2, Section 6E, SHE	Correction Slip to Section 6E SHE	**[Correction Slip to Section 6E SHE is for Appendix III (A), Bidders may note that correction Slip has revised Requirements of Appendix III (A) of Section 6G, SHE.]**
41	Employer's Requirement Part-2, Section 6E, SHE, Correction Slip to Section 6E SHE, S. NO. 7, Deployment Criteria/Requirement based on work fronts	(i) One Construction Medical Officer along with required nurse shall be mobilise within four weeks of time from LOA in both day and night shift. (ii) He should be mobilise on full time basis. However, when a small work is awarded and limited to single station/depot/boundary wall, medical officer on part time basis may be mobilise.	(i) One Construction Medical Officer along with required nurse shall be ~~mobilise~~ **mobilized** within four weeks of time from LOA ~~in both day and night shift~~ **on part time basis.** **(ii). Deleted** ~~He should be mobilise on full time basis. However, when a small work is awarded and limited to single station/depot/boundary wall, medical officer on part time basis may be mobilise.~~
42	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, LIST OF ABBREVIATIONS		**New ABBREVIATION has been added** **DTMS: - Depot Traffic Management System** **RRU: - Remote Radio Unit** **BBU: - Base Band Unit**
43	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 3, Clause No. 3.2.1.2, sr. no. 19	19. Operation Control Centre (OCC)/Backup Control Centre (BCC): There will be an Integrated Operation Control Centre which will come at Jangpura (DELHI), while the Backup Control Centre will be at DUHAI Depot (or any other location decided by Employer) of D-G-M Corridor. BCC will be first operationalised along with the Stage 1. Once the OCC at Jangpura gets ready, it will become Main Control Centre. In case operation from OCC is not possible, all the controls will be transferred	19. Operation Control Centre (OCC)/Backup Control Centre (BCC): There will be an Integrated Operation Control Centre which will come at Jangpura (DELHI), while the Backup Control Centre will be at DUHAI Depot (or any other location decided by Employer) of D-G-M Corridor. BCC will be first operationalised along with the Stage 1. Once the OCC at Jangpura gets ready, it will become Main Control Centre. In case operation from OCC is not possible, all the controls will be transferred to BCC for the entire line. Simultaneous control operation from the two Control Centers shall not be possible. The control functionality provided at BCC shall, however, be of the same degree as

		to BCC for the entire line. Simultaneous control operation from the two Control Centres shall not be possible. The control functionality provided at BCC shall, however, be of the same degree as provided at OCC. All references to the Operations Control Centre (OCC) elsewhere in the PS shall also be taken for the Backup Control Centre (BCC), if the BCC is controlling the corridor. BCC shall be replica of OCC in regard to equipment and functions. The system shall be capable of logging ATP, RBC, Interlocking and other system alarms, maintenance management system including data storage facility at BCC similar to OCC. Signalling contractor shall conduct ergonomic study for entire OCC & BCC.	provided at OCC. All references to the Operations Control Centre (OCC) elsewhere in the PS shall also be taken for the Backup Control Centre (BCC), if the BCC is controlling the corridor. BCC shall be replica of OCC in regard to equipment and functions. The system shall be capable of logging ATP, RBC, Interlocking and other system alarms, maintenance management system including data storage facility at BCC similar to OCC. Signalling contractor shall conduct ergonomic study for entire OCC & BCC. **The tentative size of OCC and BCC shall be 560 sqm &180 sqm respectively.**
44	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 3.4.2.8	3.4.2.8 Furniture for OCC at Jangpura shall be supplied by the Signalling contractor considering 3 Corridors of phase -1 of NCRTC. BCC theatre shall be considered only for controlling and monitoring D-G-M corridor. Its furniture shall be supplied by the Signalling Contractor.	3.4.2.8 Furniture for OCC at Jangpura shall be supplied by the Signalling contractor considering 3 Corridors of phase -1 of NCRTC. BCC theatre shall be considered only for controlling and monitoring D-G-M corridor. Its furniture shall be supplied by the Signalling Contractor. **Furniture for Temporary OCC (if contingency plan is executed as per Clause 2.3 of this PS) shall be supplied by Signalling contractor. This furniture may be reused. The tentative size of Temporary OCC shall be 100 Sqm.**
45	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause	5.15 Central Traffic Management System (CTMS)	5.15 ~~Central~~ Traffic Management System (~~C~~TMS)

	No. 5.15		
46	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.16(3) Addendum and Corrigendum-02B Sr. No. 110	(3) Not used. Data ~~shall be~~ provided from future corridor TMS. ~~in a format required by CTMS.~~	(3) **~~Not used.~~** Data ~~shall be~~ provided from future corridor**s** TMS**; and** ~~in a format required by CTMS.~~
47	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.17.4	TDS facilitate the system to assign the train ID on workstation to recognize the train type, destination, rake information and other information. The Train Control and Signalling System shall uniquely and positively identify every train. The train description shall consist of up to 08 alphanumeric characters. The train ID shall be consisting of digits to identify the current destination, digits to identify train types (Passenger, Freight, MRTS) and digits to identify the service identification number. The Service identification remains constant during the service, the Destination identification changes at each trip or turn back. The Undetermined trains should be numbered outside the above normal range. When the train is situated in the depot or on the mainline (Not in revenue service), the follow-up shall be carried out	TDS facilitate the system to assign the train ID on workstation to recognize the train type, destination, rake information and other information. The Train Control and Signalling System shall uniquely and positively identify every train. The train description shall consist of up to 08 alphanumeric characters. The train ID shall be consisting of digits to identify the current destination, digits to identify train types (~~Passenger, Freight, MRTS~~ **Train types as per Clause 5.19.21.5.4 of this PS**) and digits to identify the service identification number. The Service identification remains constant during the service, the Destination identification changes at each trip or turn back. The Undetermined trains should be numbered outside the above normal range. When the train is situated in the depot or on the mainline (Not in revenue service), the follow-up shall be carried out with the “Rake ID” of this train which system will pick up automatically. It shall also be possible for train identity to be attributed manually from the Depot TMS or Central TMS or in according to location of this train respectively depot or main line.

		with the “Rake ID” of this train which system will pick up automatically. It shall also be possible for train identity to be attributed manually from the Depot TMS or Central TMS or in according to location of this train respectively depot or main line.	
48	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.19.14 of Addendum & Corrigendum 2B	5.19.14 Train detection and follow up :- Train follow-up shall be executed by TMS checking the proper sequence of occupied/clear of the block sections.	5.19.14 Train detection and follow up:- Train follow-up shall be executed by TMS checking the proper sequence of occupied/clear of the ~~block~~ **track** sections.
49	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.19.		**5.19.22 Delay Distribution Management** **5.19.22.1 Delay Distribution management system shall detect the disturbing train(s) and calculate the total delay which is required to be distributed among all running trains ahead and rear of disturbing train in corridor.**
50	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.19.20	5.19.20 Junction Management 5.19.20.1 In case of delayed situation or conflict between different train service, the system implements automatically strategy to recover the standard timetable. The system shall use Junction management for handling turnback	5.19.20 Junction Management 5.19.20.1 In case of delayed situation or conflict between different train service, the system implements automatically strategy to recover the standard timetable. The system shall use Junction management for handling turnback locations. The junction management shall have following features but not limited to:-

		locations. The junction management shall have following features but not limited to:- 5.19.20.2 The TMS shall provide junction management for all merging and diverging junctions. 5.19.20.3 The TMS shall provide for the following junction management modes: 1) First come first serve 2) Priority for late trains 3) Priority for selected Trains 4) Individual trains at particular junction 5) Priority for selected routes. 5.19.20.4 The junction management mode and associated parameters shall be selectable by the Controller for individual or sets of junctions. 5.19.20.5 Not used 5.19.20.6 In case of emergency situations (the emergency types shall be mutually agreed with the NCRTC during detail design phase), the system shall propose strategies to the operator who has to acknowledge and confirm the approved decision.	**5.19.20.1.1 The TMS shall provide junction management for all merging and diverging junctions.** **5.19.20.1.2 The TMS shall provide for the following junction management modes:** **1) First come first serve** **2) Priority for late trains** **3) Priority for selected Trains** **4) Individual trains at particular junction** **5) Priority for selected routes** 5.19.20.2 **Not used**. ~~The TMS shall provide junction management for all merging and diverging junctions.~~ 5.19.20.**3 Not used**. ~~The TMS shall provide for the following junction management modes:~~ ~~5) First come first serve~~ ~~6) Priority for late trains~~ ~~7) Priority for selected Trains~~ ~~8) Individual trains at particular junction~~ ~~9) Priority for selected routes.~~ 5.19.20.4The junction management mode and associated parameters shall be selectable by the Controller for individual or sets of junctions. 5.19.20.5 Not used.

			5.19.20.6 In case of emergency situations (the emergency types shall be mutually agreed with the NCRTC during detail design phase), the system shall propose strategies to the operator who has to acknowledge and confirm the approved decision.
51	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.19.21.5.4 of A&C 2B	5.19.21.5.4 Types of Trains in Timetable The timetable compilation and proving system shall provide the facility for scheduling train paths for the following train types: 1. Different EMU consists (RRTS/MRTS); 2. Empty Rake 3. Freight	5.19.21.5.4 Types of Trains in Timetable The timetable compilation and proving system shall provide the facility for scheduling train paths for the following train types: 1. Different EMU consists (RRTS/MRTS); 2. ~~Empty Rake~~ **Train Service (Revenue, Non- Revenue, Maintenance)** 3. Freight
52	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.21.4	5.21.4 Diagnostic and Maintenance can be subdivided into the following subsets:-	5.21.4 **Not used**. ~~Diagnostic and Maintenance can be subdivided into the following subsets:-~~
53	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.26.4	5.26.4 Train Movement Model 5.26.4.1 The model shall provide for train movements, per hour per direction and for simulation of a typical 24-hour timetable. It shall be possible to simulate perturbations and observe its impact.	5.26.4 Train Movement Model **in TMS Simulator** 5.26.4.1 The **train movement** model **in TMS simulator** shall **be the replica of D-G-M Corridor**. **It shall be** provid**ed** for simulation of train movements for per hour per direction and for a typical 24-hour timetable. It shall be possible to simulate perturbations in all possible scenarios by changing all relevant vital

<table>
<tr><td></td><td></td><td></td><td>and non-vital variables and observe its impact. <u>Model refers to the training system which simulates the interlocking and the trains.</u></td></tr>
<tr><td>54</td><td>Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.26.6.2</td><td>5.26.6.2 The training facility shall permit as a minimum, the Employer’s Training Instructor to:
(1) Set up, load and save initial conditions
(2) Run the training sessions
(3) Generate, modify and select pre-defined exercise scenarios for training
(4) exercises.
(5) Introduce service perturbations and System malfunctions (viz on-board equipment failure, point failure, axle counter failure, signal failure, increased interstation run time due to failures.
(6) Record and playback trainee actions</td><td>5.26.6.2 The training facility shall permit as a minimum, the Employer’s Training Instructor to:
(1) Set up, load and save initial conditions
(2) Run the training sessions
(3) Generate, modify and select pre-defined exercise scenarios for training <u>exercises.</u>
(4) <s>exercises</s>. <u>Introduce service perturbations and System malfunctions (viz on-board equipment failure, point failure, axle counter failure, signal failure, increased interstation run time due to failures.</u>
(5) <u>Record and playback trainee actions</u></td></tr>
<tr><td>55</td><td>Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 12, Clause No. 12.8.4.2(5)</td><td>(5) CTMS, TMS & LOCAL TMS Servers;</td><td>(5) C<u>entral</u> TMS<s>, TMS</s> & LOCAL TMS Servers;</td></tr>
<tr><td>56</td><td>Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, APPENDIX C-List of TMS Workstations column BCC</td><td>
<table>
<tr><td>BCC</td><td>Traffic Controller</td><td>2</td><td>3</td><td>1</td></tr>
<tr><td></td><td>Chief Controller</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td></td><td>Assistant Chief Controller</td><td>1</td><td>1</td><td></td></tr>
<tr><td></td><td>Auxiliary System Controller</td><td>1</td><td>1</td><td></td></tr>
</table>
</td><td>
<table>
<tr><td>BCC</td><td>Traffic Controller</td><td>2</td><td>3</td><td>1</td></tr>
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<tr><td></td><td>Assistant Chief Controller</td><td>1</td><td>1</td><td></td></tr>
<tr><td></td><td>Auxiliary System Controller</td><td>1</td><td>1</td><td></td></tr>
</table>
</td></tr>
</table>

			Traction Power Controller	1	1	2(one for TMS view and one for traction view)	Traction Power Controller	1	1	2(one for TMS view and one for traction view)
			Fault Management Controller	1	1	1	Fault Management Controller	1	1	1
			Rolling Stock Controller	2	2	1	Rolling Stock Controller	2	2	1
			Timetable Management Online (TMS)	1	1		Timetable Management Online (TMS)	1	1	
			Diagnostic and maintenance workstation	1	1		Diagnostic and maintenance workstation	1	1	
			CTMS MMI	1	1(>= 42")		~~CTMS MMI~~	~~1~~	~~1(>= 42")~~	
			CCTV for train view (Chief Controller)	1	1(>= 42")		CCTV for train view (Chief Controller)	1	1(>= 42")	
			CCTV for train view (for TC)	1	1(42")		CCTV for train view (for TC)	1	1(42")	

57	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, APPENDIX- P:- LIST OF CONTRACT SPARES FOR TRAIN CONTROL & SIGNALLING SYSTEM, S. No. (H) TMS	1.TMS Server, CTMS Server and LTMS Server.	1.~~TMS Server~~,C**entral** TMS Server and LTMS Server.
58	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Clause no. 9.7 of **Attachment 4 Clause No. 9 of Appendix D** of Addendum and Corrigendum 2B	In TMS architecture, the system shall be designed in such a way that failure of Local server shall not affect the working of central server. It is preferable that All the Workstations on Whole corridor shall display the view of whole line independent of its location or ACR's. TMS system shall be designed in such a way that system shall be interoperable so that the TMS D-G-M corridor of NCRTC shall be capable of requesting route according to timetable up to the first IXL of next future corridors for proper train handover from one RBC to next RBC	In TMS architecture, the system shall be designed in such a way that failure of Local server shall not affect the working of central server. It is preferable that All the Workstations on Whole corridor shall display the view of whole line independent of its location or ACR's. TMS system shall be designed in such a way that system shall be interoperable so that the TMS D-G-M corridor of NCRTC shall be capable of requesting/**accepting** route according to timetable up to/**from** the first IXL of next future corridors for proper train handover from one RBC to next RBC**.**
59	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors	Part 2 / Section 6G / Particular Specification- Platform Screen Doors uploaded on e-Procurement portal with the Bidding Documents dated 16.06.2020.	**The existing Employer's Requirement Part -2, Section 6G: Particular Specification- Platform Screen Doors has been revised, please refer revised Section 6G: Particular Specification - Platform Screen Door - R1, enclosed as Attachment No. 3 with this Addendum & Corrigendum-05B. Bidders may kindly note that they should use the revised Section 6G: Particular Specification - Platform Screen Doors - R1.**

			(Following Addendums and Corrigendums pertaining to Section 6G have been incorporated in Section 6G Particular Specification Platform Screen Doors - R1)
60	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors-ABBREVIATION	ABBREVIATION	**Added in ABBREVIATION:** **IBL - Inspection Bay Line** **SER - Signalling Equipment Room**
61	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors- New Clause Added		**New Clause Added** **LIST OF STANDARDS**
62	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -1, Clause No: 1.1.1	This Particular Specification (PS) sets out the objectives, guidelines and technical requirements applicable to the Half Height Platform Screen Gates (PSG) at the Elevated stations and Full Height Platform Screen Doors (PSD) at the Underground stations.	This Particular Specification (PS) sets out the objectives, guidelines and technical requirements applicable to the Half Height Platform Screen Gates (PSG) at the Elevated stations and Full Height Platform Screen Doors (PSD) at the Underground **/ Elevated** stations.
63	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -1, Clause No: 1.2.2	1.2.2 Not used	1.2.2 **This Particular Specification should be read in conjunction with the General Conditions of Contract (GCC), the Particular Conditions of Contract (PCC), the General Specification (GS), the Employer's Drawings and any other document forming part of the Contract**
64	Employer's Requirement Part-2, Section 6G: PS- Platform	1.2.4 Notwithstanding the contents of Sections section 1.2.2 and 1.2.3 above, the Contractor shall always immediately seek advice from the Employer's Engineer	1.2.4 Notwithstanding the contents of Sections section 1.2.2, ~~and~~ 1.2.3 ~~above~~ **and 1.2.5,** the Contractor shall always immediately seek advice from the Employer's Engineer in the event of conflict between specifications

