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Addendum and Corrigendum No. 01B dated 11.05.2020

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

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<tr><td><u>CTMS</u></td><td><u>Central Traffic Management System</u></td></tr>
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<tr><td><u>GOA</u></td><td><u>Grade of Automation</u></td></tr>
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			LTMS **Local Traffic Management System** **MRTS** **Mass Rapid Transit system** **OEM** **Original Equipment Manufacturer** **PSD** **Platform Screen Door** **RRTS** **Regional Rapid Transit System**
3.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 1, Clause No. 1.1.2	The Works to be executed under the Contract include the design, delivery, installation, testing, commissioning and technical support for a complete, integrated Signalling and Train Control System, including all control centres, trackside, train borne equipment, LTE, accessories, fixture and fittings necessary to deliver the requirements of this Specification.	The Works to be executed under the Contract include the design, ~~delivery~~ **supply**, installation, testing, commissioning and technical support for a complete, integrated Signalling and Train Control System, including all control centres, trackside, train borne equipment, LTE, accessories, fixture and fittings necessary to deliver the requirements of this Specification.
4.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 3, Clause No. 3.2.1.1	The scope of supply shall cover the requirements of Signalling & Train Control system completely. The OEMs of ETCS Onboard, ETCS Trackside and IXL shall be from the same group of companies under the same parent company of the contractor.	The scope of supply shall cover the requirements of Signalling & Train Control system completely. The OEMs of ETCS **Level 2** Onboard **and** ETCS **Level 2** Trackside ~~and IXL~~ shall be from the same group of companies under the same parent company of the contractor. **The combination of ETCS Level 2 Trackside and Interlocking shall be proven with reliable performance.**
5.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 3, Clause No. – 3.2.2 sub Clause 3.2.2.1 Point No. (6)	Training for operations, and maintenance staff;	Training for operations, ~~and~~ maintenance **and other** staff;

6.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 3, Clause No. – 3.2.2 sub Clause 3.2.2.1 Point No. (14)	Contractor has to achieve interoperability with future two corridors as specified in this specifiaton.	Contractor has to achieve interoperability with future two corridors as specified in this ~~specifiaton~~ **specification.**
7.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 3, Clause No. – 3.2.2 sub Clause 3.2.2.1 Point No. (15)	The Signalling contractor shall attend the installation in the RS factory for both the protoypes of MRTS & RRTS trains	The Signalling contractor shall attend the installation in the RS factory for both the ~~protoypes~~ **prototypes** of MRTS & RRTS trains
8.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 4, Clause No. 4.2.3	The Train Control and Signalling System shall achieve a Mean Time between Maintenance Action (MTBMA) of no less than 28 days per 17 route km approx. of the Line. MTBMA is the average time between maintenance being required on a piece of equipment, sub-system or a system. The equipment shall be clubbed as (a) Trackside ATC (b) Onboard ATC (c) TMS (d) CBI including axle counter, signal, point machine etc. and MTBMA of 28 days shall be achieved for each group.	The Train Control and Signalling System shall achieve a Mean Time between Maintenance Action (MTBMA) of no less than 28 days per 17 route km approx. of the Line. MTBMA is the average time between maintenance being required on a piece of equipment, sub-system or a system. The equipment shall be clubbed as (a) Trackside ATC (b) Onboard ATC (c) TMS **(d) LTE (e)** CBI including axle counter, **balise,** signal, point machine etc. and MTBMA of 28 days shall be achieved for each group.
9.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 4, Clause No 4.3.3 Table No. 4-1 Availability Performance Figures Point No. (ii)	(ii) Delay to train service exceeding 15 minutes, or requiring temporary closure of signalling /ATP functionality for one complete axle counter section on either up and down lines in the normal direction of travel	(ii) Delay to train service exceeding 15 minutes, or requiring temporary closure of signalling /ATP functionality for one complete axle counter section on either up ~~and~~ **or** down lines in the normal direction of travel

10.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 4, Clause No. 4.4.3.2	The design of the system shall avoid as far as possible maintenance operations along the track. Consequently, the contractor shall avoid implementing along the track equipment that can fail or require regular maintenance/servicing. Hoever minimum equipment shall be installed along the track to meet the requirements of this specification.	The design of the system shall avoid as far as possible maintenance operations along the track. Consequently, the contractor shall avoid implementing along the track equipment that can fail or require regular maintenance/servicing. ~~Hoever~~ **However,** minimum equipment shall be installed along the track to meet the requirements of this specification.
11.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control Chapter 4, Clause No. – 4.7.1 Point No. (1)	SKK and Modipuram terminals, including turnback operation at these two terminal stations and at few intermediate staions.	SKK and Modipuram terminals, including turnback operation at these two terminal stations and at few intermediate ~~staions~~ **stations.**
12.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 4, Clause No. 4.9.3.2 Point No. (2) & (3)	(2) To attempt, in ATP mode, to reposition the train in case the train overrun the stopping position subject to a maximum total reversing distance of 10 m; and (3) To proceed to the next station in ATP Mode in case the train overrun the stopping position more than 10m**.** In this case, an alarm shall be activated by ATC system to indicate this condition.	(2) To attempt, in ATP**/FS** mode, to reposition the train in case the train overrun the stopping position subject to a maximum total reversing distance of 10 m; and (3) To proceed to the next station in ATP**/FS** Mode in case the train overrun the stopping position more than 10m**.** In this case, an alarm shall be activated by ATC system to indicate this condition.
13.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 4, Clause No. – 4.19.1	The cables used in the signalling system shall be adequately protected against external interference. Additional protective measures, including but not limited to the use of metallic conduit, armour, ferrite choke, EMI filters shall be used to reduce such external interference wherever required. Covered conduit is preferred.	The cables used in the signalling system shall be adequately protected against external interference. Additional protective measures, including but not limited to the use of metallic conduit, armour, ferrite choke, EMI filters shall be used to reduce such external interference wherever required. Covered conduit is preferred. ~~he~~ **The** cables shall also be installed at a safe separation from potential interfering sources, including power cables, LCX, etc. A cable routing plan shall be designed so that there **is** least

