



Engineering, Procurement and Construction(EPC)  
Agreement  
For

**PROVISION OF KAVACH (TRAIN COLLISION AVOIDANCE SYSTEM) INCLUDING TOWER IN  
JOLARPETTAI TO ERODE JUNCTION SECTION (179.29 Rkm) OF SALEM DIVISION  
IN SOUTHERN RAILWAY**

**On  
Engineering, Procurement and Construction (EPC) Mode**

Signal and Telecommunication Department,  
Southern Railway (Projects)

Egmore, Chennai-600031

October-2024

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Part I

**Preliminary**

# ENGINEERING, PROCUREMENT AND CONSTRUCTION AGREEMENT

THIS AGREEMENT<sup>1</sup> is entered into on this the ..... day of ....., 20....

## BETWEEN

1. The President of India, represented by the Ministry of Railways, Chief Signal and Telecommunication Engineer, Projects, 3rd floor, MMC complex Southern Railway-Chennai, and having its principal office at Headquarters office, Park town, Chennai – 600003 (hereinafter referred to as the “**Authority**” which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns) of One Part;

AND

2. {.....}<sup>2</sup>, means the selected bidder<sup>3</sup> having its registered office at ....., (hereinafter referred to as the “**Contractor**” which expression shall, unless repugnant to the context or meaning thereof, include its successors and permitted assigns) of the Other Part.

## WHEREAS:

- (A) The Authority has the responsibility to develop, operate and maintain the Indian Railways in the territorial jurisdiction of the Southern Railway zone<sup>5</sup>.
- (B) The Authority had resolved to undertake the work of “PROVISION OF KAVACH (TRAIN COLLISION AVOIDANCE SYSTEM) INCLUDING TOWER IN JOLARPETTAI TO ERODE JUNCTION SECTION (179.29 Rkm) OF SALEM DIVISION IN SOUTHERN RAILWAY” on Engineering, Procurement, Construction (“**EPC**”) basis in accordance with the terms and conditions to be set forth in an agreement to be entered into.
- (C) The Authority had prescribed the Technical and Financial terms and conditions, and invited Request for Participation (RFP) No. Proj1MS\_KAVACH\_JTJ-ED\_01 dated 19.10.2024 from the bidders for undertaking the Project.
- (D) After evaluation of the bids received, the Authority had accepted the bid of the selected bidder and issued its Letter of Acceptance No. \*\*\* dated \*\*\* (hereinafter called the “**LOA**”) to the selected bidder for construction of the

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<sup>1</sup> Serially numbered footnote in this Agreement are for guidance of the Authority and should be omitted from the draft EPC Agreement forming part of Bid Documents. Footnotes marked \$ shall be retained in the draft Agreement.

<sup>2</sup> All provisions enclosed in curly parenthesis shall be retained in the Bid Documents and shall be modified as required after the selected bidder has been identified.

<sup>3</sup> Refers to the single entity or the lead member of the Consortium/Joint venture, which is the selected bidder

<sup>4</sup> All asterisks in this Agreement should be substituted by project-specific particulars in the draft Agreement forming part of the Bid Documents.

<sup>5</sup> All project-specific provisions in this Standard I EPC Agreement have been enclosed in square parenthesis and may be modified, as necessary, before issuing the draft EPC Agreement forming part of Bid Documents.

above railway line at the Contract Price specified hereinafter, requiring the selected bidder to inter alia:

- (i) deliver to the Authority a legal opinion from the legal counsel of the selected bidder with respect to the authority of the selected bidder to enter into this Agreement and the enforceability of the provisions thereof, within 10 (ten) days of the date of issue of LOA; and
- (ii) execute this Agreement within 60 (Sixty) days of the date of issue of LOA.
- (E) The Contractor has fulfilled the requirements specified in Recital (D) above;

Now, therefore, in consideration of the foregoing and the respective covenants and agreements set forth in this Agreement, the sufficiency and adequacy of which is hereby acknowledged, the Authority hereby covenants to pay the Contractor, in consideration of the obligations specified herein, the Contract Price or such other sum as may become payable under the provisions of the Agreement at the times and in the manner specified by the Agreement and intending to be legally bound hereby, the Parties agree as follows:

## ARTICLE 1

### DEFINITIONS AND INTERPRETATION

#### 1.1 Definitions

The words and expressions beginning with capital letters and defined in this Agreement (including those in Article 26) shall, unless the context otherwise requires, have the meaning ascribed thereto herein, and the words and expressions defined in the Schedules and used therein shall have the meaning ascribed thereto in the Schedules.

#### 1.2 Interpretation

1.2.1 In this Agreement, unless the context otherwise requires,

- (a) references to any legislation or any provision thereof shall include amendment or re-enactment or consolidation of such legislation or any provision thereof so far as such amendment or re-enactment or consolidation applies or is capable of applying to any transaction entered into hereunder;
- (b) references to laws of India or Indian law or regulation having the force of law shall include the laws, acts, ordinances, rules, regulations, bye laws or notifications which have the force of law in the territory of India and as from time to time may be amended, modified, supplemented, extended or re-enacted;
- (c) references to a **“person”** and words denoting a natural person shall be construed as a reference to any individual, firm, company, corporation, society, trust, government, state or agency of a state or any association or partnership (whether or not having separate legal personality) of two or more of the above and shall include successors and assigns;
- (d) the table of contents, headings or sub-headings in this Agreement are for convenience of reference only and shall not be used in, and shall not affect, the construction or interpretation of this Agreement;
- (e) the words **“include”** and **“including”** are to be construed without limitation and shall be deemed to be followed by **“without limitation”** or **“but not limited to”** whether or not they are followed by such phrases;
- (f) references to **“construction”** or **“building”** include, unless the context otherwise requires, survey and investigation, design, developing, engineering, procurement, supply of plant, materials, equipment, labour, delivery, transportation, installation, processing, fabrication, testing, and commissioning of the Railway Project, including maintenance during the Construction Period, removing of defects, if any, and other activities incidental to the construction and **“construct”** or **“build”** shall be construed accordingly;
- (g) references to **“development”** include, unless the context otherwise requires, construction, renovation, refurbishing, augmentation, up-gradation and other activities incidental thereto during the Construction Period, and **“develop”** shall be construed accordingly;

- (h) any reference to any period of time shall mean a reference to that according to Indian standard time;
- (i) any reference to day shall mean a reference to a calendar day;
- (j) reference to a “**business day**” shall be construed as reference to a day (other than a Sunday) on which banks in the State are generally open for business;
- (k) any reference to month shall mean a reference to a calendar month as per the Gregorian calendar;
- (l) references to any date, period or Project Milestone shall mean and include such date, period or Project Milestone as may be extended pursuant to this Agreement;
- (m) any reference to any period commencing “from” a specified day or date and “**till**” or “**until**” a specified day or date shall include both such days or dates; provided that if the last day of any period computed under this Agreement is not a business day, then the period shall run until the end of the next business day;
- (n) the words importing singular shall include plural and vice versa;
- (o) references to any gender shall include the other and the neutral gender;
- (p) “**lakh**” means a hundred thousand (100,000) and “**crore**” means ten million (10,000,000);
- (q) “**indebtedness**” shall be construed so as to include any obligation (whether incurred as principal or surety) for the payment or repayment of money, whether present or future, actual or contingent;
- (r) references to the “**winding-up**”, “**dissolution**”, “**insolvency**”, or “**reorganisation**” of a company or corporation shall be construed so as to include any equivalent or analogous proceedings under the law of the jurisdiction in which such company or corporation is incorporated or any jurisdiction in which such company or corporation carries on business including the seeking of liquidation, winding-up, reorganisation, dissolution, arrangement, protection or relief of debtors;
- (s) save and except as otherwise provided in this Agreement, any reference, at any time, to any agreement, deed, instrument, licence or document of any description shall be construed as reference to that agreement, deed, instrument, licence or other document as amended, varied, supplemented, modified or suspended at the time of such reference; provided that this Sub-clause(s) shall not operate so as to increase liabilities or obligations of the Authority hereunder or pursuant hereto in any manner whatsoever;
- (t) any agreement, consent, approval, authorisation, notice, communication, information or report required under or pursuant to this Agreement from or by any Party or the Authority Engineer shall be valid and effective only if it is in writing under the hand of a duly authorised representative of such Party or the Authority Engineer, as the case may be, in this behalf and not otherwise;



- (u) the Schedules and Recitals to this Agreement form an integral part of this Agreement and will be in full force and effect as though they were expressly set out in the body of this Agreement;
- (v) references to Recitals, Articles, Clauses, Sub-clauses, Provisos or Schedules in this Agreement shall, except where the context otherwise requires, mean references to Recitals, Articles, Clauses, Sub-clauses, Provisos and Schedules of or to this Agreement; reference to an Annex shall, subject to anything to the contrary specified therein, be construed as a reference to an Annex to the Schedule in which such reference occurs; and reference to a Paragraph shall, subject to anything to the contrary specified therein, be construed as a reference to a Paragraph of the Schedule or Annex, as the case may be, in which such reference appears;
- (w) the damages payable by either Party to the other of them, as set forth in this Agreement, whether on per diem basis or otherwise, are mutually agreed genuine pre-estimated loss and damage likely to be suffered and incurred by the Party entitled to receive the same and are not by way of penalty (the “**Damages**”); and
- (x) time shall be of the essence in the performance of the Parties’ respective obligations. If any time period specified herein is extended for the reasons specified in the Agreement, such extended time shall also be of the essence.
- (y) “Maintenance” means the maintenance of the Project KAVACH as set forth in Article 15A for the period specified therein;
- (z) “Maintenance Inspection Report” shall have the meaning set forth in Clause 15B.2;
- (aa) “Maintenance Manual” shall have the meaning ascribed to it in Clause 10.6;
- (bb) “Maintenance Programme” shall have the meaning set forth in Clause 15A.3;
- (cc) “Maintenance Period” shall have the meaning set forth in Clause 15A.1; and
- (dd) “Maintenance Requirements” shall have the meaning set forth in Clause 15A.2;

1.2.2 Unless expressly provided otherwise in this Agreement, any Documentation required to be provided or furnished by the Contractor to the Authority shall be provided free of cost and in three copies, and if the Authority is required to return any such Documentation with its comments and/or approval, it shall be entitled to retain two copies thereof.