	Screen Doors, Chapter -1, Clause No: 1.2.4	in the event of conflict between specifications	
65	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -1, Clause No: 1.2.5	1.2.5 The order of preference, having the highest priority, is: A. the Contract Agreement; B. the Letter of Acceptance; C. the Letter of Tender; D. Addendum and Corrigendum E. the Particular Conditions Part A- Contract Data; F. the Particular Conditions Part B- Special Provisions; G. the General Conditions; H. the Employer's Requirements – Particular Specifications; I. the Employer's Requirements – General Specifications; J. the Employer's Requirements – Drawings; K. the Schedules; L. Contractor's Proposal; and M. any other documents forming part of the Contract.	1.2.5 The order of preference, having the highest priority, is: ~~A. the Contract Agreement;~~ ~~B. the Letter of Acceptance;~~ ~~C. the Letter of Tender;~~ ~~D. Addendum and Corrigendum~~ ~~E. the Particular Conditions Part A- Contract Data;~~ ~~F. the Particular Conditions Part B- Special Provisions;~~ ~~G. the General Conditions;~~ ~~H. the Employer's Requirements – Particular Specifications;~~ ~~I. the Employer's Requirements – General Specifications;~~ ~~J. the Employer's Requirements – Drawings;~~ ~~K. the Schedules;~~ ~~L. Contractor's Proposal; and~~ ~~M. any other documents forming part of the Contract.~~ **1. Particular Specification and its Appendices** **2. General Specification** **3. General Rules (or agreed with Employer)** **4. International Standards referenced herein** **5. Other International Standards**

			<u>However, in case of any divergent requirement between PS and International standards, design and implementation strategy shall be submitted for Employer's approval.</u>
66	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -1, Clause No: 1.3.7 A.	1.3.7 List of relevant Standard A. Engineering Standards (i) Safety and Reliability: EN 50126, EN 50128 and EN 50129 (ii) Mechanical system: EN 12650-1 (iii) Electronic system: EN 50155, (iv) Electrical system: IEC 60364 and other relevant IEEE protocols (v) Quality standard: ISO 9001 (vi) Railway applications - Platform barrier systems: EN 17168	1.3.7 List of relevant Standard A. Engineering Standards (i) Safety and Reliability: EN 50126, EN 50128 and EN 50129 (ii) Mechanical system: EN 12650-1 (iii) Electronic system: EN 50155, (iv) Electrical system: IEC 60364 and other relevant IEEE protocols (v) Quality standard: ISO 9001 (vi) ~~Railway applications - Platform barrier systems: EN **17168**~~ **<u>Not Used</u>** (vii) **<u>Communication System IEC 61158, EN 50170, EN 50254 and EN 50325</u>**
67	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -1, Clause No: 1.3.7 B.	1.3.7 B. (iii) EMC tests: EN 50121-5, EN 61000-4-2-95, EN 61000-4-3-97, EN 61000-4-4-95, EN 61000-4-5-95, EN 61000-4-6-96, EN 61000-4-8-93, EN	1.3.7 B. (iii) EMC tests: EN 50121-~~5~~**<u>4</u>**, EN 61000-4-8-93, EN 61000-4-11-94, EN 61000-4-2-95, EN 61000-4-4-95, EN 61000-4-5-95, EN 61000-4-6-96,

		61000-4-11-94, IEC 60801 (part 2) (iv) Climatic tests: EN 60068-2-1, EN 50125-3 (v) Vibration tests: EN 50125-3, EN 60068-2-27, EN 61373	EN 61000-4-3-97, ~~IEC 60801 (part 2),~~ **IEC 61000-6-2, IEC62236 – 4 & 5** (iv) **Environment and** Climatic tests: ~~EN 60068-2-1~~, ~~EN 50125-3~~ **EN 60068-2-27, EN 60068-3-4, EN 50125-3** (v) Vibration tests: ~~EN 50125-3, EN 60068-2-27,~~ EN 61373
68	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -1, Clause No: 1.5.5	**1.5.5 Submission of Samples** A. To assist the Employer's Engineer in his evaluation of the Contractor's engineering submission, the Contractor shall submit samples to the Employer's Engineer for review, when so required and instructed by the later. B. The Contractor shall arrange site visits and/or videos for illustration if the items are bulky or impracticable for submission. C. Samples of installation or mounting accessories shall be properly mounted on a suitable board, wherever feasible, prior to their submission to the Employer's Engineer for review. D. The Contractor shall provide samples of individual types of cables to the Employer's Engineer prior to the commencement of cable installation. The samples shall be properly protected with transparent housing for independent cable	**1.5.5 ~~Submission of Samples~~** ~~A. To assist the Employer's Engineer in his evaluation of the Contractor's engineering submission, the Contractor shall submit samples to the Employer's Engineer for review, when so required and instructed by the later.~~ ~~B. The Contractor shall arrange site visits and/or videos for illustration if the items are bulky or impracticable for submission.~~ ~~C. Samples of installation or mounting accessories shall be properly mounted on a suitable board, wherever feasible, prior to their submission to the Employer's Engineer for review.~~ ~~D. The Contractor shall provide samples of individual types of cables to the Employer's Engineer prior to the commencement of cable installation. The samples shall be properly protected with transparent housing for independent cable components including sheath, armour, insulation, cable cores, etc. for ease of identification as well as inspection. Each sample shall be properly labelled with description of the cable type.~~

		components including sheath, armour, insulation, cable cores, etc. for ease of identification as well as inspection. Each sample shall be properly labelled with description of the cable type. E. Samples submitted to the Employer's Engineer shall become the property of the Employer.	E. ~~Samples submitted to the Employer's Engineer shall become the property of the Employer.~~ **Not Used**
69	Employer's Requirement Part-2, Section 6G:PS- Platform Screen Doors: Chapter -2, Clause No: 2.2.1	2.2.1 The train formation that will run on the corridor is, 6 cars RRTS train & 3 cars MRTS respectively. RRTS train will have one Business coach per train. The stopping position for RRTS platform for 6 cars and MRTS platform for 3 cars shall be provided for each direction of travel, designed to centre the EMU consist on the platform or optimised for platform entry/exit locations. The detail discussion will be done during design, and as per interface with signalling. At Begumpul, Meerut South and Modipuram platform, both RRTS and MRTS trains shall stop, and stopping location will be discussed during the design stage. The PSG/ PSD system shall be designed for bi-directional train working on RRTS-MRTS corridors i.e. the PSG/ PSD system shall operate in reverse direction of train operation, in the similar way as operated in normal direction	2.2.1 The train formation that will run on the corridor is, 6 cars RRTS train & 3 cars MRTS respectively. RRTS train will have one Business coach per train. The stopping position for RRTS platform for 6 cars and MRTS platform for 3 cars shall be provided for each direction of travel, designed to centre the EMU consist on the platform or optimised for platform entry/exit locations. The detail discussion will be done during design, and as per interface with signalling. At Begumpul, Meerut South and Modipuram platform, both RRTS and MRTS trains shall stop, and stopping location will be discussed during the design stage. The PSG/ PSD system shall be designed for bi-directional train working on RRTS-MRTS corridors i.e. the PSG/ PSD system shall operate in reverse direction of train operation, in the similar way as operated in normal direction running. Typical platform length is approximate 215 meters for RRTS stations and 75 meters for MRTS stations. For ~~underground~~ stations **having full height PSD,** platform beyond train length need to be cover up with Fixed screen by PSD contractor, and for ~~Elevated/at grade~~ stations **having half height PSD,** same work will be done by Civil contractor.

<table>
<tr><td></td><td></td><td>running. Typical platform length is approximate 215 meters for RRTS stations and 75 meters for MRTS stations. For underground stations platform beyond train length need to be cover up with Fixed screen by PSD contractor, and for Elevated/at grade stations same work will be done by Civil contractor.</td><td></td></tr>
<tr><td>70</td><td>Employer’s Requirement Part-2, Section 6G:PS- Platform Screen Doors: Chapter -3, Clause No: 2.3.1</td><td>Indicative parameters of the train doors are as under (contractor may obtain the actual drawings from the employer):<table><tr><td>Train consist</td><td>3/6 cars</td></tr><tr><td>Number of train doors per car per side in Economy class car</td><td>3</td></tr><tr><td>Number of train doors per car per side in Business class car</td><td>2 (RRTS trains only)</td></tr><tr><td>Number of driver’s cab doors per side</td><td>2</td></tr><tr><td>Stopping accuracy</td><td>±300 mm of the stopping position.</td></tr></table></td><td>Indicative parameters of the train doors are as under (contractor may obtain the actual drawings from the employer):<table><tr><td>Train consist</td><td>3/6 cars</td></tr><tr><td>Number of train doors per car per side in Economy class car</td><td>3</td></tr><tr><td>Number of train doors per car per side in Business class car</td><td>2 (RRTS trains only)</td></tr><tr><td>Number of driver’s cab doors per side</td><td>2</td></tr><tr><td>Stopping accuracy</td><td>±300 mm of the stopping position <u>for ATO mode</u></td></tr></table></td></tr>
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<tr>
<td>71</td>
<td>Employer’s Requirement Part-2, Section 6G:PS- Platform Screen Doors: Chapter -3, Clause No: 3.1.2</td>
<td>
<table>
<tr><td>1</td><td>Jangpura Station</td><td>1</td><td></td><td>1 Side</td><td>Elevated</td><td>Half Height</td><td>RRTS</td></tr>
<tr><td>2</td><td>Sarai Kale Khan</td><td>6</td><td>2 Island</td><td>2 Side</td><td>Elevated</td><td>Half Height</td><td>RRTS</td></tr>
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<tr><td>1</td><td><s>Jangpura Station</s> <u>Sarai Kale Khan</u></td><td><s>1</s><u>6</u></td><td><u>2 Island</u></td><td><s>1</s><u>2</u> Side</td><td>Elevated</td><td>Half Height</td><td>RRTS</td></tr>
<tr><td>2</td><td><u>Jangpura Station</u> <s>Sarai Kale Khan</s></td><td><s>6</s>2</td><td><s>2</s><u>1</u> Island</td><td><s>2 Side</s></td><td>Elevated</td><td><s>Half</s> <u>Full</u> Height</td><td>RRTS</td></tr>
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<tr>
<td>72</td>
<td>Employer’s Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -3, Clause No: 3.1.7</td>
<td>3.1.7 Include all the civil works associated with Platform Screen Door System works at underground stations & Platform Screen Gate System works at Elevated Stations respectively, also making and painting the civil works in conformity to the aesthetics of the station and as per the approval of the Engineer</td>
<td>3.1.7 Include <u>interface with civil contractors for</u> all the civil works associated with Platform Screen Door System works at underground <u>and elevated</u> stations & Platform Screen Gate System works at Elevated Stations respectively, <s>also making and painting the civil works in</s> <u>for</u> conformity to the aesthetics of the station and as per the approval of the Engineer</td>
</tr>
<tr>
<td>73</td>
<td>Employer’s Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -3, Clause No: 3.1.21</td>
<td>3.1.21 Works which are not to be subcontracted by the PSD Contractor shall be as below: -
NOTE: Following activities cannot be further subcontracted for PSD System by Specialist Sub contractor/ JV member meeting the requirement of Key activity 2.4.2 in Section 3 of EQC:
➢ Design of PG system (Mechanical, Electrical, Electronics and software for the system.)</td>
<td>3.1.21 Works which are not to be subcontracted by the PSD Contractor shall be as below: -
<s>NOTE:</s> Following activities cannot be further subcontracted for PSD System by Specialist Sub contractor/ JV member meeting the requirement of Key activity 2.4.2 in Section 3 of EQC:
➢ Design of PG system (Mechanical, Electrical, Electronics and software for the system.)
➢ Manufacture of Door Control Unit.</td>
</tr>
</table>

		➢ Manufacture of Door Control Unit.	
74	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -3, Clause No: 3.2.1 (8)	3.2.1 Scope of Supply: System Components and Interfaces 8. MMIs	3.2.1 Scope of Supply: System Components and Interfaces 8. **Monitoring Screen for** MMI~~s~~
75	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -3, Clause No: 3.4.1	3.4.1 The Contractor shall accommodate his equipment in SER/ TER/ SMR/ OCC/ BCC/ DCC / SCR and interface for space accordingly.	3.4.1 The Contractor shall accommodate his equipment in ~~PSD Room/~~ SER/ TER/ SMR/ OCC/ BCC/ DCC / SCR and interface for space accordingly.
76	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -3, Clause No: 3.4.4	3.4.4 The Contractor shall survey the route for cable trays for cabling and shall interface with designated Contractor for cable tray requirements for system. The following cable containment run at high level will be provided by the Designated Building E&M Services Contractors at each station for use by the Contractor: i. Between the PSD Equipment Room and the Signalling Equipment Room and SMR ii. Between the PSD Equipment Room, and one platform end	3.4.4 The Contractor shall survey the route for cable trays for cabling and shall interface with designated Contractor for cable tray requirements for system. The following cable containment run at high level will be provided by the Designated Building E&M Services Contractors at each station for use by the Contractor: i. Between ~~the PSD Equipment Room and~~ the Signalling Equipment Room and SMR ii. Between the ~~PSD~~ **Signalling** Equipment Room, and one platform end iii. Between the ~~PSD~~ **Signalling** Equipment Room and the Headwall Unit/PSL

		iii. Between the PSD Equipment Room and the Headwall Unit/PSL iv. Between the PSD Equipment Room and Platform Supervisor's Booth v. Between the PSD Equipment Room and SCR/TER and any other rooms of station wherever required	iv. Between the ~~PSD~~ **Signalling** Equipment Room and Platform Supervisor's Booth **(if any, or any other suitable location at platform for PSA)** v. Between the ~~PSD~~ **Signalling** Equipment Room and SCR/TER and any other rooms of station wherever required
77	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -3, Clause No: 3.7.1	3.7.1 Space for PSG/ PSD contractor:	~~3.7.1 Space for PSG/ PSD contractor~~ 3.7.1 Space for PSG/ PSD contractor **Refer Appendix – S of Section 6B Particular Specifications Signalling and Train Control - R1**
78	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -4, Clause No: 4.6.1	4.6.1 The System shall be designed such that the Mean Time to Restore (MTTR) figures for a trained technician to repair and return a failed piece of PG equipment to revenue service shall not exceed 60 minutes (except for structural part). The mean time to repair shall be 30 minutes	4.6.1 The System shall be designed such that the Mean Time to Restore (MTTR) figures for a trained technician to repair and return a failed piece of PG equipment to revenue service shall not exceed **30**~~60~~ minutes (except for structural part). ~~The mean time to repair shall be 30 minutes.~~
79	Employer's Requirement Part-2, Section 6G: PS- Platform Screen	4.11.3 The Contractor shall comply with the requirements of the international standards EN 50121-4/-/5 Railway	4.11.3 The Contractor shall comply with the requirements of the international standards EN 50121-4~~/-/5~~ Railway Applications – Electromagnetic

	Doors, Chapter -4, Clause No: 4.11.3	Applications – Electromagnetic Compatibility, 2003 and related standards and the IEC 61000-6-2 and IEC62236 – 4 & 5 for Electromagnetic Compatibility, or equivalent Standards Approved by the Employer. EMC considerations shall be incorporated in the Contractor's procedures for functional Safety and Engineering Verification.	Compatibility, 2003 and related standards and the IEC 61000-6-2 and IEC62236 – 4 & 5 for Electromagnetic Compatibility, or equivalent Standards Approved by the Employer. EMC considerations shall be incorporated in the Contractor's procedures for functional Safety and Engineering Verification
80	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -4, Clause No: 4.11.7	4.11.7 Installation and Mitigation Guidelines A consistent series of guidelines, such as the IEC61000-5 series and EN 50121- 4 & 5, shall be observed wherever applicable. Earthing A. Common Earthing point will be provided to PG contractor in the UPS room. The MEF (Mechanical Electrical Fire Fighting) contractor shall set up earth bus from the earth provided in UPS room till the PSD room and to the Platform.	4.11.7 Installation and Mitigation Guidelines A consistent series of guidelines, such as the IEC61000-5 series and EN 50121- 4 ~~& 5~~, shall be observed wherever applicable. Earthing A. Common Earthing point will be provided to PG contractor in the UPS room. The MEF (Mechanical Electrical Fire Fighting) contractor shall set up earth bus from the earth provided in UPS room till the ~~PSD~~ **Signalling Equipment** Room and to the Platform.
81	Employer's Requirement Part-2, Section 6G: PS- Platform Screen	Passenger and Employer personnel safety shall be a prime consideration in the design and construction of the PSG/PSD System. Door control and operating	Passenger and Employer personnel safety shall be a prime consideration in the design and construction of the PSG/PSD System. Door control and operating arrangements shall be designed to fail in, or to, a safe condition.