		he cables shall also be installed at a safe separation from potential interfering sources, including power cables, LCX, etc. A cable routing plan shall be designed so that there are least likelihood of coupling between the signalling cables and the potential sources. The Contractor should refer to guidelines recommended by IEC61000-5-2 wherever possible	likelihood of coupling between the signalling cables and the potential sources. The Contractor should refer to guidelines recommended by IEC61000-5-2 wherever possible
14.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. – 5	**FUNCTIONAL REQUIREMENTS** The functional requirements shall be in accordance with these specifications, design criteria (in Appendix D), specification of CBI (Appendix N), Specification of ATC (Appendix O), and other requirements of this Particular Specification. In case of conflict between any of them the contractor shall seek the advice of Employer's Engineer	**FUNCTIONAL REQUIREMENTS** The functional requirements shall be in accordance with these specifications, design criteria (in Appendix D), specification of CBI (Appendix N), Specification of ~~ATC~~ **ATP/ATO** (Appendix O), and other requirements of this Particular Specification. In case of conflict between any of them the contractor shall seek the advice of Employer's Engineer
15.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.1.6.2	Cut-Out Mode is intended for use in case of complete train borne Train Control and Signalling System failure preventing release of the emergency brake. The emergency brake will be held off by the train. The train-borne equipment supplied by the Rolling Stock Contractor will limit the speed at 25 kmph (See Signalling/ Rolling Stock Interface Specification in Appendix A).	Cut-Out Mode is intended for use in case of complete train borne Train Control and Signalling System failure preventing release of the emergency brake. The emergency brake will be held off by the train. The train-borne equipment supplied by the Rolling Stock Contractor will limit the speed at 25**/40** kmph (See Signalling/ Rolling Stock Interface Specification in Appendix A).

16.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.2.1	The Train Control and Signalling System shall allow the train to transfer from Restricted Manual Mode to ATP mode automatically without stopping the train while it should be possible to select the Restricted Manual Mode only at standstill. The Train Control and Signalling System shall allow the train operator to transfer from ATO to ATP modes and vice versa.	The Train Control and Signalling System shall allow the train to transfer from Restricted Manual Mode to ATP**/FS** mode automatically without stopping the train while it should be possible to select the Restricted Manual Mode only at standstill. The Train Control and Signalling System shall allow the train operator to transfer from ATO to ATP**/FS** modes and vice versa.
17.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.3.7.2	Train detection shall be provided on the Main Line, sidings, reception lines and in the depots including automated/manual boundary areas in the depot. The axle counter shall be proven with reliable performance in metro/Railway field. The axle counter shall operate safely and reliably with proper interface with interlocking equipment. All Axle counters shall be duplicated. Indoor and Outdoor Axle counter equipment shall be provided in a complete redundant configuration. Axle counter type shall be MSDAC (Multi Section Digital Axle counter). Train detection shall as a minimum determine train positions with the accuracy corresponding to the subdivision of the track system, in sections where the train has to be	Train detection shall be provided on the Main Line, sidings, reception lines and in the depots including automated/manual boundary areas in the depot. The axle counter shall be proven with reliable performance in metro/Railway field. The axle counter shall operate safely and reliably with proper interface with interlocking equipment. **All Main line** Axle counters shall be duplicated. Indoor and Outdoor Axle counter equipment shall be provided in a complete redundant configuration. Axle counter type shall be MSDAC (Multi Section Digital Axle counter). **Duplicated axle counters are not required in Depot and stabling lines.** Train detection shall as a minimum determine train positions with the accuracy corresponding to the subdivision of the track system, in sections where the train has to be located according to operation requirements. This minimum train detection shall be effective irrespective of whether a vehicle carries working onboard equipment or not. Around station area train detection shall be achieved through Axle counters. A minimum two block sections shall be defined through axle counters between two consecutive RRTS stations. A

		located according to operation requirements. This minimum train detection shall be effective irrespective of whether a vehicle carries working onboard equipment or not. Around station area train detection shall be achieved through Axle counters. A minimum two block sections shall be defined through axle counters between two consecutive RRTS stations. A minmum of one block section shall be defined through axle counters between two consecutive MRTS stations and between two different type of stations, however final layout will be finalized during design phase	~~minmum~~ **minimum** of one block section shall be defined through axle counters between two consecutive MRTS stations and between two different type of stations, however final layout will be finalized during design phase.
18.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.3.8.5	The Contractor shall develop and submit the system configuration drawing, train movement specification, signalling plan and route table to the Engineer for approval. All Turnbacks permitted by the track layout shall be provided and shall be fully ATP protected. Turnbacks in ATP & ATO mode of operation shall be provided at locations in both directions at stations to meet the requirement of this specification. Sequence Mode/ Cycles shall be provided at terminals, at intermediate terminals and at stations with points; see Design Criterion, Appendix D. All such possible sequences/ cycles shall be allowed for	The Contractor shall develop and submit the system configuration drawing, train movement specification, signalling plan and route table to the Engineer for approval. All Turnbacks permitted by the track layout shall be provided and shall be fully ATP protected. Turnbacks in ATP**/FS** & ATO mode of operation shall be provided at locations in both directions at stations to meet the requirement of this specification. Sequence Mode/ Cycles shall be provided at terminals, at intermediate terminals and at stations with points; see Design Criterion, Appendix D. All such possible sequences/ cycles shall be allowed for trains arriving in the normal running direction.

		trains arriving in the normal running direction.	
19.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.3.10.2	A logic shall be built inTMS system of The Train Control and Signalling System, which shall regulate train movement as described in Appendix A. This shall be achieved for ATP and ATO mode of working. In case the distance between two underground stations is long, there may be additional ventilation shafts in between two stations. If this presents a problem in achieving required headway, the Contractor shall immediately notify the same to the Engineer.	A logic shall be built ~~inTMS~~ **in TMS** system of The Train Control and Signalling System, which shall regulate train movement as described in Appendix A. This shall be achieved for ATP**/FS** and ATO mode of working. In case the distance between two underground stations is long, there may be additional ventilation shafts in between two stations. If this presents a problem in achieving required headway, the Contractor shall immediately notify the same to the Engineer.
20.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.13.5.1	Centralization (1). Centralization of the activities of command, control and coordination of D-G-M Corridor within a single center (control room) on the final extension of the NCRTC controlled geographical area; (2). Integrated management of all the (statistical, dynamic, documentation, manuals, messages between operators, statistics).	Centralization (1). Centralization of the activities **like** ~~of~~ command, control and coordination of D-G-M Corridor ~~within~~ **at** a single ~~center~~ **place** ~~(control room~~ **named as Operational Control Center**~~)~~ ~~on the final extension of the NCRTC controlled geographical area;~~ (2). Integrated management of all the **functions like data statistics, train planning, train performance and message between operators.** ~~(statistical, dynamic, documentation, manuals, messages between operators, statistics).~~

21.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.13.5.3	Efficiency a. Automation of management processes; • Alarm management • Event management • Crew management • Train Tracking management • Boundary Management • Shunting Area (SA) • Disruption management • Multi-User Management • Configuration Management • Rolling stock Msnagement	Efficiency a. Automation of management processes; • Alarm management • Event management • Crew management • Train Tracking management • Boundary Management • Shunting Area (SA) • Disruption management • Multi-User Management • Configuration Management • Rolling stock ~~Msnagement~~ **Management**
22.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.15.1	The Central Traffic management system shall be implemented through CTMS (Centralized Traffic Mnanagement) and TMS (Traffic management system) system. Operator shall utilize all functions of CTMS and TMS for train operation.	The Central Traffic management system shall be implemented through CTMS (Centralized Traffic ~~Mnanagement~~ **Management**) and TMS (Traffic management system) system. Operator shall utilize all functions of CTMS and TMS for train operation.