1.2.3 The rule of construction, if any, that a contract should be interpreted against the parties responsible for the drafting and preparation thereof, shall not apply.

1.2.4 Any word or expression used in this Agreement shall, unless otherwise defined or construed in this Agreement, bear its ordinary English meaning and, for these purposes, the General Clauses Act, 1897 shall not apply.

### **1.3 Measurements and arithmetic conventions**

All measurements and calculations shall be in the metric system and calculations done to 2 (two) decimal places, with the third digit of 5 (five) or above being rounded up and below 5 (five) being rounded down.

### **1.4 Priority of agreements and errors/discrepancies**

1.4.1 This Agreement, and all other agreements and documents forming part of or referred to in this Agreement are to be taken as mutually explanatory and, unless otherwise expressly provided elsewhere in this Agreement, the priority of this Agreement and other documents and agreements forming part hereof or referred to herein shall, in the event of any conflict between them, be in the following order:

- (a) this EPC Agreement; and
  - (b) all other agreements and documents forming part hereof or referred to herein,
- i.e. this Agreement at (a) above shall prevail over the agreements and documents at (b).

1.4.2 Subject to the provisions of Clause 1.4.1, in case of ambiguities or discrepancies within this Agreement, the following shall apply:

- (a) between two or more Clauses of this Agreement, the provisions of a specific Clause relevant to the issue under consideration shall prevail over those in other Clauses;
- (b) between the Clauses of this Agreement and the Schedules, the Clauses shall prevail and between Schedules and Annexes, the Schedules shall prevail;
- (c) between any two Schedules, the Schedule relevant to the issue shall prevail;
- (d) between the written description on the Drawings and the Specifications and Standards, the latter shall prevail;
- (e) between the dimension scaled from the Drawing and its specific written dimension, the latter shall prevail; and
- (f) between any value written in numerals and that in words, the latter shall prevail.

### **{1.5 Joint and several liability**

1.5.1 If the Contractor has formed a Consortium/Joint Venture of two or more persons for implementing the Project:

- (a) these persons shall, without prejudice to the provisions of this Agreement, be deemed to be jointly and severally liable to the Authority for the performance of the Agreement; and
- (b) the Contractor shall ensure that no change in the composition of the Consortium/Joint Venture is affected without the prior consent of the Authority.

1.5.2 Without prejudice to the joint and several liability of all the members of the Consortium/Joint Venture, the Lead Member shall represent all the members of the Consortium/Joint Venture and shall at all times be liable and responsible for discharging

the functions and obligations of the Contractor. The Contractor shall ensure that each member of the Consortium/Joint Venture shall be bound by any decision, communication, notice, action or inaction of the Lead Member on any matter related to this Agreement and the Authority shall be entitled to rely upon any such action, decision or communication of the Lead Member. The Authority shall have the right to release payments solely to the Lead Member and shall not in any manner be responsible or liable for the *inter se* allocation of payments among members of the {Consortium/Joint Venture}}.

Part II

**Scope of the Project**

ARTICLE 2  
**SCOPE OF THE PROJECT**

**2.1 Scope of the Project**

Under this Agreement, the scope of the Project (the “**Scope of the Project**”) shall mean and include:

- (a) Construction of the Railway Project on the Site set forth in Schedule-A and as specified in Schedule-B together with provision of Project Facilities as specified in Schedule-C, and in conformity with the Specifications and Standards set forth in Schedule-D with Contractor’s own Material Supplies including all Signalling and Telecommunication materials, KAVACH equipment, civil building materials, Tower, peri-metric maintenance free earth around the tower, Aviation lamp, etc., as per laid down specifications.
- (b) Provision of Kavach in 10 locomotives of loco sheds of Southern Railway with enabling of LTE features.
- (c) Performance and fulfilment of all other obligations of the Contractor in accordance with the provisions of this Agreement and matters incidental thereto or necessary for the performance of any or all of the obligations of the Contractor under this Agreement.
- (d) Maintenance of the Project in accordance with the provisions of this Agreement and in conformity with the requirements set forth in Schedule-Q;

## ARTICLE 3

### OBLIGATIONS OF THE CONTRACTOR

#### 3.1 Obligations of the Contractor

- 3.1.1 Subject to and on the terms and conditions of this Agreement, the Contractor shall undertake the survey, investigation, design, engineering, procurement, and construction of the Railway Project and observe, fulfil, comply with and perform all its obligations set out in this Agreement or arising hereunder.
- 3.1.2 The Contractor shall comply with all Applicable Laws and Applicable Permits (including renewals as required) in the performance of its obligations under this Agreement.
- 3.1.3 Save and except as otherwise provided in this Agreement or Applicable Laws, as the case may be, the Contractor shall, in discharge of all its obligations under this Agreement, conform with and adhere to Good Industry Practice at all times.
- 3.1.4 The Contractor shall remedy any and all loss or damage to the Railway Project, occurring on or after the Appointed Date and until the date of Provisional Certificate, with respect to the Works completed prior to the issuance of the Provisional Certificate and/or Completion Certificate, with respect to the Works referred to in the Punch List, at its own cost, save and except to the extent that any such loss or damage shall have arisen from any default of the Authority or on account of a Force Majeure Event in which case the provisions of Article 19 shall apply.
- 3.1.5 The Contractor shall remedy any and all loss or damage to the Railway Project during the Defects Liability Period at its own cost, to the extent that such loss or damage shall have arisen out of the reasons specified in Clause 15.3.
- 3.1.6 The Contractor shall, at its own cost and expense, in addition to and not in derogation of its obligations elsewhere set out in this Agreement:
- (a) make, or cause to be made, necessary applications to the relevant Government Instrumentalities with such particulars and details as may be required for obtaining Applicable Permits set forth in Schedule-E and obtain and keep in force and effect such Applicable Permits in conformity with Applicable Laws;
  - (b) procure, as required, the appropriate proprietary rights, licences, agreements and permissions for Materials, methods, processes, know-how and systems used or incorporated into the Railway Project;
  - (c) make reasonable efforts to maintain harmony and good industrial relations among the personnel employed by it or its Sub-contractors in connection with the performance of its obligations under this Agreement;
  - (d) ensure that its Sub-contractors comply with all Applicable Permits and Applicable Laws in the performance by them of any of the Contractor's obligations under this Agreement;
  - (e) always act in a manner consistent with the provisions of this Agreement and not cause or fail to do any act, deed or thing, whether intentionally or otherwise,

which may in any manner be in violation of any of the provisions of this Agreement;

- (f) support, cooperate with and facilitate the Authority in the implementation and operation of the Project in accordance with the provisions of this Agreement;
- (g) ensure that the Contractor and its Sub-contractors comply with the safety and welfare measures for labour in accordance with Applicable Laws and Good Industry Practice;
- (h) keep, on the Site, a copy of this Agreement, publications named in this Agreement, the Drawings, Documents relating to the Project, Change of Scope Orders and other communications sent under this Agreement, and provide access to all these documents at all reasonable times to the Authority Engineer and its authorised personnel;
- (i) cooperate with other contractors employed by the Authority and with personnel of any other public authority; and
- (j) not interfere unnecessarily or improperly with the convenience of the public, or the access to and use and occupation of all the existing facilities within the Right of Way, irrespective of whether they are public or in the possession of the Authority or of others.
- (k) to provide reasoned comments on any information relating to the contractor's activities under or pursuant to the agreement, which the Authority may publish.

3.1.7 The Contractor shall undertake all necessary superintendence to plan, arrange, direct, manage, inspect and test the Works.

### **3.2 Obligations relating to sub-contracts and any other agreements**

3.2.1 The Contractor shall not sub-contract the Works comprising more than 70% (seventy per cent) of the Contract Price and shall carry out Works for at least 30% (thirty per cent) of the total Contract Price directly under its own supervision and through its own personnel. The Parties expressly agree that for the purposes of computing the value of sub-contracts under this Clause 3.2.1, the Contract Price shall exclude any sub-contract for the procurement of goods and equipment like Power supply equipment, datalogger / RTU, Kavach, etc. The Parties agree that all obligations and liabilities under this Agreement for the entire Railway Project shall at all time remain with the Contractor. {The Parties agree that the obligations of the Contractor to carry out Works equal to at least 30% (thirty per cent) of the Contract Price shall be discharged solely by the Lead Member.}<sup>\$</sup>

3.2.2 In the event any sub-contract for Works, or the aggregate of such sub-contracts with any Sub-contractor, exceeds 5% (five percent) of the Contract Price, the Contractor shall communicate the name and particulars, including the relevant experience of the sub-contractor, to the Authority prior to entering into any such sub-contract. Provided, however, that in any event the Contractor shall communicate the name and particulars to the Authority for any sub-contract including the relevant experience prior to entering into any such sub-contract. The Authority shall examine the particulars of the sub-

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<sup>\$</sup> May be deleted if the Contractor is not a Consortium/Joint Venture.

contractor from the national security and public interest perspective and may require the Contractor, no later than 15 (fifteen) business days from the date of receiving the communication from the Contractor, not to proceed with the sub-contract, and the Contractor shall comply therewith and shall have no claim whatsoever on this account.