	Doors, Chapter -4, Clause No: 4.15.1	arrangements shall be designed to fail in, or to, a safe condition. The door open command will not be generated by the Signalling System unless a train is at the platform and is positioned within the specified stopping tolerance (±300mm).	The door open command will not be generated by the Signalling System unless a train is at the platform and is positioned within the specified stopping tolerance (±300mm) **for ATO mode.**
82	Employer's Requirement Part-2, Section 6G:PS- Platform Screen Doors: Chapter -5, Clause No: 5.1.13.4	PSG/ PSD doorway width shall be determined by the width of the train doors (1400 mm) and the permitted over and under-run distance (+/- 300 mm) permitted by the S&TC System Specification. Typical PSG/ PSD door width will be 2000 mm.	PSG/ PSD doorway width shall be determined by the width of the train doors (1400 mm) and the permitted over and under-run distance (+/- 300 mm) **for ATO mode,** permitted by the S&TC System Specification. Typical PSG/ PSD door width will be **minimum** 2000 mm.
83	Employer's Requirement Part-2, Section 6G:PS- Platform Screen Doors: Chapter -5, Clause No: 5.1.5	5.1.5 The PSG system shall not be less than 1500 mm height and PSD system shall not be less than 2150 mm height and the both shall consist of sets of bi-parting doors installed corresponding to the length of 3/6 cars train. For underground stations platform beyond train length need to be cover up with Fixed screen by PSD contractor, and for Elevated/at grade stations same work will be done by Civil contractor.	5.1.5 The PSG system shall not be less than 1500 mm height and PSD system shall not be less than 2150 mm height and the both shall consist of sets of bi-parting doors installed corresponding to the length of 3/6 cars train. For ~~underground~~ stations **having full height PSD**, platform beyond train length need to be cover up with Fixed screen by PSD contractor, and for ~~Elevated/at grade~~ stations **having half height PSD,** same work will be done by Civil contractor.
84	Employer's Requirement Part-2, Section 6G:PS- Platform Screen Doors: Chapter -5, Clause No: 5.1.9	5.1.9 The train formation that will run on the corridor is, 6 cars RRTS train & 3 cars MRTS respectively. RRTS train will have one Business coach per train. The stopping position for RRTS platform for 6 car and MRTS platform for 3 cars shall be	5.1.9 The train formation that will run on the corridor is, 6 cars RRTS train & 3 cars MRTS, respectively. RRTS train will have one Business coach per train. The stopping position for RRTS platform for 6 car and MRTS platform for 3 cars shall be provided for each direction of travel, designed to centre the EMU consist on the platform or optimised for platform

		provided for each direction of travel, designed to centre the EMU consist on the platform or optimised for platform entry/exit locations. The detail discussion will be done during design, and as per interface with signalling. At Begumpul, Meerut South and Modipuram platform, both RRTS and MRTS trains shall stop, and stopping location will be discussed during the design stage. The PSG/ PSD system shall be designed for bi-directional train working on RRTS-MRTS corridors i.e. the PSG/ PSD system shall operate in reverse direction of train operation, in the similar way as operated in normal direction running. Typical platform length is approximate 215 meters for RRTS stations and 75 meters for MRTS stations. For underground stations platform beyond train length need to be cover up with Fixed screen by PSD contractor, and for Elevated/at grade stations same work will be done by Civil contractor.	entry/exit locations. The detail discussion will be done during design, and as per interface with signalling. At Begumpul, Meerut South and Modipuram platform, both RRTS and MRTS trains shall stop, and stopping location will be discussed during the design stage. The PSG/ PSD system shall be designed for bi-directional train working on RRTS-MRTS corridors i.e. the PSG/ PSD system shall operate in reverse direction of train operation, in the similar way as operated in normal direction running. Typical platform length is approximate 215 meters for RRTS stations and 75 meters for MRTS stations. For ~~underground~~ stations **having full height PSD,** platform beyond train length need to be cover up with Fixed screen by PSD contractor, and for ~~Elevated/at grade~~ stations **having half height PSD,** same work will be done by Civil contractor.
85	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -4, Clause No: 5.1.14	5.1.14 The Contractor shall provide means for monitoring of operational status of the Signalling interface system, PSGs, PSDs, EEGs, EEDs, PEGs & PEDs and all related	5.1.14 The Contractor shall provide means for monitoring of operational status of the Signalling interface system, PSGs, PSDs, EEGs, EEDs, PEGs & PEDs and all related alarms at SER room, OCC/ BCC, PSA, SCR & SMR (workstation in respective SMR shall cover the monitoring of

		alarms at SER room, OCC/ BCC, PSA, SCR & SMR (workstation in respective SMR shall cover the monitoring of concerned stations of that interlocking). The Contractor shall also provide the control elements to enable the operating staff to individually actuate/ inhibit any particular door or all doors of a platform, either for maintenance or testing purposes, in the event of a down-graded operation or a temporary contamination	concerned stations of that interlocking) **as per standards given in this PS**. The Contractor shall also provide the control elements to enable the operating staff to individually actuate/ inhibit any particular door or all doors of a platform, either for maintenance or testing purposes, in the event of a down-graded operation or a temporary contamination
86	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -4, Clause No: 5.1.14.1	5.1.14.1 Monitoring of all PSGs, PSDs, EEGs, EEDs, PEGs & PEDs along with all sub- systems & communication links shall be possible from Monitoring terminal in SCR, SMR, PSB, and PSD room as well as remote monitoring from OCC and BCC.	5.1.14.1 Monitoring of all PSGs, PSDs, EEGs, EEDs, PEGs & PEDs along with all sub- systems & communication links shall be possible from Monitoring terminal in SCR, SMR, PSB, and ~~PSD room~~ **SER** as well as remote monitoring from OCC and BCC.
87	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -4, Clause No: 5.1.14.6	5.1.14.6 Driving and control circuit should be designed to avoid single point failure.	5.1.14.6 Driving**, monitoring** and control circuit should be designed to avoid single point failure.
88	Employer's Requirement Part-2, Section 6G:PS- Platform Screen Doors: Chapter -5, Clause No: 5.4.1	5.4.1 Fixed Screens (FSs) of glass shall be used to fill the gap in between PSGs/ PSDs, PEGs/ PEDs and EEGs/ EEDs. Any gaps in the barrier due to civil tolerances shall be filled by Fixed Screen(s).	5.4.1 Fixed Screens (FSs) of glass shall be used to fill the gap in between PSGs/ PSDs, PEGs/ PEDs and EEGs/ EEDs. Any gaps in the barrier due to civil tolerances shall be filled by Fixed Screen(s). The Contractor shall ensure that these fixed screens shall have a similar continuity of

		The Contractor shall ensure that these fixed screens shall have a similar continuity of appearance as the working part of the PSGs/PSDs and be aesthetically acceptable from an architectural viewpoint. The Contractor shall take No objection from employer for the entire PSG/ PSD scheme. For underground stations platform beyond train length need to be cover up with Fixed screen by PSD contractor, and for Elevated/at grade stations same work will be done by Civil contractor.	appearance as the working part of the PSGs/PSDs and be aesthetically acceptable from an architectural viewpoint. The Contractor shall take No objection from employer for the entire PSG/ PSD scheme. For ~~underground~~ stations **having full height PSD,** platform beyond train length need to be cover up with Fixed screen by PSD contractor, and for ~~Elevated/at grade~~ stations **having half height PSD,** same work will be done by Civil contractor.
89	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -5, Clause No: 5.7.2	5.7.2 Door operation shall be automatic through the S&TC interface and manual from PSG/ PSD Local Control Panel (PSL) located in the platform headwall/ tail wall area and for emergency operation from SCR and SMR/PSD Room (location of PG Main Control Unit) as specified in this PS.	5.7.2 Door operation shall be automatic through the S&TC interface and manual from PSG/ PSD Local Control Panel (PSL) located in the platform headwall/ tail wall area and for emergency operation from SCR and SMR/~~PSD Room~~ **SER** (location of PG Main Control Unit) as specified in this PS.
90	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -5, Clause No:5.8.1	5.8.1 A. Doors Open Command	5.8.1 A. Doors **Enable and/or** Open Command:

91	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -5, Clause No:5.10	5.10 Electrical System 5.10.1 Not used 5.10.2 Power Supply and distribution ➢ Power Supply The power supply for the System shall be taken from the UPS room at the isolators/ MCB/ MCCB in the UPS room and shall have the following characteristics: Power Distribution: A. The Contractor shall design and install Motive Power Supply Equipment in the PSD room. This Motive Power Supply Equipment shall serve to control, condition, and distribute electrical power to the door drive mechanisms of the System and also provide the necessary isolation facilities for maintenance activities. This panel shall receive the UPS power supply from isolators/ MCB/ MCCB at E&M UPS room. Redundancy input power will also be provided by E&M UPS reserved for redundancy supply with the provision of hot standby.	5.10 Electrical System 5.10.1 ~~Not used~~ **PSG/ PSD shall be electrically driven with preference for brushless electric motors. If carbon brush type motor proposed, it shall be of maintenance free brush motors, with over 15 years of service life without maintenance and proposal shall be submitted for Engineer's acceptance.** 5.10.2 Power Supply and distribution ➢ Power Supply The power supply for the System shall be taken from the UPS room at the isolators/ MCB/ MCCB in the UPS room and shall have the following characteristics: Power Distribution: A. The Contractor shall design and install Motive Power Supply Equipment in the ~~PSD room~~ **SER**. This Motive Power Supply Equipment shall serve to control, condition, and distribute electrical power to the door drive mechanisms of the System and also provide the necessary isolation facilities for maintenance activities. This panel shall receive the UPS power supply from isolators/ MCB/ MCCB at E&M UPS room. Redundancy input power will also be provided by E&M UPS reserved for redundancy supply with the provision of hot standby. B. The centralized Motive Power Supply Equipment shall consist of distribution panel and power conditioning panel for a station. The Motive

		B. The centralized Motive Power Supply Equipment shall consist of distribution panel and power conditioning panel for a station. The Motive Power Supply Equipment shall control, condition and distribute electrical power to the door drive mechanism of the system. The power supply shall be divided into several circuits to ensure that neighbouring door-sets shall not shutdown simultaneously when one circuit is tripped. Separate power supply arrangement for Control, Driving and Monitoring shall be made such that failure of one supply doesn't affect the other. C. The door drive mechanisms of the System for each platform served by a PSD room shall be served by a dedicated outgoing circuit on the panel. The panel shall be equipped with moulded case circuit breakers (MCCB) or similar protective devices. D. Protective devices shall be sized and selected to provide the necessary overcurrent protection and discrimination in case of an earth fault or short circuit fault on the electrical circuits. E. Protection against electric shock for the AC equipment in the PSD Equipment Rooms shall	Power Supply Equipment shall control, condition and distribute electrical power to the door drive mechanism of the system. The power supply shall be divided into several circuits to ensure that neighbouring door-sets shall not shutdown simultaneously when one circuit is tripped. Separate power supply arrangement for Control, Driving and Monitoring shall be made such that failure of one supply doesn't affect the other. C. The door drive mechanisms of the System for each platform served by a ~~PSD room~~ **SER** shall be served by a dedicated outgoing circuit on the panel. The panel shall be equipped with moulded case circuit breakers (MCCB) or similar protective devices. D. Protective devices shall be sized and selected to provide the necessary overcurrent protection and discrimination in case of an earth fault or short circuit fault on the electrical circuits. E. Protection against electric shock for the AC equipment in the ~~PSD~~ **Signalling** Equipment Rooms shall be achieved by earthed equipotential bonding and automatic disconnection of supply as prescribed in the IEE Wiring Regulations.

		be achieved by earthed equipotential bonding and automatic disconnection of supply as prescribed in the IEE Wiring Regulations.	
92	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -5, Clause No: 5.16.4	5.16.4 The Engineer may reject any materials and goods, which in his opinion are inferior to the samples previously reviewed, and the Contractor shall promptly remove such materials and goods from the Site.	5.16.4 The Engineer may reject any materials and goods, which in his opinion are inferior to the ~~samples previously reviewed~~ **specifications/standards,** and the Contractor shall promptly remove such materials and goods from the Site.
93	Screen Doors, Chapter -5, Clause No: 5.16.7	5.16.7 Samples of equipment submitted for the Employer's consent shall not be incorporated into the Works without the Employer's permission in writing.	5.16.7 **Not Used** ~~Samples of equipment submitted for the Employer's consent shall not be incorporated into the Works without the Employer's permission in writing.~~
94	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -5, Clause No: 5.16.10	5.16.10 All workstation displays shall support high resolution (1920X1080) colour graphics. All the workstations shall be with minimum 21" LED screens. All servers, PCs and laptops shall be of latest configuration. The number and location of the workstation are as per the requirements of this PS. The hardware and software configuration of workstations, PCs and laptops shall be submitted for no objection certificate from the Engineer/ Employer. All workstations	5.16.10 All workstation displays shall support high resolution (1920X1080) colour graphics. All the workstations shall be with minimum 2~~1~~**4**" LED screens. All servers, PCs and laptops shall be of latest configuration. The number and location of the workstation are as per the requirements of this PS. The hardware and software configuration of workstations, PCs and laptops shall be submitted for no objection certificate from the Engineer/ Employer. All workstations should be connected with UPS supply

		should be connected with UPS supply	
95	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -5, Clause No: 5.20.2	5.20.2 C. Glazing and door frame seals/ gaskets and door edge buffers: Miscellaneous rubber, silicone, plastic and polymer items such as seals/gaskets for the glazing and door frames and leading edge buffers to the doors shall have a minimum oxygen index of 33 when tested to BS6853 Appendix-A shall have a temperature index of greater than 300oC. These miscellaneous materials shall also exhibit low smoke emission when tested to BS 6583 Appendix B.5.1 so that A0≤ 0.2 m2/g F. Lubricating Oils and Grease: Lubricating oil and grease shall be compatible with any seals, hoses and surface finishes so that they do not have a detrimental effect on performance or appearance of any part of PSG installation. Lubricating oil and grease shall be of "fire resistant" type and shall have: (i) Flash point temperature greater than 1800 C (ii) Spontaneous ignition temperature greater than 4500 C	5.20.2 C. Glazing and door frame seals/ gaskets and door edge buffers: Miscellaneous rubber, silicone, plastic and polymer items such as seals/gaskets for the glazing and door frames and leading edge buffers to the doors shall have a minimum oxygen index of 33 when tested to BS6853 Appendix-A shall have a temperature index of greater than ~~300oC~~ **300°C**. These miscellaneous materials shall also exhibit low smoke emission when tested to BS 6583 Appendix B.5.1 so that A0≤ 0.2 m2/g F. Lubricating Oils and Grease: Lubricating oil and grease shall be compatible with any seals, hoses and surface finishes so that they do not have a detrimental effect on performance or appearance of any part of PSG installation. Lubricating oil and grease shall be of "fire resistant" type and shall have: (i) Flash point temperature greater than ~~1800 C~~ **180° C** (ii) Spontaneous ignition temperature greater than ~~4500 C~~ **450° C.**