23.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.17.1	The CTMS/TMS shall monitor the progress of trains along the Track in real time to the level of resolution provided by the train detection. Train detection data shall be available to TMS from IXL, RBC & ATO. The TDS (Train Describer system) function shall be used to identify the Train on track and it shall be alphanumeric digits.	The CTMS/TMS shall monitor the progress of trains along the Track in real time to the level of resolution provided by the train detection. Train detection data shall be available to TMS from IXL **and** RBC ~~& ATO~~. The TDS (Train Describer system) function shall be used to identify the Train on track and it shall be alphanumeric digits.
24.	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 two digits to identify the current destination, 2 digits to identify type of service (Passenger, Freight, MRTS) and two 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 carries out from the “Rake Id” of this train (Range 0000 to 0999). Such a train identity is attributed manually from	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 ~~two~~ digits to identify the current destination, ~~2~~ digits to identify type of service (Passenger, Freight, MRTS) and ~~two~~ 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** ~~carries~~ carried out ~~from the~~ with the “Rake Id” of this train ~~(Range 0000 to 0999)~~ **which system will pick up automatically. It shall also be possible for** ~~Such a~~ train identity ~~is~~ **to be** attributed manually from the Depot TMS or Central TMS **or** in according to location of this train respectively depot or main line.

		the Depot TMS or Central TMS in according to location of this train respectively depot or main line.	
25.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.19.8.2 Point no.3	TSR shall be apply/removal from TMS workstation and from interlocking VDU at station depending on the existing level of control.	TSR shall be ~~apply/remove~~ **applied/removed** from TMS workstation and from interlocking VDU at station depending on the existing level of control.
26.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.19.11.10	The Contractor shall provide as a minimum the following general capabilities and characteristics for the ABA (Alarm Browsing Appliction) for alarm display list and alarm history:	The Contractor shall provide as a minimum the following general capabilities and characteristics for the ABA (Alarm Browsing ~~Applictiion~~ **Application**) for alarm display list and alarm history.
27.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.24.1	The Video Surveillance System will enable the remote monitoring of Train Saloon and coaches. The OCC will collect images from peripheral video cameras in train. Please refere clause 5.41.	The Video Surveillance System will enable the remote monitoring of Train Saloon and coaches. The OCC will collect images from peripheral video cameras in train. Please ~~refere~~ **refer** clause 5.41.
28.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.32.12	The TMS user profiles shall have the following area of operations: **TMS user profile** OCC/BCC Master chiecontroller	The TMS user profiles shall have the following area of operations: **TMS user profile** OCC/BCC Master ~~chiecontroller~~ **chief controller**
29.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.33.3.6.4	Signalling Contractor shall do Ergomonic survey of OCC for the placement of different workstations.	Signalling Contractor shall do ~~Ergomonic~~ **Ergonomic** survey of OCC for the placement of different workstations

30.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.34.1.9	All the functions of CTMS and TMS are fully integrated and executed in a real time environment in order to permit a prompt reaction of the operator. Quick reaction is obtained by the real time updated MMI and it shall be designed to reduce the operator actions. The MMI shall shall provide drag and drop, pan and zoom facilities that speed up several functionalities of the system.	All the functions of CTMS and TMS are fully integrated and executed in a real time environment in order to permit a prompt reaction of the operator. Quick reaction is obtained by the real time updated MMI and it shall be designed to reduce the operator actions. The MMI ~~shall~~ shall provide drag and drop, pan and zoom facilities that speed up several functionalities of the system
31.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.34.2.3 Point no. 3	Time table maangement	**Timetable** ~~maangement~~ **management;**
32.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.34.4.5 Point No. (31)	countdown for all critical commamnd;	countdown for all critical ~~commamnd~~ **command;**
33.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.40		**[Add the following new Sub Clause No. 5.40.3 in Clause No. 5.40 in PS]** **5.40.3 Depot Test track** **5.40.3.1 Equipment for test tracks within the depot shall be provided as part of the Train Control and Signalling System. The depot test track shall be equipped with both ETCS Level 1& Level 2.** **5.40.3.2 The test track shall be equipped with full trackside ATP/ ATO system for train tests to be conducted within the limitations of the test track length.**

			5.40.3.3 The depot test track shall provide the ability to dynamically test the train borne System. **5.40.3.4 The test track shall provide the following facilities as a minimum:** **(1) Testing of the train borne system;** **(2) Checking calibration of the speed and positioning Sub-systems;** **(3) Testing stopping accuracy;** **(4) Testing of the Bidirectional Train Wayside communication (LTE);** **(5) Testing of the train operator MMI;** **(6) Testing of Platform Screen Door.** **5.40.3.5 The tests shall include, but not limited to, testing the following functions:** **(1) Reception of Movement Authority/Telegrams** **(2) Speed trajectory determination and regulation** **(3) Train speed and speed limit detection** **(4) ATP/ATO braking and propulsion control.** **(5) Door opening authorisation on either side** **5.40.3.6 The contractor shall provide a full description of functions, interfaces and equipment tested by the interactive dynamic test, as well those which are not tested.** **5.40.3.7 Dynamic testing of the train on the depot test track shall be at the command of a train operator.**
34.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 5, Clause No. 5.42.1	All Indoor and Outdoor Cables including outdoor optical fiber cable and HDPE pipe shall be supplied by Signalling contractor.	All Indoor and Outdoor Cables including outdoor optical fiber cable and HDPE pipe shall be supplied by **S&T** ~~Signalling~~ contractor.