- 3.2.3 Without prejudice to the provisions of Clause 3.2.2, in the event any sub-contract referred to in Clause 3.2.2 relates to a sub-contractor who has, over the preceding 3 (three) financial years and the current financial year, not undertaken at least one work of a similar nature with a contract value exceeding 40% (forty per cent) of the value of the sub-contract to be awarded hereunder and received payments in respect thereof for an amount equal to at least 80% (eighty per cent) of such contract, the Authority may, no later than 15 (fifteen) business days from the date of receiving the communication from the Contractor, require the Contractor not to proceed with such sub-contract, and the Contractor shall comply therewith.
- 3.2.4 It is expressly agreed that the Contractor shall, at all times, be responsible and liable for all its obligations under this Agreement notwithstanding anything contained in the agreements with its Sub-contractors or any other agreement that may be entered into by the Contractor, and no default under any such agreement shall excuse the Contractor from its obligations or liability hereunder.
- 3.2.5 Notwithstanding anything to the contrary contained in this Agreement, the Contractor agrees and acknowledges that it will not assign any work to any contractor/sub-contractor from a country which shares a land border with India unless such contractor/sub-contractor is registered with the competent Authority. Contractor will ensure that such Contractor/sub-contractor fulfils all requirements in this regard and is eligible to be considered (evidence of valid registration by the competent authority is enclosed). The Competent Authority for registration will be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT), India.

### **3.3 Employment of foreign nationals**

The Contractor acknowledges, agrees and undertakes that employment of foreign personnel by the Contractor and/or its Sub-contractors and their sub-contractors shall be subject to grant of requisite regulatory permits and approvals including employment/residential visas and work permits, if any required, and the obligation to apply for and obtain the same shall and will always be of the Contractor. Notwithstanding anything to the contrary contained in this Agreement, refusal of or inability to obtain any such permits and approvals by the Contractor or any of its Sub-contractors or their sub-contractors shall not constitute Force Majeure Event, and shall not in any manner excuse the Contractor from the performance and discharge of its obligations and liabilities under this Agreement.

### **3.4 Contractor's personnel**

- 3.4.1 The Contractor shall ensure and procure that the personnel engaged by it or by its Sub-contractors for performance of its obligations under this Agreement are at all times appropriately qualified, skilled and experienced in their respective functions including in conformity with Applicable Laws including the Indian Railway General and Subsidiary Rules, [the Indian Electricity Rules], and Good Industry Practice.
- 3.4.2 The Authority Engineer may, for reasons to be specified in writing, direct the Contractor to remove any member of the Contractor's or Sub-contractor's personnel



from the Railway Project. Provided, any such direction issued by the Authority Engineer shall specify the reasons for the removal of such person.

3.4.3 The Contractor shall, on receiving a direction from the Authority Engineer under the provisions of Clause 3.4.2, ensure and procure the removal of such person or persons from the Railway Project with immediate effect. The Contractor shall further ensure that such persons have no further connection with the Railway Project.

3.4.4 The Contractor shall be responsible for the Security of the Work Site and for keeping the unauthorized persons off the Site.

### **3.5 Advertisement on Railway Project**

The Contractor shall not use the Railway Project or any part thereof in any manner for branding or advertising purposes including for advertising any commercial product or services or companies.

### **3.6 Contractor's care of the Works**

The Contractor shall bear full risk in and take full responsibility for the care of Works, and of Materials, goods and equipment for incorporation therein, on and from the Appointed Date and until the date of Provisional Certificate, with respect to the Works completed prior to the issuance of the Provisional Certificate and/or Completion Certificate, with respect to the Works referred to in the Punch List, save and except to the extent that any such loss or damage shall have arisen from any default or neglect of the Authority.

### **3.7 Electricity, water and other services**

The Contractor shall be responsible for procuring of all power, water and other services that it may require for the Railway Project.

### **3.8 Unforeseeable difficulties**

Except as otherwise specified in the Agreement:

- (a) the Contractor accepts complete responsibility for having foreseen all difficulties and costs of successfully completing the Works;
- (b) the Contract Price shall not be adjusted to take account of any unforeseen difficulties or costs; and
- (c) the Scheduled Completion Date shall not be adjusted to take account of any unforeseen difficulties or costs.

For the purposes of this Clause, unforeseeable difficulties include physical conditions like man-made or natural physical conditions including sub-surface and hydrological conditions which the Contractor encounters at the Site during execution of the Works.

### **3.9 Training of Authority's personnel**

3.9.1 The Contractor shall provide and complete the training to the personnel of the Authority in diagnostic, trouble shooting, repairing, operation and maintenance of the Kavach equipment. Total training shall not be less than 360 man days for Signalling and

Telecommunication and operating staff such as Maintainers, Station Masters, Traffic Inspectors etc. and 360 man days for train running staff such as Loco Pilots, Assistant Loco Pilots, Loco Inspectors etc. The contractor shall train railway personnel on various topics of Kavach such as RDSO specification, maintenance and troubleshooting, train operations and other relevant topics as instructed by the Authority Engineer.

The Contractor shall provide and complete the training to the personnel of the Authority in tower climbing. The training should be comprehensive & includes supply of all kits in PPE (personal protective equipment) such as hard hat, approved eye protection glass, gloves, climbing boots with good arch support and a defined heel, work positioning lanyards, full body safety harness, cable grab/robe grab etc. as required. The number of persons to be trained shall not exceed 10 (ten) and the period of training shall be as adequate. The training shall be completed before the issuance of the Provisional Certificate/ Completion Certificate. Before the issue of any handing-over certificate, the final O & M Manuals, wherever required, shall be submitted by the contractor to the Authority Engineer

- 3.9.2 The training shall be imparted by OEMs at a location mutually agreed by Authority Engineer and Contractor. The training shall be completed before the issuance of the Provisional Certificate/ Completion Certificate. Before the issue of any handing-over certificate, the final O & M Manuals, wherever required, shall be submitted by the contractor to the Authority Engineer.

### **3.10 Safety at work site**

The Contractor and its sub-contractors shall follow the safety instructions and take all safety measures for workmen and vehicles plying in the work area in accordance with Applicable Laws, Good Industry Practice and the provisions of this Agreement.

- a. All safety rules shall be observed by the Contractor and his workmen without exception. The Contractor shall be responsible for the safety of the equipment / material and work to be performed by him.
- b. Contractor shall also take such additional precautions as may be indicated from time to time by the Authority Engineer, with a view to prevent pilferage, accidents, fire hazards etc. Suitable number of Clerical Staff, watch and ward, Storekeepers to take care of equipment, material, construction tools and tackles 15 shall be posted at site by the Contractor till the completion of work under this contract. The Contractor shall arrange for such safety devices as are necessary for this type of work and carry out the requisite site tests of handling equipment, lifting tools, tackles etc. as per usual standards and practices.
- c. The Contractor shall provide to its work force and ensure the use of the following personal protective equipment as found necessary: Safety Helmets conforming to IS – 2925 or latest. Safety Belts conforming to IS – 3521 or latest. Safety Shoes conforming to IS – 1989 or latest. Eye & Face Protection devices conforming to IS – 8520 or latest. & IS – 8940 or latest. Hand & Body Protection devices conforming to IS – 2573 or latest., IS – 6994 or latest., IS – 8807 or latest. & IS 8519 or latest.
- d. All tools, tackles, lifting appliances, material handling equipment, scaffolds, cradles, safety nets, ladders, equipment etc. used by the Contractor shall be of safe design and construction. These shall be tested and certificate of fitness obtained before putting them to use and from time to time as instructed by authorized Railway official who shall have the right to ban the use of any item.