96	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -5, Clause No: 5.23.1	5.23.1 The Contractor shall provide indications/ alarms in SER, OCC, BCC, PSBs, SCR (Every station) & SMR.	5.23.1 The Contractor shall provide indications/ alarms in **SER** ~~PSD Room~~, OCC, BCC, PSBs, SCR (Every station) & SMR.
97	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -5, Clause No: 5.23.3	5.23.3 Following indication as a minimum shall be provided in SMR:	5.23.3 Following indication as a minimum shall be provided in ~~SMR~~ **rooms mentioned in clause no 5.23.1:**
98	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -5, Clause No: 5.24.4	5.24.4 The Contractor shall submit a detailed proposal for the health monitoring system. In each PSD equipment room, a set of keypads with LED display or touch screen HMI shall be provided on the main control cabinet for quick fault trouble shooting	5.24.4 The Contractor shall submit a detailed proposal for the health monitoring system. In each ~~PSD~~ **Signalling** Equipment Room, a set of keypads with LED display or touch screen HMI shall be provided on the main control cabinet for quick fault trouble shooting
99	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -5, Clause No: 5.25.1 B	5.25.1 B. Contractor has to provide 25% of LED video screens out of the total number of Door leaves installed in the contract (for example, if total leaves installed in the contract is 100, then contractor has to provide 25 LED screens, as part of contract). LED video screens shall be installed preferably on FDP (Half Height) and the panel associated to ASD (Full Height). For half height PSG, provision for installation of one LED videos screen	5.25.1 B. Contractor has to provide 25% of LED video screens out of the total number of Door leaves installed in the contract (for example, if total leaves installed in the contract is 100, then contractor has to provide 25 LED screens, as part of contract). ~~LED video screens shall be installed preferably on FDP (Half Height) and the panel associated to ASD (Full Height).~~ For half height PSG, provision for installation of one LED videos screen shall be there for each FDP, **and** for full height PSD, provision for installation of two LED video screens shall be there for each Door. The size of LED screen shall be 32 inch and capable of

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<tr><td></td><td></td><td>shall be there for each FDP, for full height PSD, provision for installation of two LED video screens shall be there for each Door. The size of LED screen shall be 32 inch and capable of reliable 24/7 continuous operation and should be provided along with all required and associated arrangements as part of this contract. The contractor will submit the specification of these LED screens for employer approval. The location of these video screen will be decided by employer during the design stage</td><td>reliable 24/7 continuous operation and should be provided along with all required and associated arrangements as part of this contract. The contractor will submit the specification of these LED screens for employer approval. The location of these video screen will be decided by employer during the design stage.</td></tr>
<tr><td>100</td><td>Employer’s Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -5, Clause No: 5.25.1 H</td><td>5.25.1
H. The power feed shall be totally independent of that used for the PSG/ PSD system and shall be fed via an isolating transformer in the PSD room.</td><td>5.25.1
H. The power feed shall be totally independent of that used for the PSG/ PSD system and shall be fed via an isolating transformer in the <u>SER</u> ~~PSD room~~.</td></tr>
<tr><td>101</td><td>Employer’s Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -6, Clause No:6.1.10
S No: 1, 21, 28</td><td>
<table>
<tr><th>SN</th><th>Design Criteria / Operating features</th><th>Design Criteria / Operating features Value</th></tr>
<tr><td>1</td><td>Free Passage</td><td>2000 mm (with a train doors width of 1400mm and stopping accuracy of +/- 300mm).</td></tr>
<tr><td>21</td><td>Velocity Pressure on PSG/PSD</td><td>a) For FULL Height PSD (In Underground) = 2000 Pascal</td></tr>
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<table>
<tr><th>SN</th><th>Design Criteria / Operating features</th><th>Design Criteria / Operating features Value</th></tr>
<tr><td>1</td><td>Free Passage</td><td><u>Minimum</u> 2000 mm (with a train doors width of 1400mm and stopping accuracy of +/- 300mm <u>for ATO mode</u>).</td></tr>
<tr><td>21</td><td>Velocity Pressure on PSG/PSD</td><td>a) For ~~FULL~~ <u>Full</u> Height PSD ~~(In Underground)~~ = 2000 Pascal
b) For Half Height PSG ~~(In elevated/at grade)~~ = 1200 Pascal</td></tr>
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</td></tr>
</table>

				b) For Half Height PSG (In elevated/at grade) = 1200 Pascal			
		28	Aerodynamic Pressure criteria acting on PSDs	The Aerodynamic pressure criteria acting on the PSG/ PSD system caused by Tunnel Ventilation System or wind pressure and a train running through the station is: c) For FULL Height PSD (In Underground) = 2000 Pascal d) For Half Height PSG (In elevated/at grade) = 1200 pascal	28	Aerodynamic Pressure criteria acting on PSDs	The Aerodynamic pressure criteria acting on the PSG/ PSD system caused by Tunnel Ventilation System or wind pressure and a train running through the station is: a) ~~c)~~ For ~~FULL~~ **Full** Height PSD ~~(In Underground)~~ = 2000 Pascal b) ~~d)~~ For Half Height PSG ~~(In elevated/at grade)~~ = 1200 pascal
102	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -6, Clause No: 6.1.14			Dimensional The following dimensional constraints shall pertain to all PSD/EED/PED/Fixed Screen installations: a) For Underground Station: ➢ PSD/ EED/PED Height = 2150mm ➢ PSD Header Box section = 700mm high x 300mm wide (max.) mechanism enclosure section + structural support section above (main horizontal carrier member). ➢ PSD door open width = 2000mm (each bi-parting door leaf = 1000mm) ➢ EED door opening width = 1150mm, swing-out type			**Dimension** ~~Dimentional~~ The following **tentative** ~~dimensional constraints~~ **dimension details** shall pertain to all PSD/**PSG/**EED/**EEG/**PED/**PEG/**Fixed Screen installations **but not limited to and subject to the approval of Employer's Engineer**: a) For ~~Underground Station~~ **Platforms having Full Height PSD System**: ➢ PSD/ EED/PED Height = **min** 2150mm ➢ PSD Header Box section = 700mm high x 300mm wide (max.) mechanism enclosure section + structural support section above (main horizontal carrier member). ➢ PSD door open width = **min** 2000mm (each bi-parting door leaf = 1000mm) ➢ EED door opening width = ~~1150mm~~ **1000mm**, swing-out type ➢ PED door width = ~~1250mm~~ **1000mm**, swing-out type

		➢ PED door width = 1250mm, swing-out type ➢ Fixed screen (FS) width = Varies (As per site requirement) b) For Elevated station: ➢ PSG/ EEG/PEG Height = 1500mm ➢ PSG door open width = 2000mm (each bi-parting door leaf = 1000mm) ➢ EEG door opening width = 1150mm, swing-out type ➢ PEG door width = 1250mm, swing-out type Fixed screen (FS) width = Varies (As per site requirement)	➢ Fixed screen (FS) width = Varies (As per site requirement) b) For ~~Elevated station~~ **Platforms having Half Height PSG System**: ➢ PSG/ EEG/PEG Height = **min** 1500mm ➢ PSG door open width = **min** 2000mm (each bi-parting door leaf = 1000mm) ➢ EEG door opening width = ~~1150mm~~ **1000mm**, swing-out type ➢ PEG door width = ~~1250mm~~ **1000mm**, swing-out type ➢ Fixed screen (FS) width = Varies (As per site requirement) **Note: These dimensions are tentative (except PSD/PSG height) and shall be finalized during design stage. However, the height for half height PSG and full height PSD will remain same as mentioned above.**
103	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -6, Clause No: 6.4.2	6.4.2 The Contractor shall achieve the required high level of system availability with redundancy techniques for the design of the door control and operating mechanism and also for the monitoring of the system along with redundancy in signalling interface(Such that single point failure not results into signal-PSD interface). The redundancy technique shall also be applied to the door closed detection system such that the failure of single detector when the doors are proven closed and locked shall not result in loss of "Door closed" indication to the Signalling System. Contractor shall provide detailed information on the redundancy technique adopted in design. The Contractor shall	6.4.2 The Contractor shall achieve the required high level of system availability with redundancy techniques for the design of the door control and operating mechanism and also for the monitoring of the system along with redundancy in signalling interface(Such that single point failure not results into signal-PSD interface). The redundancy technique shall also be applied to the door closed detection system such that the failure of single detector when the doors are proven closed and locked shall not result in loss of "Door closed" indication to the Signalling System. **Similar provision shall also be adopted for Door Open Detection System.** Contractor shall provide detailed information on the redundancy technique adopted in design. The Contractor shall propose suitable means of monitoring the failure of redundant equipment.

		propose suitable means of monitoring the failure of redundant equipment.	
104	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -6, New Clause		**New Clause Added** **6.7 Vendor and Sub-Contractor approval** **For Vendor and Sub-Contractor approval please refer Appendix – T & U of Section 6B Particular Specifications Signalling and Train Control - R1.**
105	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -7, Clause No: 7.3 (12)	7.3 (12) SMS interface requirements	7.3 (12) ~~SMS interface requirements~~ **Not Used**
106	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -8, Clause No: 8.5.3 (20)	8.5.3 20 Verification of BEMS(SMS) interface operability - (emulated by Contractor if not available).	8.5.3 20 ~~Verification of BEMS(SMS) interface operability - (emulated by Contractor if not available).~~ **Not Used**
107	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -11, New Clause		**New Clause Added** **11.1.3 The DLP of a section or part of work shall start from the date of opening of the section for revenue services and shall continue until 3 years from the date of opening of the section for revenue services of that relevant section or part of the work.** **For the equipment and software supplied of OCC/BCC, the DLP shall start from the date of taking over of**

			OCC/BCC and shall continue until 3 years from the date of opening of stage – 4 for revenue service. **Note: For the time period during which Temporary OCC is operational, Contractor has to manage the equipments.** **11.1.4 Employer may engage O&M agency for managing revenue operations, in that case DLP shall be handled by O&M agency on behalf of the Employer**
108	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -11, Clause No: 11.2	11.2 Maintenance during Defect Liability Period (DLP) 11.2.1 Competency of Personnel ➢ During the DLP the Contractor shall support the Employer with sufficient trained and competent personnel. ➢ Such persons shall have their generic competence established and must demonstrate their specific competence and knowledge in the particular systems, environment and procedures.	11.2 Maintenance during Defect Liability Period (DLP) 11.2.1 Competency of Personnel ➢ During the DLP the Contractor shall support the Employer with sufficient trained and competent personnel. ➢ Such persons shall have their generic competence established and must demonstrate their specific competence and knowledge in the particular systems, environment and procedures. ➢ The Contractor shall provide evidence of specific competence and knowledge, which shall include: A. Assessment and certified training in particular software applications and operations;

		➢ The Contractor shall provide evidence of specific competence and knowledge, which shall include: A. Assessment and certified training in particular software applications and operations; B. Recording of competence and work in the license holder's logbook; and C. Receiving or in receipt of sufficient and current exposure to the area of work that the holder is licensed for. ➢ Routine spot checks on licensing may be carried out from time to time by the Employer's Engineer on the proficiency of the Contractor staff.	B. Recording of competence and work in the license holder's logbook; and C. Receiving or in receipt of sufficient and current exposure to the area of work that the holder is licensed for. ➢ Routine spot checks on licensing may be carried out from time to time by the Employer's Engineer on the proficiency of the Contractor staff. ➢ **For all maintenance activities, i.e. preventive and corrective, contractor shall ensure that Reliability, Availability and Maintainability requirements given in P.S. and G.S. are complied.** ➢ **Staff of employer/O&M agency shall be deputed at suitable locations for first line of maintenance. Contractor shall depute its team of sufficient strength and competent engineers in each shift to support Employer's team/O&M agency's team in first line of maintenance. Location of contractor's staff shall be decided by Employer/O&M agency. It may change as the opening of section progresses.** ➢ **Contractor shall ensure that competent team of engineers is available for second and third line of maintenance.** ➢ **Contractor shall ensure that competent team of engineers for each sub-system is available to assist/attend failures to meet maintainability requirements given in P.S. and G.S.**

109	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -11, New Clause		**New Clause Added** **11.7 Supervision of Maintenance** **11.7.1 The Contractor shall be responsible for the supervision of maintenance of the equipment supplied under the Contract after the Taking Over of the Works or Part of the Works. The maintenance personnel shall be provided by the Employer.** **11.7.2 The responsibility for the provision of supervision of maintenance shall be based on the number of Man months as defined below. The actual utilization of these man-months shall be at the Employer's discretion.** **11.7.3 The scope of maintenance activities shall include all scheduled and unscheduled maintenance required including all routine inspections and service overhauls at wayside (Indoor and Outdoor), on trains and in workshops. Maintenance work shall include fault finding following report of incidents and repair/replacement of items of equipment changed out in the course of fault rectification but excluding any Contractor's liability for work to be carried out under the requirements of the Defects Liability Period.** **11.7.4 This shall also include planning and supervision of ongoing training and retraining as required in the correct procedures using the training materials and courses supplied under the Contract.**

			Where the supplied training courses are insufficient the Contractor shall develop additional training courses, manuals and materials to make good the deficiency as part of his Defects Liability responsibilities. The Contractor shall provide supervisory maintenance staff who are experts in the first, Second and third line fault finding, maintenance and repair of the various systems supplied under the Contract covering at least the following: (1) 5 Man Months for PSD system (Half Height and Full height) .The experts provided for supervision of maintenance shall have adequate qualifications and experience in the relevant discipline in the maintenance depots / workshops of existing metro type undertakings. Further employer shall approve CV of expert provided for supervision of maintenance, without the approval of CV by employer, there shall be no deployment of experts for SOM. **The contractor shall provide the supervisory maintenance staff mentioned in this clause, in addition to sufficient trained and competent personal required during DLP period as per clause 11.2 of this chapter.** **11.7.5 The deployment of the experts may not be continuous, and they may be required to supervise the maintenance in short periods at the discretion of the Employer.** **11.7.6 The experts shall be available in Delhi-Ghaziabad-Meerut at short notice to supervise the Employer's staff at any time during the**

			Normal Operating hours and by arrangement to undertake extended investigations during Non-Revenue hours.
110	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors: Chapter -12, Clause No: 12.3.4	12.3.4 The Contractor shall supply and deliver the Contract Spares within 1 (one) year of commissioning of PG.	12.3.4 The Contractor shall supply and deliver the Contract Spares ~~within 1 (one) year of commissioning of PG~~ **as mentioned in Appendix V of Section 6B Particular Specifications Signalling and Train Control - R1**
111	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors: Chapter -12, Clause No: 12.4.1	12.4.1, The Contractor shall provide two sets of necessary tools and test & measuring equipment to meet the maintenance requirements of the Contract. The tool shall exclude ammeter, voltmeter, frequency meter, clamp meter, megger Oscilloscope and crimping tool.	12.4.1 ~~The Contractor shall provide two sets of necessary tools and test & measuring equipment to meet the maintenance requirements of the Contract. The tool shall exclude ammeter, voltmeter, frequency meter, clamp meter, megger Oscilloscope and crimping tool~~ **The Contractor shall provide Special Tools and maintenance tool kit as specified in Appendix C. The contractor shall also provide two sets of any other necessary tools and test & measuring equipment to meet the maintenance requirements of the Contract.**
112	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -13, Clause No: 13.2.2 (C)	13.2.2 **Onshore Training -** Training to Operations & Maintenance staff C. The contractor shall provide overall 40 days of his training for this contract.	**13.2.2 Onshore Training -** Training to Operations & Maintenance staff C. The contractor shall provide overall 40 days of ~~his~~ training ~~for this contract~~. **Minimum one expat trainer along with another trainer shall come for each training module. Number of trainees shall be decided as per employer's discretion.**
113	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -13, Clause No:	**13.2.3 Offshore Training** ➢ Contractor shall submit an offshore training programme for PSD/PED system in the areas of	**13.2.3 Offshore Training**