35.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 6, Clause No. 6.4.3.4	Development process of TMS and ATO systems shall be designed, manufactured and validated to 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).	Development process of TMS and ATO systems shall be designed, manufactured and validated to 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.**
36.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 6, Clause No. 6.4.3.6	Signalling system shall enable the Traffic Controller to take train movement decision based on the indications available with him (i.e. TMS MMI/ Mimic Panel/ Interlocking VDU) in the event of failure of a signal or train detection due to any reason when a train operator is to be authorized to pass a signal at red/ blank.	Signalling system shall enable the Traffic Controller to take train movement decision based on the indications available with him (i.e. TMS MMI/ Mimic Panel/ Interlocking VDU) in the event of failure of a signal or train detection due to any reason when a train operator is to be authorized to pass a signal at **non lit** ~~red~~/ blank **condition.**
37.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 7, Clause No. 7.1.2	The Interface Specifications detailed below are used as the key documents for the interface definition and also to define the scope of each Project Contractor.	The Interface Specifications detailed ~~below~~ **in Appendix A** are used as the key documents for the interface definition and also to define the scope of each Project Contractor.
38.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 7, Clause No. 7.1.5	The following Paragraphs provide a brief overview of each Interface Specification along with key details provided within the document.	~~7.1.5 The following Paragraphs provide a brief overview of each Interface Specification along with key details provided within the document~~. **Deleted**
39.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 8, Clause No. 8.15.2	Contractor shall propose three accredited Test Labs of ETCS, Employer shall choose one of them.	Contractor shall propose **three names of European Commission Notified Body or** accredited Test Labs of ETCS, Employer shall choose one of them.

40.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 11, Clause No. 11.1.3		**[Add the following new Clause 11.1.3 in PS]** **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 for 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.**
41.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 12, Clause No. 12.8.3	Where the Contractor has used the Special Tools and Test Equipment for installation and commissioning of the Permanent Works, he shall handover one set of new special tools and test equipment to the Employer, accompanied by the Certificate of Calibration traceable to a recognized International or National standard.	~~Where the Contractor has used~~ **Whichever** ~~the~~ Special Tools and Test Equipment are used by the Contractor for installation and commissioning of the Permanent Works, **the contractor shall handover one set of the same new special tools** and test equipment to the Employer, accompanied by the Certificate of Calibration traceable to a recognized International or National standard.
42.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 15, Clause No.15.8.5 Sub Clause (1) Point No. 8	Signal on activation of driver's safety device (dead man's Handle) shall be transmitted to designated Traffic controller(s) Dispatcher, within 1 sec of its activation. Same way, the signal on activation of the Passenger Emergency Alarm Call button from the Train shall be transmitted to the designated Traffic Controller(s) Dispatcher, within 1 sec of its activation. The same shall also be	Signal on activation of driver's safety device (dead man's Handle) shall be transmitted to designated Traffic controller(s) Dispatcher, within 1 sec of its activation. Same way, the signal on activation of the Passenger Emergency Alarm Call button from the Train shall be transmitted to the designated Traffic Controller(s) Dispatcher, within 1 sec of its activation. The same shall also be transmitted to the **CTMS** System at the OCC & BCC.

		transmitted to the ATS System at the OCC & BCC.	
43.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 15, Clause 15.5 Scope {New Subclause (7), (8) & (9)}		**[Add the following new Sub-Clause (7), (8) & (9) in Clause 15.5]** **(7) Fixed Radio/Terminals: Ruggedized fixed radio/terminal with Desktop PTT mic.** **(8) Dispatchers: Voice dispatching server-client system.** **(9) NMS: Network Management system for LTE.**
44.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 15, Clause 15.7.1.3 EPC General Requirement (New Subclause W)		**[Add the following new Sub-Clause W in Clause 15.7.1.3]** **W. The critical hardware modules including processing device, data bus and memory device shall be redundant/Clustered form with built-in diagnostics software to ensure continuous operation in single or multiple module failures.**
45.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 15, Clause 15.8 Train Radio {New Subclause (6)}		**[Add the following new Sub-Clause (6) in Clause 15.8]** **6). Contractor shall submit Cab connectivity diagram showing all the connections of LTE Cab Modem with EVC, TIMS, PA/PIS, CCTV and Rear cab LTE Modem (for redundancy), as a part of Bid.**
46.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 15, Clause 15.8.1 Cab LTE Modem {New Subclause (18)}		**[Add the following new Sub-Clause (6) in Clause 15.8.1]** **(18) Cab LTE modem shall have interconnections with the On-board equipment like EVC, TIMS, PA/PIS, CCTV and Rear Cab LTE Modem.**

47.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix D, Clause No. 1	**GENERAL** This design criteria document describes the functional and design requirements for the signaling and train control systems of the NCRTC RRTS project. It is to be used in connection with the Particular Specification (PS) for this package. In the event of conflicts between this document and the PS, the PS shall govern.	**GENERAL** This design criteria document describes the functional and design requirements for the signaling and train control systems of the NCRTC RRTS project. It is to be used in connection with the Particular Specification (PS) for this package. ~~In the event of conflicts between this document and the PS, the PS shall govern.~~
48.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 15, Clause 15.3 Definitions (Definition of Fixed Radio	Fixed Radio: The Fixed Radio shall provide all features of Handheld Radios like individual, group and emergency call etc, through the use of a multi-function feature phone facility connected directly to the LTE system through a fixed LTE Antenna.	Fixed Radio: The Fixed Radio shall provide all features of Handheld Radios like individual, group and emergency call etc, ~~through the use of~~ using a multi-function feature phone facility connected directly to the LTE system ~~through a fixed LTE Antenna~~.
49.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 15, Clause 15.6 LTE System Architecture	For DGM project, the system functions will be duplicated in the Backup Control Centre (BCC). In case of a critical failure in the main OCC, the BCC shall allow the Rail Operator to resume the operations in the Corridor	For DGM project, the system functions will be duplicated in the Backup Control Centre (BCC). In case of a critical failure in the main OCC, the BCC shall allow the Rail Operator to resume the operations in the Corridor, **without affecting the ongoing communication.**
50.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 15, Clause 15.6.1 Network planning and design setup's clause number (c)	Above throughput requirement is applicable for all stabling lines, including Jangpura and test track in depot.	Above throughput requirement is **also** applicable for all stabling lines, including Jangpura and test track in depot.

51.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 15, Clause 15.7.1.3 EPC General Requirement's clause number K.	The EPC and associated routing equipment (S-GW/P-GW) shall maintain a failover time of 300ms for each interconnection between the EPC and the NCRTC network.	The EPC and associated routing equipment (S-GW/P-GW) shall maintain a failover time of 300ms for each interconnection ~~between the EPC and the NCRTC network~~.
52.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Chapter 15, Clause 15.7.1.3 EPC General Requirement's clause number M.	The EPC shall be designed, installed and commissioned to support fully automatic changeover between redundant elements,	The EPC shall be designed, installed and commissioned to support fully automatic changeover between redundant elements, **without affecting ongoing communication.**
53.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix D, Clause No. 2.0		**[Add the following new Clause No. 2.0 in PS]** **2.0 Principle of Train Operation**
54.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix D, Clause No. 8.2	The secondary train detection shall be based on Axle counter, which will be remote fed with minimum equipment on the trackside.	The ~~secondary~~ train detection shall be based on Axle counter, which will be remote fed with minimum equipment on the trackside.
55.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix D, Clause No. 10.7	The ETCS Level 2 based signalling system shall provide for continuous, high capacity, bidirectional train to wayside data communication.	The ETCS Level 2 **over LTE Radio Network** based signalling system shall provide for continuous, high capacity, bidirectional train to wayside data communication.
56.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix D, Clause No. 10.8	10.8 The system shall be capable of transmitting from train to track such data like but not 10.9 limited to operating data such as validated train data, MA request, Train position report, end of mission, initiation/termination of communication session etc.	**10.8 The system shall be capable of transmitting from train to track such data like but not** ~~10.9~~ **limited to operating data such as validated train data, MA request, Train position report, end of mission, initiation / termination of communication session etc.**