- e. All electrical equipment, connections and wiring for construction power, its distribution and use shall conform to the requirements of Indian Electricity Act and Rules. Only electricians licensed by the appropriate statutory authority shall be employed by the Contractor to carry out all types of electrical works. All electrical appliances including portable electric tools used by Contractor shall have safe plugging system to source of Power and be appropriately earthed. Where it becomes necessary to provide and / or store petroleum products, explosives, chemicals and liquid or gaseous fuel or any other substance that may cause fire or explosion, the Contractor shall be responsible for carrying out such provision and / or storage in accordance with the rules and regulations laid down in the relevant Government Acts, such as Petroleum Act, Explosive Act, Petroleum and Carbide of Calcium Manual of the Chief Controller of Explosives, Government of India etc. Prior approval of the authorized Railway official at the site shall also be taken by the Contractor in all such matters.
- f. The Contractor shall arrange at his own cost (wherever not specified) appropriate illumination at all work spots for safe working, when natural daylight may not be adequate for clear visibility
- g. In case of a fatal or disabling injury/accident to any person at construction sites due to lapses by the Contractor, the victim and/or his/her dependents shall be compensated by the Contractor as per statutory requirements. However, if considered necessary, Railway shall have the right to impose appropriate financial penalty on the Contractor and recover the same from payments due to the Contractor for suitably compensating the victim and/or his/her dependents. Before imposing any such penalty, appropriate enquiry shall be held by Railway giving opportunity to the Contractor to present his case.
- h. In case of any damage to property due to lapses by the Contractor, Railway shall have the right to recover the cost of such damages from the payments due to the Contractor after holding an appropriate enquiry.
- i. In case of any delay in the completion of a jobs due to mishaps attributable to lapses by the Contractor, Railway shall have the right to recover cost of such delay from the payments due to the Contractor, after notifying the Contractor suitably and giving him opportunity to present his case.
- j. If the Contractor fails to improve the standards of safety in its operation to the satisfaction of Railway, after being given reasonable opportunity to do so and / or if the Contractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instructions regarding safety issued by the authorized Railway official, Railway shall have the right to take the corrective steps at the risk and cost of the Contractor after giving a notice of not less than seven days indicating the steps that would be taken by Railway
- k. The Contractor shall submit report of all accidents, fires, Property damage and dangerous occurrences to the authorized Railway official immediately after such occurrence, but in any case, not later than 12 hours of the occurrence. Such reports shall be furnished in the manner prescribed by Railway. In addition, periodic reports on safety shall also be submitted by Contractor to the authorized Railway official from time to time as prescribed.
- l. During the course of construction, alteration or repair scrap lumbers with protruding nails, sharp edges etc., and all other debris including combustible scrap shall be kept cleared from working areas, passage ways and stair in and around site. Cylinders shall be moved by tilting and rolling them on their bottom edges. They shall not be

intentionally dropped, struck or permitted to strike each other violently. When cylinders are transported by powered vehicles, they shall be secured in a vertical position.

- m. Contractor shall provide enough fire protecting equipment of the types and numbers at his office, stores, erection site, other temporary structures, labour colony area etc.

Access to such fire protection equipment shall be easy and kept open at all times. Compliance of the above requirement under fire protection shall in no way relieve the Contractor of any of his responsibility and liabilities to fire accident occurring. In the event fire safety measures are not to Railway's satisfaction, Railway shall have option to provide the same and recover the cost-plus incidentals from Contractor's bills and / or impose penalty as deemed fit by the authorized representative of Railway.

## ARTICLE 4

### OBLIGATIONS OF THE AUTHORITY

#### 4.1 Obligations of the Authority

- 4.1.1 The Authority shall, at its own cost and expense, undertake, comply with and perform all its obligations set out in this Agreement or arising hereunder.
- 4.1.2 The Authority shall be responsible for the correctness of the Scope of the Project, Project Facilities, Specifications and Standards and the criteria for Testing of the completed Works.
- 4.1.3 The Authority shall, upon receiving the Performance Security under Clause 7.1.1, provide to the Contractor:
- (a) the Right of Way in accordance with the provisions of Clauses 8.2 and 8.3 on no less than 95% (ninety five per cent) of core land length and 90% (ninety percent) of non-core land length of the total length of the Railway Project before appointed date;
  - (b) environmental and forest clearances are not required for this project; and
  - (c) -deleted-
- 4.1.4 In the event that (i) the Authority does not procure fulfilment of any or all of the obligations set forth in Clause 4.1.3 within the period specified in respect thereof, and (ii) the delay has not occurred as a result of breach of this Agreement by the Contractor or due to Force Majeure, the Authority shall pay to the Contractor Damages in a sum calculated in accordance with the provisions of Clause 8.3 of this Agreement and grant Time Extension in accordance with the provisions of Clause 10.4.
- 4.1.5 Notwithstanding anything to the contrary contained in this Agreement, the Parties expressly agree that the aggregate Damages payable by the Authority under Clauses 4.1.4, 4.4.3, 8.3 and 9.2 shall not exceed 5% (five per cent) of the Contract Price. For the avoidance of doubt, the Damages payable by the Authority under the aforesaid Clauses shall not be additive if they arise concurrently from more than one cause but relate to the same part of the Railway Project.
- 4.1.6 The Authority agrees to provide support to the Contractor and undertakes to observe, comply with and perform, subject to and in accordance with the provisions of this Agreement and Applicable Laws, the following:
- (a) upon written request from the Contractor, and subject to the Contractor complying with Applicable Laws, provide reasonable support to the Contractor in procuring Applicable Permits required from any Government Instrumentality for implementation of the Project;
  - (b) upon written request from the Contractor, provide reasonable assistance to the Contractor in obtaining access to all necessary infrastructure facilities and utilities, including water and electricity at rates and on terms no less favourable than those generally available to commercial customers receiving substantially equivalent services;

- (c) procure that no barriers that would have a material adverse effect on Works are erected or placed on or about the Railway Project by any Government Instrumentality or persons claiming through or under it, except for reasons of Emergency, national security or law and order;
- (d) not do or omit to do any act, deed or thing which may in any manner is in violation of any of the provisions of this Agreement;
- (e) support, cooperate with and facilitate the Contractor in the implementation of the Project in accordance with the provisions of this Agreement; and
- (f) upon written request from the Contractor and subject to the provisions of Clause 3.3, provide reasonable assistance to the Contractor and any expatriate personnel of the Contractor or its Sub-contractors to obtain applicable visas and work permits for the purposes of discharge by the Contractor or its Sub-contractors of their obligations under this Agreement and the agreements with the Sub-contractors.

## **4.2 Maintenance and operation of the existing facilities**

The Authority shall undertake the maintenance of the facilities existing prior to the Appointed Date including railway lines, bridges, structures, electrical, signaling and communications works within the Right of Way.

## **4.3 Environmental and Forest Clearances**

Environmental and forest clearances are not required for this project.

## **4.4 Machinery and equipment**

4.4.1 The Authority shall upon receiving a request from the Contractor, provide the machinery and equipment specified in Schedule P on payment of hire charges at the monthly rates specified therein. The Parties agree that the monthly rate for each machine or equipment shall be inclusive of fuel and all other operating charges, which shall be converted into daily rates taking a month comprising 25 (twenty five) working days. The Parties further agree that for each machinery or equipment:

- (a) The charges shall be payable for a day even if a machine or equipment is used for less than 8 (eight) hours, so long as it has been placed at the disposal of the Contractor and has not been withdrawn;
- (b) the daily rates shall be computed for a shift of 8 (eight) hours taken as one day. By way of illustration, if the machinery or equipment is used for 16 (sixteen) hours on any day, the charges payable shall be equal to twice the daily rate; and
- (c) for any machinery or equipment which can be used only during the period of a Power Block or Traffic Block, no payment shall be due or payable for the day on which such block is not provided to the Contractor.

4.4.2 The Contractor shall by notice of at least three weeks convey to the Authority the particulars of the machinery and equipment required for each day of the following one month.

#### 4.4.3 -deleted-

#### 4.5 -Electricity transmission lines

Not Applicable

#### 4.6 Disconnection for modification of existing signalling and telecommunication works

The Contractor shall on requirement of disconnection of a particular subsystem for modification in the existing signalling and telecommunication system at railway stations, level crossing gates and interlocked sections, inform the Authority Engineer by notice of at least one week of its readiness for commissioning and the Authority Engineer shall obtain the requisite approvals from the Authority for the required disconnections. All such work requiring disconnection of existing signalling systems shall be executed under supervision of Authority Engineer or his representative. The Parties expressly agree that in the event of any default in providing such disconnection, the Authority shall pay to the Contractor Damages at the rate of Rs.1,000/- (Rupees One Thousand) per day. The Contractor shall ensure that there is no interruption/ disturbance to operational circuits in such cases of modification of signalling and telecom systems.

#### 4.7 Provision of Power Blocks and Traffic Blocks

4.7.1 The Authority shall provide Power Block or Traffic Block or both to enable the Contractor to undertake the construction of overhead equipment, or such other work as may be determined by the Authority Engineer.

4.7.2 The Contractor shall, in consultation with the Authority Engineer, submit a weekly programme of Blocks, commencing from Monday, with a notice of at least 1 (one) week and the Authority Engineer shall convey the approved weekly programme to the Contractor no less than 3 (three) days prior to the start of such week.

4.7.3 The minimum period for which a Power Block or Traffic Block shall be provided to the Contractor shall not be less than two hours, period being counted from the time the track is placed at the disposal of the Contractor and until it is cleared by the Contractor. Provided, however, that a Power Block or Traffic Block, as the case may be, of shorter duration may be provided with mutual consent of the Parties.

4.7.4 The aggregate period of Power Block and Traffic Block to be provided to the Contractor during the Construction Period is specified in Schedule-O. The Contractor shall organise its work so as to complete all Construction Works within such aggregate period. However, this aggregate period may be increased by the Authority Engineer on Contractor's request, if the same is considered justified and reasonable under the prevailing circumstances.

4.7.5 In the event of any change in the schedule of Power Block or Traffic Block or both, as the case may be, the Authority shall inform the Contractor by a notice of not less than 24 (twenty four) hours. Provided, however, that no such notice shall be required in case of a breakdown, accident, law and order disturbance, natural calamity or any other unusual occurrence or Emergency.

4.7.6 In the event a Power Block or Traffic Block, as the case may be, is not provided for any day in accordance with the confirmed programme, the Contractor shall be compensated by providing an additional Power Block or Traffic Block of equal time during the same week or the following week.