	13.2.3	design, configuration, testing, operation and maintenance. ➢ The Contractor shall provide overall 10 days of training for PSD/PED system.	**A**. Contractor shall submit an offshore training programme for PSD/PED system in the areas of design, configuration, testing, operation and maintenance. **B**. The Contractor shall provide overall 10 days of training ~~for PSD/PED system~~. **Number of trainees shall be decided as per employer's discretion**. **C. The employer may at his discretion decide to carry out a part or whole of offshore training in India (NCR, Preferably in Delhi). The contractor shall provide expatriate experts at NCR for such training at his own costs.**
114	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -13, Clause No: 13.2.5	13.2.5 Maintenance Training: Training shall, as a minimum, impart the following techniques to the Employer's staff of the appropriate grades: A. All planned maintenance and overhaul of the systems and equipment supplied, installed or modified under the Contract; B. Fault-finding and rectification techniques for the systems and equipment supplied, installed or modified under the Contract. These shall be developed from the Contractor's previous experience with similar equipment and also from	13.2.5 Maintenance Training **shall include**: ~~Training shall, as a minimum, impart the following techniques to the Employer's staff of the appropriate grades:~~ **A. Principles of operation;** **B. Preventative and corrective maintenance tasks and procedures;** **C. Fault repair to the lowest level replaceable unit;** **D. Use of test equipment, diagnostic and maintenance aids;** **E. Software maintenance** **F.** ~~A.~~ All planned maintenance and overhaul of the systems and equipment supplied, installed or modified under the Contract; **G.** ~~B.~~ Fault-finding and rectification techniques for the systems and equipment supplied, installed or modified under the Contract. These shall be developed from the Contractor's previous experience with

		the fault tree analysis and other analyses carried out as part of the reliability engineering studies undertaken by the Contractor; C. Normal and degraded modes of operation of the systems and equipment supplied, installed or modified under the Contract; D. All rules, regulations, practices and procedures necessary for the safe and efficient operation of the systems and equipment supplied, installed or modified under the Contract; and E. All contingency plans necessary to recover speedily and safely from any mishaps or emergencies that may arise with the systems and equipment supplied, installed or modified under the Contract.	similar equipment and also from the fault tree analysis and other analyses carried out as part of the reliability engineering studies undertaken by the Contractor; **H.** ~~C.~~ Normal and degraded modes of operation of the systems and equipment supplied, installed or modified under the Contract; **I.** ~~D.~~ All rules, regulations, practices and procedures necessary for the safe and efficient operation of the systems and equipment supplied, installed or modified under the Contract; and **J.** ~~E.~~ All contingency plans necessary to recover speedily and safely from any mishaps or emergencies that may arise with the systems and equipment supplied, installed or modified under the Contract.
115	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -13, Clause No: 13.4	13.4 Transfer of Technology 13.4.1 Tenderer shall submit the detailed plan of Transfer of Technology along with MOU with suitable Indian companies or company having proven track record and are working in related areas for all major systems/ subsystems.	13.4. Transfer of Technology 13.4.1 Tenderer shall submit the detailed plan of Transfer of Technology along with MOU with suitable Indian companies or company having proven track record and are working in related areas for all major systems/ subsystems. **The contractor will not impose any technical or commercial condition on the Indian company receiving transfer**

		13.4.2 TOT shall be essential and shall include installation and maintenance support.	**of technology and this stipulation should be reflected in the MOU as well.** 13.4.2 TOT shall be essential and shall ~~include installation and maintenance support.~~ **cover until the end of the DLP. TOT shall include installation, testing, commissioning, and maintenance support as a minimum. In case the Indian JV member or Indian Specialist Sub contractor is responsible for above mentioned works, TOT along with MOU with Indian companies or company is not essential.**
116	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -13, New Clause		**New Clause Added** **13.4.6 In case of any conflict between PS & GS with regards to TOT clause, PS shall prevail.**
117	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -14, Clause No: 14.1.3	14.1.3 Contractor shall submit three copies (plus one softcopy) for each document/ drawing submission. Document/ drawing shall be considered accepted only if 'No objection'/ 'No objection subject to comments' are given by the Employer's Engineer. In case of rejection/comments, contractor shall resubmit three copies (plus soft copy) document/drawing within two weeks after incorporating Employer's Engineer comments.	14.1.3 ~~Contractor shall submit three copies (plus one softcopy) for each document/ drawing submission. Document/ drawing shall be considered accepted only if 'No objection'/ 'No objection subject to comments' are given by the Employer's Engineer. In case of rejection/comments, contractor shall resubmit three copies (plus soft copy) document/drawing within two weeks after incorporating Employer's Engineer comments.~~ **All the submission shall normally be done in electronic form through a Common Data Environment with one hard copy; however, employer reserves the right to instruct contractor to submit any or all the submissions in hard copy(ies) Document/ drawing shall be considered accepted only if**

			‘No objection’/ ‘No objection subject to comments’ are given by the Employer’s Engineer. In case of rejection/comments, contractor shall resubmit document/drawing within two weeks after incorporating Employer’s Engineer comments. **14.1.4 CDE user accounts and Training on CDE environment will be provided to the Contractor by the Employer**
118	Employer’s Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -14, Clause No: 14.2.19	14.2.19 F. criteria on which the Verification or Validation is judged to be acceptable. These criteria shall be traceable to the design and performance requirements as referred to in Clause 14.2.20.4 below.	14.2.19 F. criteria on which the Verification or Validation is judged to be acceptable. These criteria shall be traceable to the design and performance requirements as ~~referred to in Clause 14.2.20.4~~ **detailed** below.
119	Employer’s Requirement Part-2, Section 6G: PS- Platform Screen Doors, Chapter -14, Clause No: 14.2.20	14.2.20 Health, Safety and Environmental Documentation The Contractor shall submit Health and Safety Documentation to fully comply with the requirements of the Project conditions and proposed work activities in accordance with Safety, Health and Environmental manual of ITT. The Contractor shall submit to the Employer’s Engineer the Health and Safety Documentation for review within 30 days of the Commencement Date of the Works.	14.2.20 Health, Safety and Environmental Documentation The Contractor shall submit Health and Safety Documentation to fully comply with the requirements of the Project conditions and proposed work activities in accordance with Safety, Health and Environmental manual of ~~ITT~~ **bidding document**. The Contractor shall submit to the Employer’s Engineer the Health and Safety Documentation for review within 30 days of the Commencement Date of the Works.

120	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors: Appendix A	Appendix A – Design and Construction Interface Management	**For Appendix A Detail of Design and Construction Interface Management Please refer APPENDIX – A & A1 of Section 6B Particular Specification Signalling and Train Control - R1 as Attachment No. 1 with this Addendum & Corrigendum-05B.**
121	Employer's Requirement Part-2, Section 6G:PS- Platform Screen Doors: Appendix B:	Appendix B: LIST OF SPARES FOR PLATFORM GATES	Appendix B: LIST OF **CONTRACT** SPARES FOR PLATFORM GATES
122	Employer's Requirement Part-2, Section 6G:PS- Platform Screen Doors: Appendix B:	**The existing Employer's Requirement Part -2, Section 6G: Particular Specification Platform Screen Doors has been revised, please refer revised Section 6G: Particular Specification Platform Screen Doors - R1, enclosed as Attachment No. 3 with this Addendum & Corrigendum-05B. Bidders may kindly note that they should use Appendix B- R1 of revised Section 6G: Particular Specification Platform Screen Doors - R1.**	
123	Employer's Requirement Part-2, Section 6G:PS- Platform Screen Doors: Appendix C: LIST of SPECIAL TOOLS FOR PLATFORM GATES	**The existing Employer's Requirement Part -2, Section 6G: Particular Specification Platform Screen Doors has been revised, please refer revised Section 6G: Particular Specification Platform Screen Doors - R1, enclosed as Attachment No. 3 with this Addendum & Corrigendum-05B. Bidders may kindly note that they should use Appendix C- R1 of revised Section 6G: Particular Specification Platform Screen Doors - R1.**	
124	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors: Appendix E	APPENDIX E – KEY & ACCESS DATES	**For Details of 'KEY & ACCESS DATES' Please refer 'APPENDIX – V' of Section 6B Particular Specification Signalling and Train Control – R1 as Attachment No. 1 with this Addendum & Corrigendum-05B.**
125	Employer's Requirement Part-2, Section 6G: PS- Platform Screen Doors: APPENDIX F	APPENDIX F – CAD AND BIM STANDARDS **Please see attached separate Appendix-F**	APPENDIX F – CAD AND BIM STANDARDS ~~**Please see attached separate Appendix-F**~~

			For Details of 'CAD AND BIM STANDARDS' Please refer Section 6F of Employer Requirement Part 2
126	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, 9.3 Attachment C – Indicative Interface Coordination Sheets for the present Contract Legend S.N. 22	Design, Engineering, Manufacture, Supply, Installation, Testing & Commissioning including any civil works of Solar Power Systems, including comprehensive Operation and Maintenance for Delhi – Ghaziabad – Meerut RRTS Corridor of NCRTC.	**Deleted**
127	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, 9.3 Attachment C – Indicative Interface Coordination Sheets for the present Contract Legend S.N. 28	Design, Manufacture, Supply, Installation, Testing and Commissioning of Platform Screen Doors for Delhi – Ghaziabad – Meerut RRTS Corridor of NCRTC.	**Deleted**
128	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, 9.4 List of Interface sheets for S&T S.N. 12, Column reference	Present Annexure	**[Replace with the following]** **Refer Appendix A1 S.No.3.6**
129	Employers Requirement Part-2, Section 6B: PS-Signalling and	15. PSD and Signalling contractors shall ensure 15. PSD and Signalling contractors shall ensure	15. PSD and Signalling contractors shall ensure that all the vital signals 15. PSD and Signalling contractors shall ensure that all the vital signals

	Train control, Appendix-A, 9.4 List of Interface sheets for S&T S.N. 12, Clause 15	that all the vital signals shall be exchanged in a safe way to comply SIL 4 requirements of S&T system. The contractor shall prove through Safety case that following shall meet SIL4 performance. a) PG closed and locked signal b) Enable signal c) Interlock override d) Local Bypass Switch operation	that all the vital signals shall be exchanged in a safe way to comply SIL 4 requirements of S&T system. The contractor shall prove through Safety case that following shall meet SIL4 performance. a) PG closed and locked signal b) Enable signal c) Interlock override d) Local Bypass Switch operation	shall be exchanged in a safe way to comply SIL 4 requirements of S&T system. The contractor shall prove through Safety case that following shall meet SIL4 performance. a) PG closed and locked signal b) Enable**/Open** signal c) Interlock override d) Local Bypass Switch operation	shall be exchanged in a safe way to comply SIL 4 requirements of S&T system. The contractor shall prove through Safety case that following shall meet SIL4 performance. a) PG closed and locked signal b) Enable **/Open** signal c) Interlock override d) Local Bypass Switch operation	
130	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, 9.4 List of Interface sheets for S&T S.N. 13, Column reference	Present Annexure		**[Replace with the following]** **Refer Appendix A1 S.No.3.7**		
131	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, Table	41. Shall Coordinate with Civil contractor for Earth Bar	41. Shall Insure dedicated Earth Bar (MET & CET)	41. Shall Coordinate with Civil contractor for Earth Bar	41. Shall Insure dedicated Earth Bar (MET & CET)	

	1. Signalling & Telecommunication (S&T) and UG Stations and Tunnel Contractor Clause 41	Resistance. MET=1 ohm and CET=0.5 ohm	Resistance in S&T equipment rooms. Value to be mentioned with measurement date. Clean earth and main earth to be provided separately. Extension of Main earth (<1 ohm) and Clean Earth to be done from Main Earth Mat location to SER & TER Room and SCR. Copper Bus bar to be provided in SER & TER Room and SCR. Extension of clean earth (< 0.5 ohm) to be done from Clean Earth Mat location to TER. Copper Bus bar to be provided in TER	Resistance. MET≦ 1 ohm and CET≦ 0.5 ohm	Resistance in S&T equipment rooms. Value to be mentioned with measurement date. Clean earth and main earth to be provided separately. Extension of Main earth (≦ 1 ohm) and Clean Earth to be done from Main Earth Mat location to SER & TER Room and SCR. Copper Bus bar to be provided in SER & TER Room and SCR. Extension of clean earth (≦ 0.5 ohm) to be done from Clean Earth Mat location to TER. Copper Bus bar to be provided in TER	

132	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, Table 7. S&T (Signalling) Vs DEPOT Contractor Clause 24 & Clause 26		24. Shall Coordinate with DEPOT contractor for Earth Bar Resistance. MET=1 ohm and CET=0.5 ohm	24. Shall Insure dedicated Earth Bar (MET & CET) Resistance in S&T equipment rooms. Value to be mentioned with measurement date. Clean earth and main earth to be provided separately. Extension of Main earth (<1 ohm) and Clean Earth to be done	24. Shall Coordinate with DEPOT contractor for Earth Bar Resistance. MET**≤1** ohm and CET**≤0.5** ohm	24. Shall Insure dedicated Earth Bar (MET & CET) Resistance in S&T equipment rooms. Value to be mentioned with measurement date. Clean earth and main earth to be provided separately. Extension of Main earth (**≤1** ohm) and Clean Earth to be done from Main Earth Mat location to SER & TER Room and DCC. Copper Bus bar to be provided in SER & TER Room and DCC. Extension of clean earth (**≤** 0.5 ohm) to be done from Clean

				from Main Earth Mat location to SER & TER Room and DCC. Copper Bus bar to be provided in SER & TER Room and DCC. Extension of clean earth (< 0.5 ohm) to be done from Clean Earth Mat location to TER. Copper Bus bar to be provided in TER.			Earth Mat location to TER. Copper Bus bar to be provided in TER.
			26.The Signalling contractor will be	26.Shall provide		26.The Signalling contractor will be provided a space of about 1200 sqm at each of the two suitable places for constructing permanent site offices and storage facilities for contractor as well as employer's engineer along the D-G-M corridor.**(Space may be provided outside Depot)**	26.Shall provide required space at each of the two suitable places along the D-G-M corridor.

			provided a space of about 1200 sqm at each of the two suitable places for constructing permanent site offices and storage facilities for contractor as well as employer's engineer along the D-G-M corridor.	required space at each of the two suitable places along the D-G-M corridor.		
133	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, Table 8. S&T (TELECOM) Vs DEPOT Contractor Clause 5 & Clause 19		5. Shall coordinate with DEPOT Contractor.	5. DEPOT Contractor shall provide counter/slab/furniture in BCC to keep telecom system MMIs of all telecom subsystems. Holes of		**5. Not Used** 19. Shall Coordinate with Civil contractor for Earth Bar Resistance. MET≦1 ohm and CET≦0.5 ohm **5. Not Used** 19. Shall Insure dedicated Earth Bar (MET & CET) Resistance in S&T equipment rooms. Value to be mentioned with measurement date. Clean earth and main earth to be

				appropriate diameter in this Counter/slab/furniture for MMIs cable extraction			
			19. Shall Coordinate with Civil contractor for Earth Bar Resistance. MET=1 ohm and CET=0.5 ohm	19. Shall Insure dedicated Earth Bar (MET & CET) Resistance in S&T equipment rooms. Value to be mentioned with measurement date. Clean earth and main earth to be provided separately. Extension of Main earth (<1 ohm) and Clean Earth to be done from Main Earth Mat location to SER & TER Room and SCR. Copper Bus bar to be		

	provided separately. Extension of Main earth (≦1 ohm) and Clean Earth to be done from Main Earth Mat location to SER & TER Room and SCR. Copper Bus bar to be provided in SER & TER Room and SCR. Extension of clean earth (≦0.5 ohm) to be done from Clean Earth Mat location to TER. Copper Bus bar to be provided in TER

				provided in SER & TER Room and SCR. Extension of clean earth (< 0.5 ohm) to be done from Clean Earth Mat location to TER. Copper Bus bar to be provided in TER		
134	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, Table 8. S&T (TELECOM) Vs DEPOT Contractor Clause 25		The Telecom contractor will be provided a space of about 600 sqm at each of the two suitable places for constructing permanent site offices and storage facilities for contractor as well as employer's engineer along the D-G-M corridor.	Shall provide required space at each of the two suitable places along the D-G-M corridor.		The Telecom contractor will be provided a space of about 600 sqm at each of the two suitable places for constructing permanent site offices and storage facilities for contractor as well as employer's engineer along the D-G-M corridor.**(Space may be provided outside Depot)**	Shall provide required space at each of the two suitable places along the D-G-M corridor.
135	Employers Requirement Part-2, Section 6B: PS-Signalling and		18. Shall Coordinate with MEF contractor for	18. Shall Insure dedicated Earth Bar		18. Shall Coordinate with MEF contractor for Earth Bar Resistance.	18. Shall Insure dedicated Earth Bar (MET & CET) Resistance in

	Train control, Appendix-A, Table 9) S&T Vs. Elevated stations - MEF (& Arch Finishes) Contractor, Clause 18	Earth Bar Resistance. MET=1 ohm and CET=0.5 ohm	(MET & CET) Resistance in S&T equipment rooms. Value to be mentioned with measurement date. Clean earth and main earth to be provided separately. Extension of Main earth (<1 ohm) and Clean Earth to be done from Main Earth Mat location to SER & TER Room and SCR. Copper Bus bar to be provided in SER & TER Room and SCR. Extension of clean earth (< 0.5 ohm) to be done from Clean Earth Mat location to TER. Copper Bus bar to be provided in TER.	MET≦1 ohm and CET ≦0.5 ohm	S&T equipment rooms. Value to be mentioned with measurement date. Clean earth and main earth to be provided separately. Extension of Main earth (≦1 ohm) and Clean Earth to be done from Main Earth Mat location to SER & TER Room and SCR. Copper Bus bar to be provided in SER & TER Room and SCR. Extension of clean earth (≦0.5 ohm) to be done from Clean Earth Mat location to TER. Copper Bus bar to be provided in TER.
136	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, Table	7. Antennae & radio for train radio including special cables etc.		**[Replace with the following]** **7. Antenna & radio for train radio, wireless network antenna & modem including special cables etc.**	