57.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix D, Clause No. 10.10	10.10 The data from train to track shall be transmitted to Wayside ETCS equipment/ OCC. This shall be submitted to Employer/Engineer for review.	~~10.10~~ **10.9** The data from train to track shall be transmitted to Wayside ETCS equipment/ OCC. This shall be submitted to Employer/Engineer for review.
58.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix D, Clause No. 10.11 & 10.12	10.11 The system shall be capable of transmitting from track to train such data like but not 10.12 limited to operating data such as Movement authority, conditional/unconditional emergency stop, track ahead free request etc.	~~10.11~~ **10.10 The system shall be capable of transmitting from track to train such data like but not** ~~10.12~~ **limited to operating data such as Movement authority, conditional / unconditional emergency stop, track ahead free request etc.**

59.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix D, Clause No. 11.1	**General** The ETCS Level 1 system shall extend into the Depot. Test track shall be equipped with both ETCS Level 1 and ETCS Level 2. Separate Interlocking shall be provided for the depot and test track. Locking shall be provided in accordance with the requirements as specified in PS. Interlocking system shall be based on Entry-Exit Principle. The depot will be under the control of a Depot controller. All the points in the depot will be operated by electrically operated point machines. The track axle counter shall prevent the point machines from being operated whenever a vehicle is detected to be on the turnout or within fouling distance of it. Remote fed Axle counter shall be provided in the depot. For any stabling track that can hold more than one 3-car rake, the axle counter shall be provided in such a way so as detect the presence of rakes individually. The signalling contractor will co-ordinate with the track design contractor for proper design of axle counter.	**General** The ETCS Level 1 system shall extend into the Depot. Test track shall be equipped with both ETCS Level 1 and ETCS Level 2. Separate Interlocking shall be provided for the depot and test track. Locking shall be provided in accordance with the requirements as specified in PS. Interlocking system shall be based on Entry-Exit Principle. The depot will be under the control of a Depot controller. All the points in the depot will be operated by electrically operated point machines. The ~~track~~ axle counter shall prevent the point machines from being operated whenever a vehicle is detected to be on the turnout or within fouling distance of it. Remote fed Axle counter shall be provided in the depot. For **MRTS** ~~any~~ stabling track that can hold more than one 3-car rake, the axle counter shall be provided in such a way so as detect the presence of rakes individually. **For RRTS stabling track that can hold more than one 6-car rake, the axle counter shall be provided in such a way so as detect the presence of rakes individually.** The signalling contractor will co-ordinate with the track design contractor for proper design of axle counter.

60.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix D, Clause No. 11.2	Main line to depot operation: • Trains shall be sent from mainline to depot in accordance with automatic schedule • requirements or upon OCC request. The relevant track section, signal and point • indications of concerned main line station CBI should be available with depot CBI and the relevant track section, signal and point indications of depot CBI should be available with concerned main line station CBI.	**Main line to depot operation:** • **Trains shall be sent from mainline to depot in accordance with automatic schedule requirements or upon OCC request. The relevant track section, signal and point indications of concerned main line station CBI should be available with depot CBI and the relevant track section, signal and point indications of depot CBI should be available with concerned main line station CBI.**
61.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix N, Clause No. 6.5.4	6.5.4 The system shall have provision for accommodating additional 25% of I/O cards.	~~6.5.4~~ **6.6** The system shall have provision for accommodating additional 25% of I/O cards.
62.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, APPENDIX O	APPENDIX O – SPECIFICATIONS OF ATP/ ATO/UTO	APPENDIX O – SPECIFICATIONS OF ATP/ ATO~~/UTO~~
63.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix O, Clause No. 3.4 Point No. (2)	ATP, ATO Mode	ATP**/FS,** ATO Mode

64.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix O, Clause No. 3.7.1 Point No. (xiv) & (xxii)	(xiv) Entering and cancelling speed restriction sections: It shall be possible to add temporary speed restriction in a safe manner from both Operation control centre and local control. The temporary speed restriction removal shall be done in a safe manner from local control at Station control room. A temporary speed restriction shall be limited to a sub-section of less than 250m of track. Temporary speed restriction shall be in effect for the entire train. The sectioning of track for implementation of temporary speed restriction functionality will be subject to approval of Employer's Engineer. (xxii) Starting trains in ATP/ATO mode after Turnback operation	(xiv) Entering and cancelling speed restriction sections: It shall be possible to add temporary speed restriction in a safe manner from both Operation control centre and local control. The temporary speed restriction removal shall be done in a safe manner from **both Operation control centre and** local control at Station control room **depending on the existing level of control**. A temporary speed restriction shall be limited to a sub-section of less than 250m of track. Temporary speed restriction shall be in effect for the entire train. The sectioning of track for implementation of temporary speed restriction functionality will be subject to approval of Employer's Engineer. (xxii) Starting trains in ATP**/FS**/ATO mode after Turnback operation
65.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix O, Clause No. 3.8.1 Point No. (viii)	(viii). Generation and transmission of necessary data in fail safe manner for safe train movement. The train separation determination shall be independent of secondary detection (Axle counter).	(viii). Generation and transmission of necessary data in fail safe manner for safe train movement. The train separation determination shall be independent of ~~secondary~~ **train** detection (Axle counter).

66.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix O, Clause No. 3.9.2 Point No. (i), (ii) & (vi)	(i). Signalling mode (provided only when operating in the signalling modes) namely: Staff Responsible, On sight, ATP or ATO Operating mode (ii). Available mode: Staff Responsible, On sight, ATP or ATO available modes shall be provided (vi). Target distance; If monitoring mode is ATP/AUTO, the target point indications are displayed when in brake curve: next target speed and next target distance.	(i). Signalling mode (provided only when operating in the signalling modes) namely: Staff Responsible, On sight, ATP**/FS** or ATO Operating mode (ii). Available mode: Staff Responsible, On sight, ATP**/FS** or ATO available modes shall be provided (vi). Target distance; If monitoring mode is ATP/~~AUTO~~ **ATO**, the target point indications are displayed when in brake curve: next target speed and next target distance.
67.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix O, Clause No. 7.4 Sub Clause a. Point No. (1)	Separate RBC shall be provided for depots. The area of jurisdiction of the RBC on the main line shall be so configured as to cover the entire D-G-M corridor.	Separate RBC shall be provided for depot **having test track**. The area of jurisdiction of the RBC on the main line shall be so configured as to cover the entire D-G-M corridor.