4.7.7 The Contractor shall be entitled to undertake the Construction Works within the aggregate period specified in Schedule-O. Provided, however, that in the event the aggregate period utilised by the Contractor exceeds the period specified in Schedule-O and the extra time granted thereto under clause 4.7.4 if any, the Contractor shall pay to the Authority hourly charges at the rate specified therein.



ARTICLE 5  
**REPRESENTATIONS AND WARRANTIES**

**5.1 Representations and warranties of the Contractor**

The Contractor represents and warrants to the Authority that:

- (a) it is duly organised and validly existing under the laws of India, and has full power and authority to execute and perform its obligations under this Agreement and to carry out the transactions contemplated hereby;
- (b) it has taken all necessary corporate and other actions under Applicable Laws to authorise the execution and delivery of this Agreement and to validly exercise its rights and perform its obligations under this Agreement;
- (c) this Agreement constitutes its legal, valid and binding obligation, enforceable against it in accordance with the terms hereof, and its obligations under this Agreement will be legally valid, binding and enforceable obligations against it in accordance with the terms hereof;
- (d) it is subject to the laws of India, and hereby expressly and irrevocably waives any immunity in any jurisdiction in respect of this Agreement or matters arising there under including any obligation, liability or responsibility hereunder;
- (e) the information furnished in the Bid and as updated on or before the date of this Agreement is true and accurate in all respects as on the date of this Agreement;
- (f) the execution, delivery and performance of this Agreement will not conflict with, result in the breach of, constitute a default under, or accelerate performance required by any of the terms of its memorandum and articles of association or any Applicable Laws or any covenant, contract, agreement, arrangement, understanding, decree or order to which it is a party or by which it or any of its properties or assets is bound or affected;
- (g) there are no actions, suits, proceedings, or investigations pending or, to its knowledge, threatened against it at law or in equity before any court or before any other judicial, quasi-judicial or other authority, the outcome of which may result in the breach of this Agreement or which individually or in the aggregate may result in any material impairment of its ability to perform any of its obligations under this Agreement;
- (h) it has no knowledge of any violation or default with respect to any order, writ, injunction or decree of any court or any legally binding order of any Government Instrumentality which may result in any material adverse effect on its ability to perform its obligations under this Agreement and no fact or circumstance exists which may give rise to such proceedings that would adversely affect the performance of its obligations under this Agreement;
- (i) it has complied with Applicable Laws in all material respects and has not been subject to any fines, penalties, injunctive relief or any other civil or criminal liabilities which in the aggregate have or may have a material adverse effect on its ability to perform its obligations under this Agreement;

- (j) no representation or warranty by it contained herein or in any other document furnished by it to the Authority or to any Government Instrumentality in relation to Applicable Permits contains or will contain any untrue or misleading statement of material fact or omits or will omit to state a material fact necessary to make such representation or warranty not misleading;
- (k) no sums, in cash or kind, have been paid or will be paid, by it or on its behalf, to any person by way of fees, commission or otherwise for securing the contract or entering into this Agreement or for influencing or attempting to influence any officer or employee of the Authority in connection therewith;
- (l) all information provided by the {selected bidder/ members of the Consortium/Joint Venture} in response to the RFP or otherwise, is to the best of its knowledge and belief, true and accurate in all material respects; and
- (m) nothing contained in this Agreement shall create any contractual relationship or obligation between the Authority and any Sub-contractors, designers, consultants or agents of the Contractor.

## **5.2 Representations and warranties of the Authority**

The Authority represents and warrants to the Contractor that:

- (a) it has full power and authority to execute, deliver and perform its obligations under this Agreement and to carry out the transactions contemplated herein and that it has taken all actions necessary to execute this Agreement, exercise its rights and perform its obligations, under this Agreement;
- (b) it has taken all necessary actions under Applicable Laws to authorise the execution, delivery and performance of this Agreement;
- (c) it has the financial standing and capacity to perform its obligations under this Agreement;
- (d) this Agreement constitutes a legal, valid and binding obligation enforceable against it in accordance with the terms hereof;
- (e) it has no knowledge of any violation or default with respect to any order, writ, injunction or any decree of any court or any legally binding order of any Government Instrumentality which may result in any material adverse effect on the Authority's ability to perform its obligations under this Agreement;
- (f) it has complied with Applicable Laws in all material respects;
- (g) it has good and valid right to the Site and has the power and authority to grant the Right of Way in respect thereof to the Contractor; and
- (h) it shall have procured, as on the Appointed Date, Right of Way and environment clearances such that the Contractor can commence construction forthwith on 95% (ninety five per cent) of the core land length and 90% of non-core land length of the Railway Project.

### **5.3 Disclosure**

In the event that any occurrence or circumstance comes to the attention of either Party that renders any of its aforesaid representations or warranties untrue or incorrect, such Party shall immediately notify the other Party of the same. Such notification shall not have the effect of remedying any breach of the representation or warranty that has been found to be untrue or incorrect nor shall it adversely affect or waive any obligation of either Party under this Agreement.

ARTICLE 6  
**DISCLAIMER**

**6.1 Disclaimer**

- 6.1.1 The Contractor acknowledges that prior to the execution of this Agreement, the Contractor has, after a complete and careful examination, made an independent evaluation of the Request for Proposal (RFP), Scope of the Project, Specifications and Standards, Site, local conditions, physical qualities of ground, subsoil and geology, traffic volumes, suitability and availability of access routes to the Site and all information provided by the Authority or obtained, procured or gathered otherwise, and has determined to its satisfaction the accuracy or otherwise thereof and the nature and extent of difficulties, risks and hazards as are likely to arise or may be faced by it in the course of performance of its obligations hereunder. Save as provided in Clause 4.1.2 and Clause 5.2, the Authority makes no representation whatsoever, express, implicit or otherwise, regarding the accuracy, adequacy, correctness, reliability and/or completeness of any assessment, assumptions, statement or information provided by it and the Contractor confirms that it shall have no claim whatsoever against the Authority in this regard.
- 6.1.2 The Contractor acknowledges and hereby accepts to have satisfied itself as to the correctness and sufficiency of the Contract Price.
- 6.1.3 The Contractor acknowledges and hereby accepts the risk of inadequacy, mistake or error in or relating to any of the matters set forth in Clause 6.1.1 above and hereby acknowledges and agrees that the Authority shall not be liable for the same in any manner whatsoever to the Contractor, or any person claiming through or under any of them, and shall not lead to any adjustment of Contract Price or Scheduled Completion Date.
- 6.1.4 The Parties agree that any mistake or error in or relating to any of the matters set forth in Clause 6.1.1 above shall not vitiate this Agreement, or render it voidable.
- 6.1.5 In the event that either Party becomes aware of any mistake or error relating to any of the matters set forth in Clause 6.1.1 above, that Party shall immediately notify the other Party, specifying the mistake or error.
- 6.1.6 Except as otherwise provided in this Agreement, all risks relating to the Project shall be borne by the Contractor; and the Authority shall not be liable in any manner for such risks or the consequences thereof.

Part III

**Construction and Maintenance**

## ARTICLE 7

### PERFORMANCE SECURITY

#### 7.1 Performance Security

- 7.1.1 The Contractor shall, for the performance of its obligations hereunder, provide to the Authority, within 30(Thirty) days of issue of LOA, an irrevocable and unconditional Bank Guarantee (the “**Performance Security**”), for an amount equal to **3% (Three per cent)**, of the Contract Price from a Bank in the form set forth in Annex-I of Schedule-F.

The Performance Security shall be valid until 60 (sixty) days of the expiry of the Defects Liability Period specified in Clause 15.1.1. Until such time the Performance Security is furnished by the Contractor pursuant hereto and the same comes into effect, the ‘Bid Security’ shall remain in force and effect, and upon such furnishing of the Performance Security, the Authority shall release the Bid Security to the Contractor. For the avoidance of doubt, the Parties expressly agree that the Contractor shall provide, no later than 30 (thirty) days prior to the expiry of the Performance Security for the Defects Liability Period specified in Clause 15.1.1, a Performance Security in respect of the extended Defects Liability Period, as specified in Clause 15.1.2, for an amount equal to **3% (Three per cent)** of the estimated cost of the Structures, Important Bridges, if any, comprising a new technology not currently in use in the Railways and the interlocking and telecom switching equipment as specified in Schedule B.

- 7.1.2 Notwithstanding anything to the contrary contained in this Agreement, the Parties agree that in the event of failure of the Contractor to provide the Performance Security in accordance with the provisions of Clause 7.1.1 and within the time specified therein or such extended period as may be provided by the Authority, in accordance with the provisions of Clause 7.1.3, the Authority shall encash the Bid Security and appropriate the proceeds thereof as part-Damages, and thereupon all rights, privileges, claims and entitlements of the Contractor under or arising out of this Agreement shall be deemed to have been waived by, and to have ceased with the concurrence of the Contractor, and this Agreement shall be deemed to have been terminated by mutual agreement of the Parties along with further levy of the Liquidated Damages equivalent to the stipulated ‘Performance Security’, which shall be recoverable from contractor’s pending/future dues with IR in any of the ongoing/future contracts.
- 7.1.3 In the event the Contractor fails to provide the Performance Security within 30 (Thirty) days of the issue of LOA as provided in Clause 7.1.1 above, the Contractor may seek extension of time for a period not exceeding a further 30 (Thirty) days on payment of damages for such extended period equivalent to a sum calculated at the rate of 0.002% (zero point zero zero two percent) of the Contract Price for each day of delay until the Performance Security is provided.