	10) S&T, PSD Vs Rolling Stock, column item	10. Wi-Fi access points with antenna (02 per cab), if required	**10. (a) 3 Wi-Fi access points with antenna per coach for transferring Passenger Internet Data and content server data to Wi-Fi access point and any other requirement. (As per appendix Q of Section 6C)** **(b) L3 Switch for accessing TCMS and CCTV data from the Wireless Network Router for Live onboard CCTV streaming, TCMS data transfer to central RS/TCMS server and bulk data download in Depot and any other requirement. (As per appendix Q of Section 6C)**
137	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, Table 10) S&T, PSD Vs Rolling Stock, column Signalling	To supply the equipment to the Rolling Stock Contractor's Works (item 1 to 10 except item 7,8,9)	**[Replace with the following]** **To supply the equipment to the Rolling Stock Contractor's Works (item 1 to 7)**
138	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, Table 10) S&T, PSD Vs Rolling Stock, column Telecommunication	To supply the equipment to the Rolling Stock Contractor's Works as per item 7. The location of the onboard cab equipment shall be mutually agreed between Telecom and Rolling Stock Contractors so as to optimize seating & standing space duly considering maintainability and easy accessibility; however the onboard cab equipment shall not be placed in the underframe on account of maintainability issues and external equipment (like	~~To supply the equipment to the Rolling Stock Contractor's Works as per item 7.~~ ~~The location of the onboard cab equipment shall be mutually agreed between Telecom and Rolling Stock Contractors so as to optimize seating & standing space duly considering maintainability and easy accessibility; however the onboard cab equipment shall not be placed in the underframe on account of maintainability issues and external equipment (like antennas) have to comply the static and the dynamic gauge.~~

		antennas) have to comply the static and the dynamic gauge.	
139	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, Table 10) S&T, PSD Vs Rolling Stock, column Rolling Stock		**[Add following "To provide train lines/Ethernet Connection as per S&T requirement. (S.no. 8)"]** **To provide L3 switch and 3 Wi-Fi access points with antenna per coach. (S.no. 10)** **Employer intends to provide internet access & content streaming to passengers. The RS Contractor is required to provide equipment for Wi-Fi (Wireless LAN) for this purpose. Three (3) Wi-Fi access points shall be provided in each coach by the RS contractor. The Wi-Fi access points should be rugged and shall not infringe with passengers. The wired LAN connecting these access points shall be of 10 GBPS capacity to handle high definition media content and each access point shall be capable of handling 1 Gbps. The Wi-Fi shall comply to the latest wireless LAN standards. Space, power supply and bracket for mounting of server shall be provided by the RS Contractor, which will be utilized by the employer for Content Services later on. Full details shall be submitted for review by the Engineer.**

140	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control Appendix-A 10.S&T, PSD Vs Rolling Stock NOTE: -	f) For detail on “Wi-Fi access points with antenna (02 per cab), if required”, kindly refer Appendix Q of Section 6C.	**f) Not Used**
141	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, Table 12. S&T (Signalling) Vs PSD Contractor		**[Replace the table with the following]** **Refer Appendix A1 S. No. 3.6**
142	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, Table 13. S&T (Telecom) Vs. PSD Contractor		**[Replace the table with the following]** **Refer Appendix A1 S. No. 3.7**
143	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, Table 16. S&T VS MAINTENANCE VEHICLE CONTRACTOR		**[Replace the table with the following]** **The maintenance vehicle shall be capable of fitment of ETCS level 1 and 2 based Signalling & Train control system (without ATO) planned for RRTS project. The supplier shall interface with the S&T contractor for installation, testing & commissioning of the ETCS Level 1 and 2 equipment on the maintenance vehicle. The equipment will be supplied**

by S&T contractor/NCRTC. Table given below describes interface requirements between S&T contractor and Maintenance Vehicle contractor.

A- S&T Vs Catenary Maintenance Vehicle Contractor

S&T Contractor		**Maintenance Vehicle Contractor (Catenary Maintenance Vehicle)**	**Sheet 1/2**
Contract A (S&T)	**Design/Installation Stage**	Contract B (**Catenary Maintenance Vehicle**)	
1. Shall jointly develop interface for equipping the vehicle to provide ETCS level 1 and 2 (covering all physical, electrical, hardware, software, and power supply requirements). 2. Shall take all the relevant vehicle characteristics required for providing ETCS level-1 and 2 equipment so that the vehicle can be operated on mainline in a safe manner. 3. Shall jointly develop the safety		1. Shall jointly develop interface for equipping the vehicle to provide ETCS level 1 and 2 (covering all physical, electrical, hardware, software and power supply requirements). 2. Shall provide all the relevant vehicle characteristics required for providing ETCS level 1 and 2 equipment so that the vehicle can be operated on mainline in a safe manner. 3. Shall jointly develop the safety	

			requirements so that the vehicle can be operated on mainline in a safe manner in all signaling modes including Full supervision mode. Modes shall be finalized during design phase. 4. Shall furnish the requirement of space for installation of “ETCS Onboard S&T System” in maintenance vehicle. It shall include but not limited to Onboard EVC, Euro Radio and antenna, Speedometer, Balise antenna, Driver Machine Interface (DMI), Driver Identification Reader, Onboard Digital Counter and requirement for voice communication (Radio Console) as a minimum. 5. Shall supply all the equipment mentioned in item 4 to Maintenance vehicle contractor at agreed location and shall supervise installation.	requirements so that the vehicle can be operated on mainline in a safe manner in all signaling modes including Full supervision mode. Modes shall be finalized during design phase. 4. Shall provide the space provision in the cab, on roof, underframe etc., and provide power supply (independent and redundant) as per S&T contractor’s requirement. For housing onboard S&T (Internal train borne) equipment, suitable enclosed environment (minimum IP-52) needs to be provided by the Maintenance Vehicle contractor. 5. Shall install all the equipment supplied by S&T contractor. 6. Not Used. 7. Shall jointly develop testing and

			6. Not Used. 7. Shall jointly develop testing and commissioning plan. 8. Shall perform testing and commissioning in the presence of Maintenance vehicle contractor. 9. Shall prepare Safety case for Train control and submit to ISA for assessment. 10. S&T contractor shall be the lead contractor. **11. <u>ZVR (if required) & Redundant EBR relays to be supplied by the Signalling and Train Control Contractor.</u>** **12. <u>The S&T Contractor will provide the requirements to the Maintenance Vehicle Contractor for the train line (wiring between both cabs) and/or Ethernet cables for the data flow.</u>** **<u>The S&T Contractor shall supply the necessary</u>**	commissioning plan. 8. Shall coordinate with S&T contractor in testing and commissioning. 9. Shall prepare Safety case for vehicle and submit to ISA for assessment. 10. Maintenance vehicle contractor shall be participating contractor. **11. <u>Maintenance Vehicle Contractor shall co-ordinate with the Signalling and Train Control Contractor to agree on levels and protocols for interface signals. There shall be no delay in braking from vehicle during the transition from ED to friction brake at slow speed (if provided).</u>** **12. <u>Maintenance Vehicle contractor shall be responsible for providing the cables for the train lines (wiring between both cabs)</u>**

			disconnection and terminal blocks, device mounting brackets and plates for equipment mounted on the roof and underframe, flexible conduit assemblies complete with connectors and cables from S&T equipment to the junction boxes. **13. S&T Contractor to specify at an early date, the total heat load, and maximum permitted temperature.** **14. The inputs and outputs shall be categorized as vital and non-vital. The levels and form of these inputs and outputs shall be coordinated between the two Contractors. Emergency brake output from signaling shall be vital (SIL-4) as a minimum.** **15. Shall furnish the requirement for lockable rack to accommodate maintenance tools/ equipment used in**	**and/or Ethernet links required by the S&T contractor.** **The Maintenance Vehicle Contractor will provide the S&T equipment mounting brackets for equipment mounted in the coach/cab, conduits, support or clamping arrangements to ensure security and reliability.** **13. Maintenance vehicle contractor to provide Air Conditioning to maintain a nominal temperature of 25°C. Suitable ventilation shall be provided by the contractor.** **14. The inputs and outputs shall be categorized as vital and non-vital. The levels and form of these inputs and outputs shall be coordinated between the two Contractors. Emergency Brake output**

			corrective and preventive maintenance of S&T gears.	**from signaling shall be vital (SIL-4) as a minimum.** **15. Shall provide lockable rack of sufficient size as per S&T requirements.**

B S&T Vs Rail Grinding Vehicle Contractor

S&T Contractor		**Rail Grinding Vehicle Contractor**	**Sheet 1/2**
Contract A (S&T)	**Design / Installation Stage**		**Contract B (RGV)**
1) Shall jointly develop interface for equipping the vehicle to provide ETCS level 1 and 2 (covering all physical, electrical, hardware, software and power supply requirements). **2) Shall take all the relevant vehicle characteristics**		**1) Shall jointly develop interface for equipping the vehicle to provide ETCS level 1 and 2 (covering all physical, electrical, hardware, software and power supply requirements).** **2) Shall provide all the relevant vehicle characteristics**	

			required for providing ETCS level-1 and 2 equipment so that the vehicle can be operated on mainline in a safe manner. **3) Shall jointly develop the safety requirements so that the vehicle can be operated on mainline in a safe manner in all signaling modes including Full supervision mode. Modes shall be finalized during design phase.** **4) Shall furnish the requirement of space for installation of "ETCS Onboard S&T System" in maintenance vehicle. It shall include but not limited to Onboard EVC, Euro Radio and antenna, Speedometer, Balise antenna, Driver Machine Interface (DMI), Driver Identification Reader, Onboard Digital Counter and requirement for voice**	**required for providing ETCS level 1 and 2 equipment so that the vehicle can be operated on mainline in a safe manner.** **3) Shall jointly develop the safety requirements so that the vehicle can be operated on mainline in a safe manner in all signaling modes including Full supervision mode. Modes shall be finalized during design phase.** **4) Shall provide the space provision in the cab, on roof, underframe etc., and provide power supply (independent and redundant) as per S&T contractor's requirement. For housing onboard S&T (Internal train borne) equipment, suitable enclosed environment (minimum IP-52) needs to be provided by the**

			communication (Radio Console) as a minimum. **5) Shall supply all the equipment mentioned in item 4 to Maintenance vehicle contractor at agreed location and shall supervise installation.** **6) ZVR (if required) & Redundant EBR relays to be supplied by the Signalling and Train Control Contractor.** **7) The S&T Contractor will provide the requirements to the Maintenance Vehicle Contractor for the train line (wiring between both cabs) and/or Ethernet cables for the data flow.** **The S&T Contractor shall supply the necessary disconnection and terminal blocks, device mounting brackets and plates for equipment mounted on the roof and underframe, flexible**	**Maintenance Vehicle contractor.** **5) Shall install all the equipment supplied by S&T contractor.** **6) Maintenance Vehicle Contractor shall co-ordinate with the Signalling and Train Control Contractor to agree on levels and protocols for interface signals. There shall be no delay in braking from vehicle during the transition from ED to friction brake at slow speed (if provided).** **7) Maintenance Vehicle contractor shall be responsible for providing the cables for the train lines (wiring between both cabs) and/or Ethernet links required by the S&T contractor.** **The Maintenance Vehicle Contractor will provide the S&T equipment mounting**

			conduit assemblies complete with connectors and cables from S&T equipment to the junction boxes. **8) S&T Contractor to specify at an early date, the total heat load, and maximum permitted temperature.** **9) The inputs and outputs shall be categorized as vital and non-vital. The levels and form of these inputs and outputs shall be coordinated between the two Contractors. Emergency brake output from signaling shall be vital (SIL-4) as a minimum.** **10) Shall jointly develop testing and commissioning plan.** **11) Shall perform testing and commissioning in the presence of Maintenance vehicle contractor.**	**brackets for equipment mounted in the coach/cab, conduits, support or clamping arrangements to ensure security and reliability.** **8) Maintenance vehicle contractor to provide Air Conditioning to maintain a nominal temperature of 25°C. Suitable ventilation shall be provided by the contractor.** **9) The inputs and outputs shall be categorized as vital and non-vital. The levels and form of these inputs and outputs shall be coordinated between the two Contractors. Emergency Brake output from signaling shall be vital (SIL-4) as a minimum.** **10) Shall jointly develop testing and commissioning plan.**

			12) **Shall prepare Safety case for Train control and submit to ISA for assessment.** 13) **S&T contractor shall be the lead contractor.**	11) **Shall coordinate with S&T contractor in testing and commissioning.** 12) **Shall prepare Safety case for vehicle and submit to ISA for assessment.** 13) **Maintenance vehicle contractor shall be participating contractor.**
144	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, Table 16. S&T VS MAINTENANCE VEHICLE CONTRACTOR		**[New Notes added]** **- Maintenance Vehicle shall have 2 driver cab / driver desk per vehicle.** **- Driver identification reader shall be required in maintenance vehicle (1 per driver cab).** **- Onboard digital counter shall be required in maintenance vehicle (1 per driver cab).**	
145	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, Table 17. S&T (Telecom) VS AFC CONTRACTOR, column Telecom Contractor	1.g) Shall provide wireless access to WLAN at stations for the AFC portable devices incl. HHT, media vending/ validation devices/ other Wi-Fi enabled equipment (in case applicable)	**1.g) Not Used**	

146	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, Table 17. S&T (Telecom) VS AFC CONTRACTOR, column Telecom Contractor	2.b) **WLAN** – provides wireless network access to AFC portable devices at stations including Wi-Fi enabled equipment	**2.b) Not Used**
147	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A, Table		**[New tables added]** **20) S&T (Telecom) Vs. PEB (Pre-engineered roof structure)** **21)S&T (Telecom) Vs. VHT (Escalators) Contractor** **22)S&T (Telecom) Vs. VHT (Elevator) Contractor** **23)PSD Vs UG Stations and Tunnel Contractor.** **24)PSD Vs EAGC - Elevated at Grade Viaduct & Stations Contractor.** **25)PSD Vs Trackwork (TKW) Contractor** **26)PSD Vs DEPOT Contractor (For Depot At Grade Station & DEPOT)** **27)PSD Vs. Elevated stations - MEF (& Arch Finishes) Contractor** **28)PSD Vs Rolling Stock Contractor**

			29)PSD Vs TVS (Tunnel Ventilation System) / ECS Contractor **30)Platform Screen Door Vs. Operation Control Centre Contractor (and Jangpura Station)** (for tables detail, bidder must refer "Part 2: Employer's Requirement Section-6B-R1" uploaded herewith Addendum & Corrigendum-05B)
148	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix-A1	**The existing Employer's Requirement Part -2, Section 6B: Particular Specification - Signalling and Train control has been revised, please refer revised Section 6B: Particular Specification - Signalling and Train control - R1, enclosed as Attachment No. 1 with this Addendum & Corrigendum-05B. Bidders may kindly note that they should use Appendix-A1 of the revised Section 6B: Particular Specification - Signalling and Train control - R1.**	
149	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMM	The Contractor shall submit all the documents in hard copy (minimum 3 sets) and electronic copy through Common Data Environment (CDE).	~~The Contractor shall submit all the documents in hard copy (minimum 3 sets) and electronic copy through Common Data Environment (CDE).~~

	UNICATION/ CH- 1/ CLAUSE NO. 1.16.1.4		**All the submission shall normally be done in electronic form through a Common Data Environment with one hard copy; however, employer reserves the right to instruct contractor to submit any or all the submissions in hard copy(ies)** **CDE user accounts and Training on CDE environment will be provided to the Contractor by the Employer.**
150	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMM UNICATION/ CH- 1/ CLAUSE NO. 1.7.2.1.7		**[Add the following new Sub Clause No. 1.7.2.1.7 in Clause No. 1.7.2.1 in PS]** **All the network switches installed in outdoors shall be industrial grade with operating temperature upto 70 ºC or better.**
151	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMM UNICATION/ CH- 1/ CLAUSE NO. 1.15.2.3		**[Add the following new Sub Clause No. 1.15.2.3 in Clause No. 1.15.2 in PS]** **Transfer of Technology must include the training of following but not limited to:** **1. Complete Installation and customisation from factory default settings of all Telecom subsystems.**