68.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix O, Clause No. 9.2.1	Ambient temperature: The equipment shall be designed and manufactured for working in the ambient temperature range as specified in Range –1, operation as defined in table 6.1.1 for train, table 6.1.2 for track and trackside of A200 FRSenv.02 version 00.03. The Indoor system shall be designed and manufactured for working in a non-air-conditioned environment and ambient temperature range between -10°C to -70°C.	Ambient temperature: The equipment shall be designed and manufactured for working in the ambient temperature range as specified in Range –1, operation as defined in table 6.1.1 for train, table 6.1.2 for track and trackside of A200 FRSenv.02 version 00.03. The Indoor system shall be designed and manufactured for working in a non-air-conditioned environment and ambient temperature range between -10°C to ~~- 70°C~~ **70°C.**
69.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix P, LIST OF SPARES FOR TRAIN CONTROL & SIGNALLING SYSTEM	The existing Appendix P: LIST OF SPARES FOR TRAIN CONTROL & SIGNALLING SYSTEM has been Revised. The revised **Appendix P: LIST OF SPARES FOR TRAIN CONTROL & SIGNALLING SYSTEM R1** is attached herewith as **Attachment no. 1** in Addendum and Corrigendum No. 01. Bidders may kindly note the same.	
70.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix Q, LIST OF SPECIAL TOOLS AND TEST/MEASURING EQUIPMENT FOR TRAIN CONTROL & SIGNALLING SYSTEM	The existing Appendix Q: LIST OF SPECIAL TOOLS AND TEST/MEASURING EQUIPMENT FOR TRAIN CONTROL & SIGNALLING SYSTEM has been Revised. The revised **Appendix Q: LIST OF SPECIAL TOOLS AND TEST/MEASURING EQUIPMENT FOR TRAIN CONTROL & SIGNALLING SYSTEM R1** is attached herewith as **Attachment no. 2** in Addendum and Corrigendum No. 01. Bidders may kindly note the same.	
71.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix S, Clause No. 1.2.7		**[Add the following new point (e) to Clause No. 1.2.7 in PS]** **(e) 1 Meeting room of 25 sqm area.**
72.	Employers Requirement Part-2, Section 6B: PS-Signalling and Train control, Appendix V, KEY & ACCESS DATES	The existing Appendix V: Key dates has been Revised. The revised **Appendix V: KEY & ACCESS DATES R1** is attached herewith as **Attachment no. 3** in Addendum and Corrigendum No. 01. Bidders may kindly note the same.	

73.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 1/ CLAUSE NO. 1.3.1.13**	Chapter 11 of this Particular Specifications specifies the list of appendices regarding Interface Specifications, Key Dates & Access Dates, Wi-fi System etc. and also includes additional information pertaining to the telecom sub-systems which should also be ensured.	Chapter 11 of this Particular Specifications specifies the list of appendices regarding Interface Specifications, Key Dates & Access Dates, ~~Wi-fi~~ **Wireless Network** System etc. and also includes additional information pertaining to the telecom sub-systems which should also be ensured.
74.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 1/ CLAUSE NO. 1.4.2.1**	The scope of supply shall cover the requirements of Telecom system completely. The detailed requirements shall be as given for each sub-system in the relevant Chapter of Part -2 this Particular Specification. The Contractor to please note that - in addition to any stipulation in the relevant Chapter for the particular sub-system, the financial bid gives the minimum BOQ to be covered as part of the scope of work and any other item or enhancement of the listed items required to complete the Telecom Contract shall also be provided as part of this lump sum Contract.	The scope of supply shall cover the requirements of Telecom system completely. The detailed requirements shall be as given for each sub-system in the relevant Chapter of Part -2 this Particular Specification. The Contractor to please note that - in addition to any stipulation in the relevant Chapter for the particular sub-system, the financial bid gives the minimum BOQ to be covered as part of the scope of work and any other item or enhancement of the listed items required to complete the Telecom Contract shall also be provided as part of this lump sum Contract. **Further, if any item mentioned in the BOQ are higher in quantity, than actually installed at sites as per approved final design, the balance quantity of items shall be handed over to the Employer by the contractor.**
75.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 1/ CLAUSE NO. 1.7.1**		**[Add the following new Sub Clause No. 1.7.1.2 in Clause No. 1.7.1 in PS]** **Antivirus software shall be installed in all workstations, servers, NMS and any other applicable systems. The software license to be extended till handing over works i.e.- till end of DLP support.**

76.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 1/ CLAUSE NO. 1.7.4.5**	The Telecom contractor shall make provisions for upgrading to or integration of similar PAS facilities to future corridors.	The Telecom contractor shall make provisions for upgrading to or integration of similar ~~PAS~~ **TELECOM** facilities to future corridors.
77.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 1/ CLAUSE NO. 1.12.6.1**		**[Add the following new Sub Clause No. 1.12.6.1.16 in Clause No. 1.12.6.1 in PS]** **The DLP/DNP of a section or part of the 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 for OCC/BCC, the DLP/DNP 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.**
78.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 1/ CLAUSE NO. 1.12.6.1**		**[Add the following new Sub Clause No. 1.12.6.1.17 in Clause No. 1.12.6.1 in PS]** **The DLP shall not be considered closed if any failure (related to software or hardware) that was reported during the DLP is left un- resolved/ pending at the time of proclaimed DLP Closure.**

79.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 1/ CLAUSE NO. 1.12.6.1**		**[Add the following new Sub Clause No. 1.12.6.1.18 in Clause No. 1.12.6.1 in PS]** **<u>The availability figure shall be calculated on a monthly basis and the contractor shall demonstrate that the availability figures are met in 6 consecutive months of observation. If the availability figure is not met in 6 consecutive months by the end of DLP period, then the DLP for that section shall be extended by 1 month everytime till the requirement of achieving availability figures for 6 consecutive months is reached.</u>**
80.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 2/ CLAUSE NO. 2.6.3.1 (2)**	The PAS control equipment shall be provided with suitable redundant modules / cards to prevent single point of failure that affects overall system operation at a particular location including critical components so as to achieve the RAMS requirement laid down. The PAS control equipment shall have hot redundancy of the controller in both OCC & BCC to prevent failure that affects overall system operations.	The PAS control equipment shall be provided with suitable redundant modules / cards to prevent single point of failure that affects overall system operation at a particular location including critical components so as to achieve the RAMS requirement laid down. The PAS control equipment shall have hot redundancy of the controller ~~in both OCC & BCC~~ at **<u>all locations (Stations, Depots, OCC, BCC etc)</u>** to prevent failure that affects overall system operations.
81.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 2/ CLAUSE NO. 2.6.3.5 (6)**	Inter Panel calling facility shall also be available.	Inter Panel calling facility shall ~~also~~ **<u>preferably</u>** be available.