#### 7.2 Extension of Performance Security

The Contractor may initially provide the Performance Security for a period of [2 (two) years]; provided that it shall procure the extension of the validity of the Performance Security, as necessary, at least 2 (two) months prior to the date of expiry thereof. Upon the Contractor providing an extended Performance Security, the previous Performance Security shall be deemed to be released and the Authority shall return the same to the Contractor within a period of 7 (seven) business days from the date of submission of the extended Performance Security.

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<sup>12</sup> It is different from Retention Money.

### **7.3 Appropriation of Performance Security**

- 7.3.1 Upon occurrence of a Contractor Default, the Authority shall, without prejudice to its other rights and remedies hereunder or in law, be entitled to encash and appropriate from the Performance Security the amounts due to it as Damages for the Contractor Default.
- 7.3.2 Upon such encashment and appropriation from the Performance Security, the Contractor shall, within 30 (thirty) days thereof, replenish, in case of partial appropriation, to its original level the Performance Security, and in case of appropriation of the entire Performance Security provide a fresh Performance Security, as the case may be, and the Contractor shall, within the time so granted, replenish or furnish fresh Performance Security as aforesaid failing which the Authority shall be entitled to terminate the Agreement in accordance with Article 21. Upon such replenishment or furnishing of a fresh Performance Security, as the case may be, the Contractor shall be entitled to an additional Cure Period of 30 (thirty) days for remedying the Contractor Default, and in the event of the Contractor not curing its default within such Cure Period, the Authority shall be entitled to encash and appropriate such Performance Security as Damages, and to terminate this Agreement in accordance with Article 21.

### **7.4 Release of Performance Security**

The Authority shall release the Performance Security within 60 (sixty) days of the expiry of the Defects Liability Period or the extended Defects Liability Period, as the case may be, under this Agreement. Notwithstanding the aforesaid, the Parties agree that the Authority shall not be obliged to release the Performance Security until all Defects identified during the Defects Liability Period or the extended Defects Liability Period, as the case may be, have been rectified.

### **7.5 Retention Money<sup>13</sup>**

- 7.5.1 From every payment for Works due to the Contractor in accordance with the provisions of Clause 17.5, the Authority shall deduct 6% (six per cent) thereof as guarantee money for performance of the obligations of the Contractor during the Construction Period (the “**Retention Money**”) subject to the condition that the maximum amount of Retention Money shall not exceed 5% (five per cent) of the Contract Price.
- 7.5.2 Upon occurrence of a Contractor’s Default, the Authority shall, without prejudice to its other rights and remedies hereunder or in law, be entitled to appropriate the relevant amounts from the Retention Money as Damages for such Contractor’s Default.
- 7.5.3 The Contractor may, upon furnishing an irrevocable and unconditional bank guarantee substantially in the form provided at Annex-II of Schedule-F, require the Authority to refund the Retention Money deducted by the Authority under the provisions of Clause 7.5.1. Provided that the refund hereunder shall be made in tranches of not less than 0.5% (zero point five percent) of the Contract Price. Further, the Retention money may be deposited as Bank Guarantee, issued by Scheduled commercial Bank after signing of Contract Agreement, but before payment of first payment bill. Provided further that validity of Bank Guarantee shall be extended from time to time depending upon extension of Contract granted.
- 7.5.4 Within 15 (fifteen) days of the date of issue of the Completion Certificate, the Authority shall discharge the bank guarantees, if any, furnished by the Contractor under the provisions of Clause 7.5.3 and refund the balance of Retention Money remaining with the Authority after adjusting the amounts appropriated under the provisions of Clause 7.5.2 and the amounts refunded under the provisions of Clause 7.5.3.

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<sup>13</sup> This is different from Performance Security

7.5.5 The Parties agree that in the event of Termination of this Agreement, the Retention Money and the bank guarantees specified in this Clause 7.5 shall be treated as if they are Performance Security and shall be reckoned as such for the purposes of Termination Payment under Clause 21.6.

## **7.6 Maintenance Security**

### **7.6.1 Maintenance Security**

7.6.1.1 The Contractor shall, for the performance of its obligations hereunder between the date of completion of Defects Liability Period and the Completion of Maintenance Period, provide to the Authority, no later than 30 (thirty) days prior to the completion of Defects Liability Period, an irrevocable and unconditional guarantee from a Bank for a sum equivalent to 5% of Capital cost of [KAVACH] equipment substantially in the form set forth in Schedule-F, Annex-I (the “**Maintenance Security**”), to be modified, mutatis mutandis, for this purpose. Until such time the Maintenance Security is provided by the Contractor pursuant hereto and the same comes into effect, the Performance Security shall remain in force and effect, the Performance Security shall remain in force and effect, and upon such provision of the Maintenance Security pursuant hereto, the Authority shall release the Performance Security to the Contractor.

7.6.1.2 Notwithstanding anything to the contrary contained in this Agreement, in the event Maintenance Security is not provided by the Contractor within the period specified in Clause 7.6.1.1, such failure shall be entitled to be a Contractor’s Default and the Authority shall be entitled to encash the Performance Security and appropriate the proceeds thereof as Damages, in accordance with the provisions of Clause 7.4.

### **7.6.2 Appropriation of Maintenance Security**

Upon occurrence of a Contractor Default, the Authority shall, without prejudice to its other rights and remedies hereunder or in law, be entitled to encash and appropriate the Maintenance Security as Damages for such Contractor Default and to terminate this Agreement in accordance with Article 21.

### **7.6.3 Release of Maintenance Security**

Subject to the Contractor not being in default under this Agreement, the Authority shall, no later than 30 (thirty) days from the Date of Completion of Maintenance Period, release the Maintenance Security.

7.6.4 The Parties expressly agree that the Contractor may furnish Maintenance Security valid for 2 (two) years at a time; provided that the Contractor shall, 2 (two) months prior to the expiry of such Maintenance Security, submit a new Maintenance Security valid for a further period of 2 (two) years and repeat the process hereunder until expiry of the Maintenance Period.



ARTICLE 8  
**RIGHT OF WAY**

**8.1 The Site**

The site of the Railway Project (the “**Site**”) shall comprise the site described in Schedule-A in respect of which the Right of Way shall be provided by the Authority to the Contractor. The Authority shall be responsible for:

- (a) acquiring and providing Right of Way on the Site in accordance with the Tower Site Plan as per RDSO/third party approved drawings as proposed by RDSO shortlisted firms for 4G LTE-R finalised by the Authority and attached with this document, free from all encroachments and encumbrances, and free access thereto for the execution of this Agreement;

This Right of Way will not include completely free access to locations where working may affect safety of train traffic (i.e. relay room, OFC huts, telecom equipment room, locations boxes, track crossings, existing cable path etc). In such cases, right of work will be arranged by the Authority Engineer on written request made by contractor at least 7 days in advance, if such request is reasonable.

**8.2 Handing over of the Project Site**

- 8.2.1 The Authority Representative and the Contractor shall, within 15 (fifteen) days of providing the Performance Security by the Contractor in accordance with the provisions of Clause 7.1, jointly inspect the Site and prepare a joint memorandum containing an inventory of the Site including the vacant and unencumbered land, buildings, structures, road/ railway works, trees and any other immovable property on or attached to the Site. Subject to the provisions of Clause 8.2.3, such memorandum shall have appended thereto an Appendix (the “**Appendix**”) specifying in reasonable detail those parts of the Site to which vacant access and Right of Way has not been given to the Contractor. Signing of the memorandum, in 2 (two) counterparts (each of which shall constitute an original), by the authorised representatives of the Parties shall be deemed to constitute valid evidence of handing over of the Right of Way to the Contractor for discharging its obligations under and in accordance with the provisions of this Agreement and for no other purpose whatsoever.

For the avoidance of doubt, the Parties agree that subject to the provisions of Clauses 8.2.2 and 8.2.3, whenever the Authority is ready to provide Right of Way for any part or parts of the Site included in the “**Appendix**”, it shall by notice inform the Contractor, of the proposed date and time when the Authority Representative and the Contractor shall inspect the specified parts of the Site, and prepare a memorandum which shall be deemed to constitute a valid evidence of handing over of such Right of Way to the Contractor in accordance with the provisions of this Clause 8.2.1.

- 8.2.2 Notwithstanding anything to the contrary contained in this Clause 8.2, the Authority shall specify the parts of the Site, if any, for which Right of Way shall be provided to the Contractor on the dates specified in Schedule-A. Such parts shall also be included in the Appendix prepared in pursuance of Clause 8.2.1. For the avoidance of doubt, the Parties expressly agree that the Appendix shall in no event contain Sections of the Railway

Project the cumulative length of which exceeds 5% (Five per cent) of the core land length and 10% (Ten percent) of the non-core land length of the Railway Project.

- 8.2.3 The Authority shall provide the Right of Way to the Contractor, in respect of the land included in the Appendix, by the date specified in Schedule-A for each part of the Site referred to therein, but in no case later than 180 (one hundred and eighty) days of the Appointed Date, and in the event of delay for any reason other than Force Majeure or breach of this Agreement by the Contractor, it shall pay to the Contractor, Damages in a sum calculated in accordance with Clause 8.3.