			2. **Configuration, integration and customisation, deletion, addition of same or third-party equipment.** 3. **Configuration and customisation of PAS system for new triggers including triggers received from the external interfacing systems/subsystem for announcements.** **All the above subject matters are separate from the training referred under Clause 1.15**
152	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMMUNICATION/ CH- 1/ CLAUSE NO. 1.18.1	1.18.1 Contractor shall refer to Part -2 regarding vendors' and subcontractors' approval. 1.18.1.1 Additionally, while submitting the proposal for vendor approval for each telecom subsystem, the Contractor shall submit the following details to the Employer: 1) Make, model, production location / country, detailed technical literature and data sheet of the major equipment / system / software. 2) Clause wise compliance of the equipment / system / software with the specified requirements with appropriate cross references to the technical literature / data sheet. 3) Certification by OEM that the equipment / system / software meets full functionalities as per the specified requirements. 4) All valid test reports as relevant. 5) Documentary evidence of the provenness of the proposed equipment	1.18.1 Contractor shall refer to ~~Part -2~~ **Appendix T & U of Section -6B- Particular Specifications Signalling and Train Control** regarding vendors' and subcontractors' approval. 1.18.1.1 **NOT USED** ~~Additionally, while submitting the proposal for vendor approval for each telecom subsystem, the Contractor shall submit the following details to the Employer:~~ ~~1) Make, model, production location / country, detailed technical literature and data sheet of the major equipment / system / software.~~ ~~2) Clause wise compliance of the equipment / system / software with the specified requirements with appropriate cross references to the technical literature / data sheet.~~

		/ system / software in Indian Metro/ Railways environment as per relevant chapters of sub-systems in this PS.	~~3) Certification by OEM that the equipment / system / software meets full functionalities as per the specified requirements.~~ ~~4) All valid test reports as relevant.~~ 5) ~~Documentary evidence of the provenness of the proposed equipment / system / software in Indian Metro/ Railways environment as per relevant chapters of sub-systems in this PS~~.
153	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMMUNICATION/ CH- 2/ CLAUSE NO. 2.3.3.7, 2.6.3.5 (6)	2.3.3.7 One Hard wired PA Control panels, complete with microphone, zone selection facility and inter- panel- calling facility shall be provided at designated positions in OCC & BCC, Crisis rooms, Depots (DCC, PPIO), Stations (Station Control Room and at every PF) and HQ for announcement in the respective areas so that, in case of emergency, announcement can be done in each zone/ all zones. The PAS shall provide uniform broadcast coverage throughout all areas of each site within which staff or members of the public may gain access to. The design shall be such that the speakers are so located as to ensure that there are no dead zones between adjacent speakers due to interference or any other reason. 2.6.3.5 (6) Inter Panel calling facility shall preferably be available	2.3.3.7 One Hard wired PA Control panels, complete with microphone~~,~~ **and** zone selection facility ~~and inter- panel- calling facility~~ shall be provided at designated positions in OCC & BCC, Crisis rooms, Depots (DCC, PPIO), Stations (Station Control Room and at every PF) and HQ for announcement in the respective areas so that, in case of emergency, announcement can be done in each zone/ all zones. The PAS shall provide uniform broadcast coverage throughout all areas of each site within which staff or members of the public may gain access to. The design shall be such that the speakers are so located as to ensure that there are no dead zones between

			adjacent speakers due to interference or any other reason. ~~2.6.3.5 (6) Inter Panel calling facility shall preferably be available~~ **NOT USED**
154	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMMUNICATION/ CH- 2/ CLAUSE NO. 2.5.6.2	The contractor has to provide a PAS rack for full coverage of OCC and BCC similar to a PAS rack provided at a typical elevated station with expansion capacity. Provision of hardwired control panel, complete with microphone and station-wise zone selection shall be made for OCC and BCC to make live audio broadcasts to any zone or group of zones or all zones there	The contractor has to provide a PAS rack for full coverage of OCC and BCC similar to a PAS rack provided at a typical elevated station with expansion capacity. Provision of hardwired control panel~~,~~ complete with microphone **& zone selection for OCC & BCC** and station-wise zone selection **through GUI** shall be made for OCC and BCC to make live audio broadcasts to any zone or group of zones or all zones ~~there~~
155	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMMUNICATION/ CH- 2/ CLAUSE NO. 2.5.16.1. (1)	The equipment shall incorporate a self-diagnostic process for monitoring at least all amplifiers and loudspeaker circuits. In the event of a fault being detected, an alarm shall be given on the control panel at OCC & BCC also at SCR MMI.	The equipment shall incorporate a self-diagnostic process for monitoring at least all amplifiers and loudspeaker circuits. In the event of a fault being detected, an alarm shall be given on the control ~~panel~~ **position** at OCC & BCC also at SCR MMI.
156	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMM	Minimum two 200 W Class-D power amplifier shall be provided for each zone at each station.	~~Minimum two 200 W Class-D power amplifier shall be provided for each zone at each station.~~ **Not Used**

	UNICATION/ CH- 2/ CLAUSE NO. 2.6.3.8 (2)		
157	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMM UNICATION/ CH- 3/ CLAUSE NO. 3.4.1.12	The PC-based control equipment shall be industrial grade PC model. The PC- based control equipment shall function normally from -5°C to +55°C (ambient) and with relative humidity ranging up to 99%.	The PC-based control equipment shall be industrial grade PC model. The PC- based control equipment shall function normally from -5°C to +55°C (ambient) and with relative humidity ranging up to ~~99~~ **90% or better**.
158	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMM UNICATION/ CH- 4/ CLAUSE NO. 4.6.2.1 (3-ii)	Indoor Single Sided Digital Clocks- Min. Qty.: 15 Nos. per Station, 120 in OCC/BCC/HQ, 25 Nos. for each Depot	Indoor Single Sided Digital Clocks- Min. Qty.: 15 Nos. per Station, ~~120~~ **40** in OCC/BCC/HQ, 25 Nos. for each Depot
159	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMM UNICATION/ CH- 5/ CLAUSE NO. 5.6.2.8 (6)	Compression technology- Two independently configurable H.264 streams: Stream 1: H.264, 1080p @ 25 FPS, Stream 2: H.264, 1080p @25fps & 720p @50/60	Compression technology- Two independently configurable H.264 streams: Stream 1: H.264, 1080p @ 25 FPS, Stream 2: H.264, 1080p @25fps ~~& 720p @50/60~~
160	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMM UNICATION/ CH- 5/ CLAUSE NO. 5.6.2.11 (5)	Operating temperature 0°C to + 60°C, Humidity up to 90% (non-condensing). Switch shall be without any moving parts (no fans)	Operating temperature 0°C to + ~~60~~ **70**°C, Humidity up to 90% (non-condensing). Switch shall be without any moving parts (no fans)

161	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMMUNICATION/ CH- 5/ CLAUSE NO. 5.10		**[Add the following new Sub Clause No. 5.10 in PS]** **5.10 CCTV PF MONITORS** **5.10.1. For the purpose of monitoring all the train doors (or all train coaches or PF) by a train- operator from the train cab, the contractor shall provide CCTV display(s) at head end of each platform (complete with housing/ mounts) at all stations** **5.10.2. If required, the displays shall be provided in suitable housings including all primary and secondary fixtures.** **5.10.3. The contractor shall submit procedures for measurement of picture quality, visibility distance and visibility angle for these platform monitors.** **5.10.4. The displays shall be 42 inches full HD industrial grade product. The product shall be fully resistant to**

			dust, water and other harsh environment conditions. **5.10.5. The complete arrangement including the displays, related accessories and the CCTV view on these displays shall be subject to approval from the employer's representative. Printed data sheet of manufacturer to be provided for performance and other specifications for approval by employer's representative.** **5.10.6. The contractor shall interface with designated or relevant project contractors (EMF, Civil, RS, Traction etc) for installation of these monitors in terms of visibility from train operator's position in the train, PSG height, PF- location etc.**
162	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMMUNICATION/ CH- 6/ CLAUSE NO. 6.2.1.4	The Telephone System shall interface to the Radio System/ LTE to enable radio users to initiate and receive calls from IP PBX extension or from the PSTN telephones.	~~The Telephone System shall interface to the Radio System/ LTE to enable radio users to initiate and receive calls from IP PBX extension or from the PSTN telephones.~~

163	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMMUNICATION/ CH- 6/ CLAUSE NO. 6.5.1.3.4	The IP PBX switch network shall be connected to the Radio system/LTE to provide switching and connection for user to make telephone call connection through the hand portable/train mobile radios and call to hand portable/train mobile radios through telephone extension. This facility shall be programmable. Contractor shall coordinate, interface, test and commission this Interface with the Radio Contractor.	~~The IP PBX switch network shall be connected to the Radio system/LTE to provide switching and connection for user to make telephone call connection through the hand portable/train mobile radios and call to hand portable/train mobile radios through telephone extension. This facility shall be programmable. Contractor shall coordinate, interface, test and commission this Interface with the Radio Contractor.~~
164	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMMUNICATION/ CH- 6/ CLAUSE NO. 6.8.1.3.1	The Radio/LTE system shall connect to the Telephone System and the Telephone System shall provide necessary circuits and facilities so that user can make telephone call through the hand portable/train mobile radios and call to hand portable/train mobile radios.	~~The Radio/LTE system shall connect to the Telephone System and the Telephone System shall provide necessary circuits and facilities so that user can make telephone call through the hand portable/train mobile radios and call to hand portable/train mobile radios.~~
165	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMMUNICATION/ CH- 6/ CLAUSE NO. 6.6.7.3.4	Data cables (UTP Cable CAT 6 & 5e) and Low Voltage power cables wherever used in telephone system should conform to the details given Appendix I of chapter 11 under Part -2 (PS-Telecom).	Data cables ~~(UTP Cable CAT 6 & 5e)~~ and Low Voltage power cables wherever used in telephone system should conform to the details given Appendix I of chapter 11 under Part -2 (PS-Telecom).
166	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMM		**[Add the following new Sub Clause No. 8.4.4 in Clause No. 8.4 in PS]**

	UNICATION/ CH- 8/ CLAUSE NO. 8.4		**The Access control system shall comply to UL-294 standard.**
167	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMM UNICATION/ CH- 11/ APPENDIX- B/ CLAUSE NO. 3.1		**The Existing Appendix B has been revised. The revised Appendix B- R3 is attached herewith in Addendum & Corrigendum-05B. Bidders may kindly note the same.**
168	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMM UNICATION/ CH- 11/ APPENDIX- I/ CLAUSE NO. 1.5	1.5 DATA CABLE UTP Cat 6 or better 1.5.1 In addition to the requirements specified in Para1 of this PS following specifications shall be complied with by Data UTP cables. 1.5.2 The Cable shall be UTP Category 6 or better having following as minimum	1.5 DATA CABLE ~~UTP~~ **STP** Cat 6**A** or better 1.5.1 In addition to the requirements specified in Para1 of this PS following specifications shall be complied with by Data ~~UTP~~ **STP** cables. 1.5.2 The Cable shall be ~~UTP~~ **STP** Category 6**A** or better having following as minimum
169	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMM UNICATION/ CH- 11/ APPENDIX- P	IT requirements applicable to this Particular Specification are given in the Appendix-A, Part -2 (PS- Signaling).	IT requirements applicable to this Particular Specification are given in the Appendix-A, Part -2 (PS- Signaling) **under asset management**.
170	PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMM UNICATION/ CH- 11/ APPENDIX- D/ CLAUSE NO. 1		**[Add the following new Sub Clause No. 1.6 in Clause No. 1 in PS]** **1.6 Wireless Network** | | | |

S. No.	Item	Quantity
1	On Board Radio with associated accessories including power supply and Antennae	10% of the installed population
2	Wayside Radio including power supply and Antennae with associated accessories	10% of the installed population
3	Gateways and Switches	10% of the installed population
4	Command cum Maintenance Terminals	01
5	All types of outdoor cables (those supplied by the Contractor) (Note: cables of different core are also means different type of cable)	500 m of each type

<table>
<tr>
<td>171</td>
<td>PART II A/ P24 PART-2- 1/ SECTION 6C_PARTICULAR SPECIFICATIONS_TELECOMMUNICATION/ CH- 11/ APPENDIX- E/ CLAUSE NO. 1</td>
<td></td>
<td>Add the following new Sub Clause No. 24, 25 in Clause No. 1 in PS]
<table>
<tr><th>S. No</th><th>Description</th><th>Unit</th><th>Make</th><th>Model</th><th>Total</th></tr>
<tr><td>24.</td><td>Rugged Notebook/Laptop (comply to MIL-STD810G) for measuring RF power and programming of Network equipments (Onboard Radio, Wayside Radio, repeaters, switch and Gateways etc) with accessories (programming cables, dongle etc.) for Wireless Network (Appendix Q)</td><td>No.</td><td colspan="2">As Approved</td><td>1</td></tr>
</table>
</td>
</tr>
</table>

			25.	Any other tool used by the vendor during the installation, testing and commissioning of project for the Wireless Network (Appendix Q)	No.	As Approved	1
172	Addendum and Corrigendum-02B Sr. No. 232	The proposed LTE system for the NCRTC RRTS Project consists of LTE System comprising of Passive Infra, Active Infra, EPC (Evolved Packet Core), MCX services (Hardware & Software), UEs (Cab Equipment, Handsets, Fixed Radios for stations/Depots/Sections) with SIM cards, Dispatchers, NMS etc. and associated services 15.1.1 The proposed LTE system for the DGM RRTS Corridor Project consists of the following as a minimum:	The proposed LTE system for the NCRTC RRTS Project consists of LTE System comprising of Passive Infra, Active Infra, EPC (Evolved Packet Core), MCX services (Hardware & Software), UEs (Cab Equipment, Handsets, Fixed Radios for stations/Depots/Sections) with SIM cards, Dispatchers, NMS etc. and associated services			

		15.1.2 The scope of work to be performed is Design, Engineering, Supply, Installation, Testing and Commissioning, including the following: 15.1.3 The proposed solution shall comply with the following: (5) The Systems shall be so designed as to have a minimum of 15 years of service life operating continuously~~.~~ for the equipment (excluding Servers & workstations) For Servers & workstations it shall be 10 years. . (12) The Handheld, Fixed Radio and Train Radios (Voice + data, Cab LTE Modem & Data Only Radios etc) shall have PTCRB/GCF or equivalent Interoperability certification.	~~15.1.1~~**15.5.1** The proposed LTE system for the DGM RRTS Corridor Project consists of the following as a minimum: ~~15.1.2~~**15.5.2** The scope of work to be performed is Design, Engineering, Supply, Installation, Testing and Commissioning, including the following: ~~15.1.3~~**15.5.3** The proposed solution shall comply with the following:

			(5) The Systems shall be so designed as to have a minimum of 15 years of service life operating continuously~~.~~ for the equipment (excluding Servers & workstations) For Servers & workstations it shall be 10 years. (12) The Handheld, Fixed Radio and Train Radios (Voice + data, Cab LTE Modem & Data Only Radios etc) shall have PTCRB/GCF or equivalent Interoperability certification.
173	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause No. 15.6.1 sub clause (3)	3. Following RF Parameters shall be considered while designing the network – Cell edge throughput (a) (Downlink)– 4 Mbps minimum, (Uplink)– 2 Mbps minimum (Assuming 5Mhz Spectrum is provided) per UE, with network loading of 50% in case of all eNodeB sites functioning. (b) (Downlink)– 2 Mbps minimum, (Uplink)– 1 Mbps minimum (Assuming 5Mhz Spectrum is provided) per UE, with network loading of 50% in case of single eNodeB sites failure.	3. Following RF Parameters shall be considered while designing the network – Cell edge throughput (a) (Downlink)– 4 Mbps minimum, (Uplink)– 2 Mbps minimum (Assuming 5Mhz Spectrum is provided) ~~per UE~~, with network loading of 50% in case of all eNodeB sites functioning. (b) (Downlink)– 2 Mbps minimum, (Uplink)– 1 Mbps minimum (Assuming 5Mhz Spectrum is provided) ~~per~~

<table>
<tr>
<td></td>
<td></td>
<td>(c) Above throughput requirement is also applicable for all stabling lines, including Jangpura and test track in depot

(d) Link budget summary

<table>
<tr><th colspan="2">Link Budget Summary</th></tr>
<tr><td>Technology</td><td>LTE</td></tr>
<tr><td>Frequency (MHz)</td><td>700 (Tentative)</td></tr>
<tr><td>Channel Bandwidth</td><td>5MHz</td></tr>
<tr><td>DL power (W)</td><td>40 W max</td></tr>
<tr><td>Interference margin (Used)</td><td>2 dB</td></tr>
<tr><td>PDSCH Loading (DL)</td><td>50%</td></tr>
</table>
Note: Allocated frequency spectrum is subject to change and the same will be confirmed during design stage</td>
<td>~~UE~~, with network loading of 50% in case of single eNodeB sites failure.