82.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 2/ CLAUSE NO. 2.6.3.12 (13)**	All speakers should preferably be from same OEM as that of PAS System Supplier.	~~All speakers should preferably be from same OEM as that of PAS System Supplier.~~
83.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 4/ CLAUSE NO. 4.6.2.1 (3ii)/ Façade Clocks/ Note no. 2**	During design the contractor shall ensure the ease of maintain aspect for future maintenance purpose and necessary provisions should be developed to facilitate easy maintainability without repairing use of any external maintenance vehicle/ Manlifter vehicle.	During design the contractor shall ensure the ease of ~~maintain~~ **maintenance** aspect for future maintenance purpose and necessary provisions should be developed to facilitate easy maintainability without ~~repairing~~ **requiring** any external maintenance vehicle/ ~~Manlifter~~ **Man-lifter** vehicle.
84.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 5/ CLAUSE NO. 5.2.3 (4)**	Locations outside the stations: RSS (Receiving substation) SCADA Room, Control Rooms, Entrances, Exits, Parking areas, RSS boundary (Perimeter), Ancillary buildings, Pump Room, DG Set/ room, Mid shafts (tunnel shafts, escape routes on the viaduct, other exit points on the viaduct), station's subway, specially identified theft prone areas should be covered by CCTV. Note: Long range PTZ/Fixed CCTV cameras with night vision facility shall be provided at the entry/exit of the platforms at every station which would be pointing towards the viaduct on each side of station	Locations outside the stations: RSS (Receiving substation) SCADA Room, Control Rooms, Entrances, Exits, Parking areas, RSS boundary (Perimeter), Ancillary buildings, Pump Room, DG Set/ room, Mid shafts (tunnel shafts, escape routes on the viaduct, other exit points on the viaduct), station's subway, specially identified theft prone areas should be covered by CCTV. Note: ~~Long range PTZ/~~Fixed CCTV cameras with night vision facility shall be provided at the entry/exit of the platforms at every station which would be pointing towards the viaduct on each side of station

85.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 5/ CLAUSE NO. 5.5.1.4**	Telecom contractor shall design the distribution of all cameras at each location to comply with the coverage requirements and submit to the Employer's Representative for approval. CCTV camera coverage plots shall also be submitted with the detailed design for approval. The CCTV Coverage to be provided by provision of fixed cameras only. The PTZ Fisheye cameras shall not be counted for CCTV coverage calculation. The requirement of verification, testing and commissioning are given in Chapter1 General Requirements of this PS. In addition the contractor as part of PAT procedure shall conduct continuous CCTV coverage tests following the predefined spots for each camera at each station/depot/OCC/BCC as given by the employer representative.	Telecom contractor shall design the distribution of all cameras at each location to comply with the coverage requirements and submit to the Employer's Representative for approval. CCTV camera coverage plots shall also be submitted with the detailed design for approval. The CCTV Coverage to be provided by provision of fixed cameras only. The ~~PTZ Fisheye~~ **PTZ & Fisheye** cameras shall not be counted for CCTV coverage calculation. The requirement of verification, testing and commissioning are given in Chapter1 General Requirements of this PS. In addition the contractor as part of PAT procedure shall conduct continuous CCTV coverage tests following the predefined spots for each camera at each station/depot/OCC/BCC as given by the employer representative.
86.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 5/ CLAUSE NO. 5.5.1.11**	Some of the cameras in depot, signal crossings, RSS, parking, specifically identified theft prone area etc. are required to be installed outdoor i.e. outside the buildings with no covering shed. A proper weatherproof mounting arrangement complying with IP 66 or better along with wiper arrangement shall be provided for housing these cameras including any other accessories /equipment required	Some of the cameras in depot, signal crossings, RSS, parking, specifically identified theft prone area etc. are required to be installed outdoor i.e. outside the buildings with no covering shed. A proper weatherproof mounting arrangement complying with IP 66 or better along with ~~wiper arrangement~~ **self-cleaning glass arrangement (i.e. wiper arrangement or heater with window defroster)** shall be provided for housing these cameras including any other accessories /equipment required shall also be provided as part of this contract.

<table>
<tr><td></td><td></td><td>shall also be provided as part of this contract.</td><td></td></tr>
<tr><td>87.</td><td>Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / CH- 5/ CLAUSE NO. 5.6.1.1</td><td></td><td>[Add the following new Sub Clause No. 5.6.1.1 (14) in Clause No. 5.6.1.1 in PS]

<u>5.6.1.1 (14) Camera, Housing and software should be from same OEM</u></td></tr>
<tr><td>88.</td><td>Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / CH- 5/ CLAUSE NO. 5.6.2.19 (2/ xvi/ a)</td><td>Management servers, recording servers, Fail over servers which shall show CPU and memory usage of the servers.</td><td>Management servers, recording servers, Fail over servers which shall show <s>CPU and memory usage</s> <u>the status details</u> of the servers.</td></tr>
<tr><td>89.</td><td>Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / CH- 5/ CLAUSE NO. 5.6.2</td><td></td><td>[Add the following new Sub Clause No. 5.6.2.20 in Clause No. 5.6.2 in PS]
5.6.2.20 Lift Camera

<table>
<tr><th>S. No.</th><th>Parameter</th><th>Specification</th></tr>
<tr><td>1</td><td>Active Pixels</td><td>2 MP</td></tr>
<tr><td>2</td><td>Sensor Type</td><td>1/2 .8 inch CMOS</td></tr>
<tr><td>3</td><td>Effective pixels</td><td>1920 (H) x 1080 (V)</td></tr>
<tr><td>4</td><td>Optical Lens</td><td>2.3 mm fixed, F2.2</td></tr>
<tr><td>5</td><td>Field of view</td><td>2 MP2.3 mm: 132° x 77° (H x V)
2MP Measured according to IEC 62676 Part 5 (1/30, F1.6 or F2.2)
•Color0.1 lx
•Mono0.02 lx
•With IR0.0 lx</td></tr>
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</table>