### **8.3 Damages for delay in handing over the Site**

- 8.3.1 In the event the Right of Way to any part of the Site is not provided by the Authority on or before the date(s) specified in Clause 8.2 for any reason other than Force Majeure or breach of this Agreement by the Contractor, the Authority shall pay Damages to the Contractor in a sum calculated in accordance with the following formula for and in respect of those parts of the core land to which the Right of Way has not been provided:

Amount of Damages in Rs. per day per km = 0.001% of Contract Price

In the event that any Damages are due and payable to the Contractor under the provisions of this Clause 8.3.1 for delay in providing the Right of Way, the Contractor shall, subject to the provisions of Clause 10.4, be entitled to Time Extension equal to the period for which the Damages have become due and payable under this Clause 8.3.1, save and except that:

- (a) if any delays involve time overlaps, the overlaps shall not be additive; and
- (b) such Time Extension shall be restricted only to the Works which are affected by the delay in providing the Right of Way.

For the avoidance of doubt, the Parties expressly agree that the Damages specified hereunder and the Time Extension specified in Clause 10.4 shall be restricted only to failure of the Authority to provide the Right of Way for and in respect of the width of the Site required for Works in accordance with the Good Industry Practice.

- 8.3.2 Notwithstanding anything to the contrary contained in this Agreement, the Contractor expressly agrees that Works on all parts of the Site for which Right of Way is granted within 180 (one hundred and eighty) days of the Appointed Date, or with respect to the parts of the Site provided in Schedule-A, no later than the date(s) specified therein, as the case may be, shall be completed before the Scheduled Completion Date and shall not qualify for any Time Extension under the provisions of Clause 8.3.1.
- 8.3.3 Notwithstanding anything to the contrary contained in this Agreement, the Authority may at any time withdraw any part of the Right of Way and the Works forming part of this Agreement, subject to such Works not exceeding an aggregate value, such value to be determined in accordance with Schedule-G, equal to 5% (five per cent) of the Contract Price.

Provided that if Right of Way has not been provided within 240 (two hundred and forty) days of the Appointed Date, for commencing construction on any part of the Site included in the Appendix, the affected Works shall be deemed to be withdrawn under the provisions of this Clause 8.3.3 unless the Parties agree to the contrary, and such Works shall not be computed for the purposes of the aforesaid ceiling of 5% (five per

cent) of the Contract Price hereunder. For the avoidance of doubt, the Parties agree that such deemed withdrawal of Works hereunder shall be without prejudice to the Contractor's entitlement to Damages under Clauses 4.1.4, 8.3 and 9.2.

- 8.3.4 In the event of withdrawal of Works under Clause 8.3.3, including deemed withdrawal of Works, the Contract Price shall be reduced by an amount equal to 95% (ninety five per cent) of the value of the Works withdrawn and the Contractor shall not be entitled to any other compensation or Damages for the withdrawal of Works, including their deemed withdrawal, save and except for Damages as provided under Clause 4.3.

Provided that if any Works are withdrawn after commencement of the Construction of such Works, the Authority shall pay to the Contractor 100% (one hundred) of the fair value of the work done, as assessed by the Authority Engineer:

#### **8.4 Site to be free from Encumbrances**

Subject to the provisions of Clause 8.2, the Site shall be made available by the Authority to the Contractor pursuant hereto free from all Encumbrances and occupations and without the Contractor being required to make any payment to the Authority on account of any costs, compensation, expenses and charges for the acquisition and use of such Site for the duration of the Project Completion Schedule. For the avoidance of doubt, it is agreed that the existing rights of way, easements, privileges, liberties and appurtenances to the Site shall not be deemed to be Encumbrances. It is further agreed that, unless otherwise specified in this Agreement, the Contractor accepts and undertakes to bear any and all risks arising out of the inadequacy or physical condition of the Site.

#### **8.5 Protection of Site from encroachments**

On and after signing the memorandum and/or subsequent memorandum referred to in Clause 8.2.1, and until the issue of the Provisional Certificate, the Contractor shall maintain a round-the-clock vigil over the Site and shall ensure and procure that no encroachment thereon takes place. During the Construction Period, the Contractor shall protect the Site from any and all occupations, encroachments or Encumbrances, and shall not place or create nor permit any Sub-contractor or other person claiming through or under the Agreement to place or create any Encumbrance or security interest over all or any part of the Site or the Project Assets, or on any rights of the Contractor therein or under this Agreement, save and except as otherwise expressly set forth in this Agreement. In the event of any encroachment or occupation on any part of the Site, the Contractor shall report such encroachment or occupation forthwith to the Authority and undertake its removal at its own cost and expenses.

#### **8.6 Special/temporary Right of Way**

The Contractor shall bear all costs and charges for any special or temporary right of way required by it in connection with access to the Site. The Contractor shall obtain at its cost such facilities on or outside the Site as may be required by it for the purposes of the Railway Project and the performance of its obligations under this Agreement.

#### **8.7 Access to the Authority and the Authority Engineer**

- 8.7.1 The Right of Way given to the Contractor hereunder shall always be subject to the right of access of the Authority and the Authority Engineer and their employees and agents

for inspection, viewing and exercise of their rights and performance of their obligations under this Agreement.

- 8.7.2 The Contractor shall ensure, subject to all relevant safety procedures, that the Authority has unrestricted access to the Site during any Emergency.

## **8.8 Geological and archaeological finds**

It is expressly agreed that mining, geological or archaeological rights do not form part of this Agreement with the Contractor for the Works, and the Contractor hereby acknowledges that it shall not have any mining rights or interest in the underlying minerals, fossils, antiquities, structures or other remnants or things either of particular geological or archaeological interest and that such rights, interest and property on or under the Site shall vest in and belong to the Authority or the concerned Government Instrumentality. The Contractor shall take all reasonable precautions to prevent its workmen or any other person from removing or damaging such interest or property and shall inform the Authority forthwith of the discovery thereof and comply with such instructions as the Authority or the concerned Government Instrumentality may reasonably give for the removal of such property. For the avoidance of doubt, it is agreed that any reasonable expenses incurred by the Contractor hereunder shall be reimbursed by the Authority. It is also agreed that the Authority shall procure that the instructions hereunder are issued by the concerned Government Instrumentality within a reasonable period.

**ARTICLE 9**  
**UTILITIES AND TREES**

**9.1 Existing utilities and roads**

Notwithstanding anything to the contrary contained herein, the Contractor shall ensure that the respective entities owning the existing roads, right of way, level crossings, structures, or utilities on, under or above the Site are enabled by it to keep them in continuous satisfactory use, if necessary, by providing suitable temporary diversions with the authority of the controlling body of that road, right of way or utility.

9.1.1 Not Applicable

9.1.2 Not Applicable

9.1.3 Not Applicable

**9.2 Shifting of obstructing utilities**

9.2.1 The Contractor shall, in accordance with Applicable Laws and with the proactive support & assistance of the Authority, cause shifting of any utility (including electric lines, water pipes and telephone cables) to an appropriate location or alignment, if such utility or obstruction adversely affects/ infringes the execution of Works in accordance with this Agreement. The actual cost of shifting/relocation of such utilities, as approved and communicated/demanded by the entity owning such utility, shall be paid by the Authority directly to the entity. In the event of any delay in such shifting by the entity owning the utility beyond a period of 180 (one hundred and eighty) days from the date of notice by the Contractor to the entity owning the utility and to the Authority, the Contractor shall be entitled to Damages in a sum calculated in accordance with the formula specified in Clause 8.3.1 for the period of delay, and to Time Extension in accordance with Clause 10.4 for and in respect of the part(s) of the Works affected by such delay; provided that if the delays involve any time overlaps, the overlaps shall not be additive.

9.2.2 For the existing utilities owned by Railways, where the shifting thereof can take place only after certain works for enabling its shifting have been completed by the Contractor, the Authority shall, undertake and complete its shifting within 180 (one hundred and eighty) days after the Contractor has notified the Authority of the completion of the enabling works. In the event of delay in shifting the utility, beyond the aforesaid period of 180 (one hundred and eighty) days, the Contractor shall be entitled to Damages for the period of delay in accordance with the provisions of this Clause 9.2.1.

9.2.3 The utilities which are not to be diverted, proper supporting to be done to prevent any damage. No payment shall however be made for supporting and protecting the utilities during execution of the work. All temporary diversion of any utilities done to facilitate the construction activity shall be the part of the schedule G.

**9.3 New utilities**

9.3.1 The Contractor shall allow, subject to such conditions as the Authority may specify, access to, and use of the Site for laying telephone lines, water pipes, electric cables or other public utilities. Where such access or use causes any financial loss to the

Contractor, it may require the user of the Site to pay compensation or damages as per Applicable Laws. For the avoidance of doubt, it is agreed that use of the Site under this Clause 9.3 shall not in any manner relieve the Contractor of its obligation to construct and maintain the Railway Project in accordance with this Agreement and any damage caused by such use shall be restored forthwith at the cost of the Authority.

- 9.3.2 In the event the construction of any Works is affected by a new utility or works undertaken in accordance with this Clause 9.3, the Contractor shall be entitled to a reasonable Time Extension in accordance with Clause 10.4 for and in respect of the part(s) of the Works affected by such delay; provided that if the delays involve any time overlaps, the overlaps shall not be additive.