(c) Above throughput requirement is also applicable for all stabling lines, including Jangpura and test track in depot

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</tr>
<tr>
<td>174</td>
<td>Employers Requirement Part-2, Section 6B: PS</td>
<td>The (MCPTT Voice and S&TC Data) and On-Board CCTV Live stream from trains must be routed through separate Optical Fibre, through Backhaul</td>
<td>~~The (MCPTT Voice and S&TC Data) and On-Board CCTV Live stream from trains must be routed through separate Optical Fibre, through Backhaul~~ Not used.</td>
</tr>
</table>

	Signalling and Train control, Chapter 15, Clause No. 15.6.3 sub clause (3)		
175	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause No. 15.7.1.3 sub clause (A)	The Evolved Packet Core (EPC) shall be compliant to the 3GPP Release 15 & later standards, ultimately compliant to the emerging Future Rail Mobile Communication Standard (FRMCS) being developed by UIC. Broadly the solution provided should match with the feature set of FRMCS	~~The Evolved Packet Core (EPC) shall be compliant to the 3GPP Release 15 & later standards, ultimately compliant to the emerging Future Rail Mobile Communication Standard (FRMCS) being developed by UIC. Broadly the solution provided should match with the feature set of FRMCS~~ **Not used**
176	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause No. 15.7.1.3 sub clause (H)	The EPC shall provide encryption for Control Plane and User Plane LTE traffic. ETCS data and MCX services shall also be encrypted	The EPC shall provide encryption **(using IPsec or equivalent security protocol)** for Control Plane and User Plane LTE traffic. ETCS data and MCX services shall also be encrypted
177	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause No. 15.7.1.3 sub clause (Q)	The EPC shall be provided with a hot standby with automatic changeover in the event of a failure of the working unit. There has to be full redundancy of the Main equipment at the OCC & BCC	The EPC shall be provided with a hot standby **(Geo-redundant EPC)** with automatic changeover in the event of a failure of the working unit. There has to be full redundancy of the Main equipment at the OCC & BCC. **There shall be no Emergency Brake application in trains due to this changeover.**
178	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause No. 15.7.1.13		**[Add the following new Sub Clause (12) in Clause No. 15.7.1.13 in PS]**

			12. Rating group modifications
179	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause No. 15.7.1.14		**[Add the following new Sub Clause (U) in Clause No. 15.7.1.14 in PS]** U. Serving/Packet data Gateway shall support of content screening, white-lists and blacklists
180	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause 15.7.1.17, sub clause (L)	The PCRF vendor shall state if overlapping IP addresses are supported, for example with VPN.	~~The PCRF vendor shall state if overlapping IP addresses are supported, for example with VPN~~ **Not used.**
181	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause 15.7.1.17, sub clause (P)	The PCRF shall provide a direct interface towards S-GW that will enable the launch of added value use cases	The PCRF shall provide a direct interface towards S**/P**-GW that will enable the launch of added value use cases
182	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause 15.7.6, sub clause (4)	Operating temp range as per clause 6.7.4.1 of chapter 6	Operating temp range: ~~as per clause 6.7.4.1 of chapter 6~~ **-10 °C to + 55 °C.**
183	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause	System Call Requirements	System Call Requirements 1. A minimum of eleven priority levels shall be available for assignment to radio users of varying

15.7.10.1.1

1. A minimum of eleven priority levels shall be available for assignment to radio users of varying importance. Priority-setting shall be configurable from the network management system at central control.
2. The LTE System shall support Telephony calls as per ETSI TS 122 179 and 22 280 and shall be as a minimum support the communication between various parties in accordance with the following matrix:

	OCC	**SCR**	**Train**	**Hand portable**	**DCC**	**EPABX/ Telephone/ Station PA**
OCC	Yes	Yes	Yes	Yes	Yes	Yes
SCR	Yes	Yes	Yes	Yes		Yes **
Train Radio	Yes	Yes	Yes	Yes	Yes	Yes*
Hand-portable	Yes	Yes	Yes	Yes	Yes	Yes **
EPABX/Station PA	Yes	Yes		Yes **	Yes	
DCC	Yes	Yes	Yes	Yes		Yes

* Calls authorized by OCC & BCC

** Calls between designated radios & designated EPABX extensions and Station PA system

importance. Priority-setting shall be configurable from the network management system at central control.

2. The LTE System shall support ~~Telephony calls as per ETSI TS 122 179 and 22 280 and shall be as a minimum support~~ the communication between various parties in accordance with the following matrix, **as a minimum**

	OCC	**SCR**	**Train**	**Hand portable**	**DCC**	**~~EPABX/ Telephone~~/Station PA**
OCC	Yes	Yes	Yes	Yes	Yes	~~Yes~~
SCR	Yes	Yes	Yes	Yes		~~Yes **~~
Train Radio	Yes	Yes	Yes	Yes	Yes	~~Yes*~~
Hand-portable	Yes	Yes	Yes	Yes	Yes	Yes **
~~EPABX~~/ Station PA	~~Yes~~	~~Yes~~		Yes **	~~Yes~~	

			<table><tr><td>**DCC**</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td><td></td><td>~~Yes~~</td></tr></table> * ~~Calls authorized by OCC & BCC~~ ** Calls between designated radios & designated ~~EPABX extensions and~~ Station PA system
184	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause 15.7.11	15.7.11 Functional Addressing Plan and Location Based Services: (1) The NCRTC's/FRMCS requirements are identified and studied in TR 22.889. Some of these functionalities have been adopted in MCX generic specifications TS 22.280, already in 3GPP release 15 for location-based services and functional addressing. (2) The normative NCRTCs standard specification TS 22.289 which is proposed for 3GPP release 16 with all the NCRTCs specific features needs to comply with and the contractor is expected to provide a roadmap for the same.	15.7.11 Functional Addressing Plan and Location Based Services: (1) The ~~NCRTC's~~ **Railway's**/FRMCS requirements are identified and studied in TR 22.889. Some of these functionalities have been adopted in MCX generic specifications TS 22.280, already in 3GPP release 15 for location-based services and functional addressing. (2) The normative ~~NCRTCs~~ **Railways** standard specification TS 22.289 which is proposed for 3GPP release 16 with all the ~~NCRTCs~~ **Railways** specific features needs to comply with and the contractor is expected to provide a roadmap for the same.

185	Addendum and Corrigendum-02B Sr. No. 239	**[Add the following new Sub Clause (H) in Clause No. 15.7.11 in PS]** H. Support of content screening, white-lists and blacklists	~~**[Add the following new Sub Clause (H) in Clause No. 15.7.11 in PS]**~~ ~~H. Support of content screening, white-lists and blacklists~~ **Deleted.**
186	Addendum and Corrigendum-02B Sr. No. 240	**[Add the following new Sub Clause (12) in Clause No. 15.7.13 in PS]** 12. Rating group modifications	~~**[Add the following new Sub Clause (12) in Clause No. 15.7.13 in PS]**~~ ~~12. Rating group modifications~~ **Deleted.**
187	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause No. 15.4 sub clause (1)	The product shall be compliant to 3GPP Rel. 15, upgradable to further releases supporting Railway/Public safety features and ultimately compliant to the emerging Future Rail Mobile Communication Standard (FRMCS) being developed by UIC. Broadly the solution provided should match with the feature set of FRMCS, on existing Hardware through software upgrade	The product shall be compliant to 3GPP Rel. 15, ~~upgradable to further releases~~ **to be upgraded to 3GPP Rel. 16** supporting Railway/Public safety features and ~~ultimately~~ compliant to the emerging Future Rail Mobile Communication Standard (FRMCS) ~~being developed by UIC~~ **features set which will be mapped with 3GPP Rel. 16, only through software upgrade on the existing hardware. If any hardware change is warranted, the same shall be handled as per provisions in the contract.** ~~Broadly the solution provided should match with the feature set of FRMCS, on existing Hardware through software upgrade~~

188	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause No. 15.4 sub clause (2)	Any exclusions/deviation from the final FRMCS specification shall be jointly agreed upon between the Employer and Contractor. Employer's decision shall be final	~~Any exclusions/deviation from the final FRMCS specification shall be jointly agreed upon between the Employer and Contractor. Employer's decision shall be final~~ **Not used**
189	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause No. 15.4 sub clause (3)	The contractor's commercial quote should be inclusive of the up gradations required to meet the emerging standards till FRMCS. For the purposes of this tender the FRMCS specification, up to 31st Dec 2024, shall be considered and LTE is to be understood as the LTE for National Capital Region Transport corporation being defined in this document	~~The contractor's commercial quote should be inclusive of the up gradations required to meet the emerging standards till FRMCS. For the purposes of this tender the FRMCS specification, up to 31st Dec 2024, shall be considered and LTE is to be understood as the LTE for National Capital Region Transport corporation being defined in this document~~ **Not used**
190	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause No. 15.4 sub clause (4)	In case of meeting requirements of location-based services and functional aliasing temporary solution using dispatcher etc. are permitted, only if 3GPP Rel 16 specifications do not describe the Location based services and functional aliasing	~~In case of meeting requirements of location-based services and functional aliasing temporary solution using dispatcher etc. are permitted, only if 3GPP Rel 16 specifications do not describe the Location based services and functional aliasing~~ **Not used**
191	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause 15.7.10.2	15.7.10.2 Short Message Service The LTE NCRTC Network must provide a Short Message Service (SMS) as per ETSI TS 122 282	15.7.10.2 Short ~~Message~~ **Data** Service The LTE NCRTC Network must provide a Short ~~Message~~ **Data** Service (~~SMS~~ **SDS**) as per ETSI TS 122 282

192	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause 15.7.13	15.7.13 Network Management System The FRMCS NMS (LTE-NMS) shall comprise of a common centralized management system for supplied nodes such as eNodeB, EPC, HSS, Provisioning system and MC-PTT server. This shall be used for centralized operation and maintenance including FCAPS functions General Requirements (1) Single LTE-NMS solution shall support all the offered nodes in this RFP as defined by ITU-T, 3GPP in Rel. 7 i.e. 3GPP and smoothly upgradable to FRMCS	15.7.13 Network Management System The ~~FRMCS~~ **LTE-**NMS (~~LTE-NMS~~) shall comprise of a common centralized management system for supplied nodes such as eNodeB, EPC, HSS, Provisioning system and MC-PTT server. This shall be used for centralized operation and maintenance including FCAPS functions General Requirements (1) Single LTE-NMS solution shall support all the offered nodes in this RFP ~~as defined by ITU-T, 3GPP in Rel. 7 i.e. 3GPP and smoothly upgradable to FRMCS~~
193	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause 15.9 (5) Wireless connectivity, sub clause (i)	3GPP Release 15 and upgradable to FRMCS	3GPP Release ~~15~~ **13** ~~and upgradable to FRMCS~~ **or a higher version with the approval of Employer**.
194	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause 15.9 (5) Wireless connectivity, sub clause (iii)	It should support all Bands i.e. NCRTC s LTE Network and MVNO LTE network	It should support all Bands i.e. NCRTC's LTE Network and ~~MVNO~~ ~~LTE network~~ **Public LTE network in India.**

195	Employers Requirement Part-2, Section 6B: PS Signalling and Train control, Chapter 15, Clause 15.11 sub clause (4)	Layer 3 device should comply for Temperature performance parameters as per clause 6.7.4.1 of chapter 6	Layer 3 device ~~should comply for Temperature performance parameters as per clause 6.7.4.1 of chapter 6~~ **Operating Temperature range: - 5 °C to + 55 °C.**
196	Employers Requirement Part-2, Section 6C: PS-Telecommunication, Appendix Q Clause 1.1 Sub Clause 1.1.3	The primary task of the Wireless is to seamlessly convey bi-directional train-to-ground and vice-versa data communication (vital and non-vital) for the ETCS Signalling Data, MCPPT Handheld Devices, TIMS, On-Board CCTV video and Passenger Internet data (Both On-Board Passengers and Passengers at Stations) throughout the RRTS Corridor including Mainline, stations, Depots, test tracks and stabling lines for all trains.	The primary task of the Wireless is to seamlessly convey bi-directional train-to-ground and vice-versa data communication (vital and non-vital) for the ETCS Signalling Data, ~~MCPPT Handheld Devices~~, TIMS, On-Board CCTV video and Passenger Internet data (~~Both~~ On-Board Passengers ~~and Passengers at Stations~~) throughout the RRTS Corridor including Mainline, stations, Depots, test tracks and stabling lines for all trains. This Wireless Network will be a separate network i.e. not the LTE Network.
197	Employers Requirement Part-2, Section 6C: PS-Telecommunication, Appendix Q Clause 1.1 Sub Clause 1.1.5	The network throughput requirement is min 100 Mbps per train at the max operational speed	~~The network throughput requirement is min 100 Mbps per train at the max operational speed~~, **The network shall be commissioned with minimum throughput of 100 Mbps per train at the max operational speed. The network shall be designed to support throughput of 200 Mbps per train on the deployed hardware. This upgradation shall be handled as per provisions in contracts.**

198	Employers Requirement Part-2, Section 6C: PS-Telecommunication, Appendix Q Clause 2.1.1 Sub Clause (2)	In particular the radio element shall work in 2.4/5.8 GHz (ISM) for the radio interface.	In particular the radio element shall work in 2.4/~~5.8~~ **5** GHz (ISM) for the radio interface.
199	Employers Requirement Part-2, Section 6C: PS-Telecommunication, Appendix Q Clause 2.3.4	Passenger Wi-Fi services shall not disrupt transmission of mission critical data (Signalling, Voice etc) in any scenario. Signalling Data and MCX data will have priority over passenger internet	Passenger Wi-Fi services shall not disrupt transmission of mission critical data (Signalling, Voice etc) in any scenario. Signalling Data, ~~and MCX~~ **TIMS** data **and Onboard CCTV video** will have priority over passenger internet
200	Employers Requirement Part-2, Section 6C: PS-Telecommunication, Appendix Q Clause 4		**[Add the following new Sub Clause (4.14) in Clause No. 4 in PS]** **The primary link for ETCS data is LTE. Arrangements may be provided for transfer of ETCS data over Wireless Network in case of non-availability of primary link. Wireless Network may not be considered active standby to primary link.**
201	Employers Requirement Part-2, Section 6C: PS-Telecommunication, Appendix Q Clause 4.1	The Wireless subsystem shall be designed to sustain all functions needed by the ETCS Signalling Data, MCPPT Handheld Devices, TIMS, On-Board CCTV video and Passenger Internet data (Both On-Board Passengers and Passengers at Stations) applications. The mentioned applications are critical and shall require high availability and reliability. The Wireless system, shall, where possible be based upon COTS products	The Wireless subsystem shall be designed to sustain all functions needed by the ETCS Signalling Data, ~~MCPPT Handheld Devices,~~ TIMS, On-Board CCTV video and Passenger Internet data (~~Both~~ On-Board Passengers ~~and Passengers at Stations~~) applications. The mentioned applications are critical and shall require high availability and reliability. The Wireless system, shall, where possible be based upon COTS products

202	Employers Requirement Part-2, Section 6C: PS-Telecommunication, Appendix Q Clause 4, Sub Clause 4.13	The wireless radio elements for the train-to-ground communication shall be IP 65 or higher, with or without enclosure. Onboard antenna should be IP 67 or higher	~~The wireless radio elements for the train-to-ground communication shall be IP 65 or higher, with or without enclosure. Onboard antenna should be IP 67 or higher~~ **The diversity in Wireless network coverage shall be provided, so that single point failure in the Wireless network system should not affect ETCS communication, TIMS data and On-Board CCTV live stream.**
203	Employers Requirement Part-2, Section 6C: PS-Telecommunication, Appendix Q Clause 5.1 Sub Clause (7)	Interface with LTE Subsystem for VoIP on the Handheld Terminals and Dispatchers	~~Interface with LTE Subsystem for VoIP on the Handheld Terminals and Dispatchers~~ **Interface with Rolling Stock Contractor for data offload.**

Enclosures:

1) **Section -6B Particular Specifications Signalling and Train Control - R1**
2) **Section 6F: General Alignment Drawings**
3) **Section 6G: Particular Specifications Platform Screen Doors - R1**
4) **Appendix- B-R3**