			6	Video resolution	1080p HD-1920 x 1080 720p HD-1280 x 720
			7	High Dynamic Range	120 dB WDR
			8	Night vision Distance	15 m (49 ft) LED2 LEDs, 850 nm
			9	Shutter speed-	Fixed (1/25[30] to 1/15000) selectable; Default shutter
			10	Adjustable picture settings	Day/Night-Auto (adjustable switch points), Color,Monochrome
			11	Video compression	H.265; H.264; M- JPEG
			12	Encoding interval	2 MP 1 to 30 fps
			13	Signal-to-noise ratio(SNR)	>55 dB
			14	Analytics	Line crossing, Enter / leave field, Follow route, Loitering, Idle / removed object, People counting, Crowd density estimation,
			15	Memory card	Memory card slot – micro SDHC / micro SDXC SD card slot
			16	Inputs	Audio input-Built-in mic Alarm input , Alarm output Ethernet RJ45 connector
			17	Protocols	IPv4, IPv6, UDP, TCP, HTTP, HTTPS, RTP/RTCP, IGMP V2/V3, ICMP, ICMPv6, RTSP,FTP, ARP, DHCP, APIPA (Auto-IP, link local address), NTP (SNTP), SNMP (V1, V3, MIB-II)

			18	Ethernet	10/100 Base-T, auto-sensing, half/full duplex
			19	Interoperability	ONVIF Profile S; ONVIF Profile T: GB/T 28181
			20	Power	Input voltage - POE IEEE 802.3af / 802.3 at Type 1, Class 312 VDC ±30% Power consumption (typical / maximum) PoE: 3.5 W / 10.5 W12 VDC: 3.1 W / 9.5 W
			21	Operating temperature	-20 °C to +50 °C (-4 °F to +122 °F)
			22	Storage temperature	-30 °C to +70 °C (-22 °F to +158 °F
			23	Humidity	- 5% to 100% relative humidity (condensing)5% to 93% relative humidity (non condensing)
			24	Impact resistance	- IK08
			25	Water/dustprotection	- IP66
90.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 7/ CLAUSE NO. 7.2.17**	The DTS shall also serve as the backbone connectivity for Wi-Fi system	The DTS shall also serve as the backbone connectivity for ~~Wi-Fi~~ **Wireless Network** system		
91.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 7/ CLAUSE NO. 7.9.1 (9)**	Wi-Fi system	~~Wi-Fi~~ **Wireless Network** system		

92.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 8/ CLAUSE NO. 8.6.1**	The Access Control and Intrusion Detection System shall be a fully IP based solution including as a minimum, following elements as shown in the typical schematic diagram	The Access Control and Intrusion Detection System shall be a fully IP based solution ~~including as a minimum, following elements as shown in the typical schematic diagram~~ **A tentative schematic diagram is provided below for reference. The actual system architecture shall be as per approved final design.**
93.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication / **CH- 11/ APPENDIX- B**	**The existing Appendix- B has been revised. The revised Appendix- B/ R1 (fo Key- Dates and Access Dates) is attache herewith in ADDENDUM & CORRIGENDUM NO. 01. Bidders may kindly note the same.**	
94.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication, Appendix Q, Clause 1.1 General (New Subclause1.1.8 & 1.1.9)		**[Add the following new Sub-Clause 1.1.8 & 1.1.9 in Appendix Q]** i) **1.1.8 The data connection from the train to the ground shall be maintained during the whole hand-off process thus guaranteeing a complete seamless hand-off experience to end-user data.** ii) **1.1.9 The solution should be proven at minimum speed of 160 kmph for the required throughput per train.**
95.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication, Appendix Q, Clause 2.1 Wireless Systems, Sub-Clause 2.1.1 {New Subclause (2)}	2.1.1 (2) In particular the radio element shall work in 2.4/5.8 GHz (ISM) for the radio interface.	**[Replace the existing clause with this following new Sub-Clause 2.1.1 (2) in Appendix Q]** 2.1.1 (2) Preferably the radio elements for the train-to-ground network shall work in 5.8 GHz (ISM) for the radio interface.

96.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication, Appendix Q, Clause 2.3 Security Management, Sub-Clause 2.3.1	2.3.1 The Wireless shall be designed to perform in compliance with the International Standard IEC 62280-2 (EN 50159-2) "Railway applications – Communication, signalling and processing systems – Part 2: Safety-related communication in open transmission systems" or equivalent standard	**[Replace the existing clause with this following new Sub-Clause 2.3.1 in Appendix Q]** 2.3.1 The Wireless Network shall be designed to perform in compliance with the International Standard EN50129 & IEC 62280-2 (EN 50159-2) or equivalent standard.
97.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication, Appendix Q, Clause 2.3 Security Management, Sub-Clause 2.3.2	2.3.2 The system shall be designed to manage potential threats.	**[Replace the existing clause with this following new Sub-Clause 2.3.2 in Appendix Q]** 2.3.2 The system shall be designed to manage potential threats. Adequate security arrangement should be made for critical data.
98.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication, Appendix Q, Clause 4 General Architecture Description, Sub-Clause 4.6	4.6 On-Board outside antenna shall be installed on the Rolling Stock roof, at a suitable location after interfacing with the RS contractor.	**[Replace the existing clause with this following new Sub-Clause 4.6 in Appendix Q]** 4.6 On-Board outside antenna shall be installed on the Rolling Stock roof, at a suitable location after interfacing with the RS contractor. The antennas shall be EN50155 certified.
99.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication, Appendix Q, Clause 4 General Architecture Description		**[Add new clause with this following new Sub-Clause 4.13 in Appendix Q]** 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.

100.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication/ **CH- 1/ CLAUSE NO. 1.3.1.13**	Chapter 11 of this Particular Specifications specifies the list of appendices regarding Interface Specifications, Key Dates & Access Dates, Wi-fi System etc. and also includes additional information pertaining to the telecom sub-systems which should also be ensured.	Chapter 11 of this Particular Specifications specifies the list of appendices regarding Interface Specifications, Key Dates & Access Dates, ~~Wi-fi~~ **Wireless Network** System etc. and also includes additional information pertaining to the telecom sub-systems which should also be ensured.
101.	Part II A/ P24 Part-2/ Section 6C_Particular Specifications_Telecommunication/ Appendix B	The existing Appendix B has been Revised. The revised **Appendix B R1** is attached herewith as **Attachment no. 4** in Addendum and Corrigendum No. 01. Bidders may kindly note the same.	

Enclosures:

Attachment no. 1: Appendix P: LIST OF SPARES FOR TRAIN CONTROL & SIGNALLING SYSTEM - R1

Attachment no. 2: Appendix Q: LIST OF SPECIAL TOOLS AND TEST/MEASURING EQUIPMENT FOR TRAIN CONTROL & SIGNALLING SYSTEM - R1

Attachment no. 3: Appendix V: KEY & ACCESS DATES - R1

Attachment no. 4: Appendix B - R1