#### **9.4 Felling of trees**

The Authority shall obtain the Applicable Permits for felling of trees to be identified by the Authority for this purpose if and only if such trees cause a Material Adverse Effect on the construction of the Railway Project. The cost of such felling and of the compensatory plantation of trees, if any, shall be borne by the Authority. In the event of any delay in felling thereof for reasons beyond the control of the Contractor; it shall be excused for failure to perform any part of its obligations hereunder if such failure is a direct consequence of delay in the felling of trees. The Parties hereto agree that the felled trees shall be deemed to be owned by the Authority and shall be disposed in such manner and subject to such conditions as the Authority may in its sole discretion deem appropriate. For the avoidance of doubt, the Parties agree that if any felling of trees hereunder is in a forest area, the Applicable Permit thereof shall be procured by the Authority within the time specified in the Agreement; and for any period of delay in providing the Applicable Permits, the Contractor shall be entitled to Damages and Time Extension as provided under Clause 9.2.1.

## ARTICLE 10

### DESIGN AND CONSTRUCTION OF THE RAILWAY PROJECT

#### 10.1 Obligations prior to commencement of Works

10.1.1 Within 20 (twenty) days of the Appointed Date, the Contractor shall:

- (a) appoint its representative, duly authorised to deal with the Authority in respect of all matters under or arising out of or relating to this Agreement;
- (b) appoint a design director (the “**Design Director**”) who will head the Contractor’s design unit and shall be responsible for surveys, investigations, collection of data, and preparation of preliminary and detailed designs;
- (c) undertake and perform all such acts, deeds and things as may be necessary or required before commencement of Works under and in accordance with this Agreement, Applicable Laws and Applicable Permits; and
- (d) make its own arrangements for quarrying and procurement of materials needed for the Railway Project under and in accordance with Applicable Laws and Applicable Permits.

10.1.2 The Authority shall, within 15 (fifteen) days of the date of this Agreement, appoint an engineer (the “**Authority Engineer**”) to discharge the functions and duties specified in this Agreement, and shall notify to the Contractor the name, address and the date of appointment of the Authority Engineer forthwith.

10.1.3 Within 30 (thirty) days of the Appointed Date, the Contractor shall submit to the Authority and the Authority Engineer a programme/CPM Charts & Bar Charts (the “**Programme**”) for construction of Works, developed using networking techniques and giving the following details:

*Part I* Contractor’s organisation for the Project, the project execution plan indicating arrangements for design and construction i.e. engagement of design consultants, project phasing and sub-contracting etc., environmental management plan, Quality Assurance Plan including design quality plan, traffic management and safety plan covering safety of users and workers during construction, Contractor’s key personnel, and equipment.

*Part II* Programme for completion of all stages of construction given in Schedule-G and Project Milestones of the Works as specified in Project Completion Schedule set forth in Schedule-I. The Programme shall include:

- (a) the order in which the Contractor intends to carry out the Works, including the anticipated timing of design and stages of Works;
- (b) the periods for reviews under Clause 10.2; and
- (c) the sequence and timing of inspections and tests specified in this Agreement.

The Contractor shall submit a revised programme whenever the previous programme is inconsistent with the actual progress or with the Contractor's obligations.

*Part III Monthly cash flow forecast for the Project*

Provided, however, that the Authority may, within a period of 21 (twenty-one) days of receipt of the Programme, convey its comments to the Contractor stating the modifications, if any, required for compliance with the provisions of this Agreement, and the Contractor shall carry out such modifications, to the extent required for conforming with the provisions of this Agreement.

- 10.1.4 The Contractor shall plan the project work by keeping Schedule-G and Schedule-G1 into consideration in order to maximise the cash flow and progress. However the Authority Engineer may modify/break up any of the stage payment schedule (payment milestones) during execution if the same is considered essential to speed up the progress or if the contractor is not able to achieve a particular payment milestone due to the reasons/delays attributable to the Authority or due to the factors beyond the control of Contractor or to any unforeseen circumstances.
- 10.1.5 Procurement of items should be planned by the Contractor in consultation with the Authority Engineer. Procurement plan should be prepared in such a manner that those materials which have limited shelf life may be procured in a staggered manner so that materials are utilised/consumed well before its expiry. If the material/product does not remain of required specifications at the time of its actual use, the same will be replaced by the Contractor with materials conforming to Specifications at his own cost.

## **10.2 Design and Drawings**

- 10.2.1 Design and Drawings shall be developed in conformity with the Specifications and Standards set forth in Schedule-D. In the event, the Contractor requires any relaxation in design standards due to restricted Right of Way in any section or unforeseen issues, the alternative design criteria for such section shall be provided for review/approval of the Authority Engineer.
- 10.2.2 The Contractor shall appoint a proof checking consultant at its cost (the "**Proof Consultant**"). Contractor shall submit the panel of 3 names within 30 days of Appointed date to the Authority Engineer. After proposing to the Authority a panel of 3 (three) names of qualified, reputed and experienced firms and Authority will select one Proof Consultant from the above panel, provided, however, that if none of the name proposed in the panel is acceptable to the Authority and the reasons for the same are furnished to the Contractor, the Contractor shall propose to the Authority a revised panel of 3 (three) more names for obtaining the consent of the Authority. The Contractor shall also obtain the consent of the Authority for two key personnel of the Proof Consultant who shall have adequate experience and qualifications with respect to the main components of the Railway Project. The Authority shall, within 30 (thirty) days of receiving a panel from the Contractor, either convey its decision with reasons, to the Contractor, and if no such decision is conveyed within the said period, the Contractor may proceed with engaging of the Proof Consultant of its own choice. For the avoidance of doubt, the Parties agree that no firm or person having any conflict of interest shall be engaged for this purpose. The Parties further agree that any assignments completed at least three years prior to the appointment hereunder shall not be reckoned for the purposes of conflict of interest.



10.2.3 The Proof Consultant shall:

- (a) evolve a systems approach with the Design Director so as to minimise the time required for approval of final designs and construction drawings; and
- (b) examine the designs expeditiously and wherever necessary raise observations/ seek clarifications etc. as deemed appropriate and refer back the drawings within 15 days for rectifications/clarifications, and finally proof check and endorse/counter-sign the detailed calculations, drawings and designs, which have been approved by the Design Director.

10.2.4 In respect of the Signalling Interlocking Plan, Kavach control table and other relevant documents like RFID Tag Layout, etc., the following shall apply:

- (a) Signalling Interlocking Plan, Kavach control chart and other relevant documents like RFID Tag Layout, etc.
- (i) The Contractor shall prepare and submit to the Authority Engineer all Kavach control charts and RFID Tag plan conforming to the ESP / SIPs of Automatic and block stations, PSRs, within a period of 3 (three) months from the Appointed Date;
- (ii) The Authority Engineer shall review the Kavach control chart within two weeks and submit it with its comments to the Authority for its approval; and
- (iii) The Authority shall communicate the Kavach control chart as approved by it within a period not exceeding 2 (two) months from the date of submission of the Kavach control chart by the Contractor. Such period of two months shall exclude any time that is taken by the Contractor in providing clarifications or modifications in response to any communication from the Authority.

10.2.5 In the event of delay by the Contractor in submitting KCC as the case may be, within the period specified in Clause 10.2.4 for any reason other than Force Majeure or the delay attributable to the Authority, the Contractor shall pay Damages to the Authority in a sum equal to 0.001% (zero point zero zero one percent) of the Contract Price for each day of delay.

10.2.6 In the event of delay by the Authority in providing to the Contractor the approved Kavach control chart, within the period specified in Clause 10.2.4 for any reason other than Force Majeure or breach of this Agreement by the Contractor, the Authority shall pay Damages to the Contractor in a sum equal to 0.001% (zero point zero zero one percent) of the Contract Price for each day of delay, and shall also grant Time Extension in accordance with the provisions of Clause 10.4.

10.2.7 In regard to Contractor's obligations with respect to the design and Drawings of the Railway Project as set forth in Schedule-H, the following shall apply:

- (a) The Contractor shall prepare and submit, with reasonable promptness and in such sequence as is consistent with the Project Completion Schedule, 3 (three) copies each of the design and necessary Drawings, duly approved/signed by the Design Director and certified/signed by the Proof Consultant, to the Authority Engineer for review. Provided, however, that in respect of Important Bridges, Major Bridges, Structures, railway stations and yards, the Authority Engineer may

require additional drawings for its review in accordance with Good Industry Practice;

- (b) by submitting the Drawings for review to the Authority Engineer, the Contractor shall be deemed to have represented that it has determined and verified that the design and Drawings are in conformity with stipulated Specifications and Standards, the Applicable Laws, statutory stipulations and Good Industry Practice;
- (c) within 21 (twenty one) days of the receipt of the Drawings, the Authority Engineer shall review the same and convey its observations to the Contractor with particular reference to their conformity or otherwise with the Scope of the Project and the Specifications and Standards. Beyond the said period of 21 (twenty one) days, the Contractor shall not be obliged to await the observations of the Authority Engineer on the Drawings submitted pursuant hereto and may begin or continue Works at its own discretion and risk; Provided, however, that in case of Important Bridges, Major Bridges, Structures, interlocking and telecom switching equipment and any other specified item the aforesaid period of 21 (twenty one) days may be extended as per the time limit as indicated in Annexure-II of Schedule-D;
- (d) if the aforesaid observations of the Authority Engineer indicate that the Drawings are not in conformity with the Scope of the Project or the Specifications and Standards, such Drawings shall be revised by the Contractor in conformity with the provisions of this Agreement and resubmitted to the Authority Engineer for review. The Authority Engineer shall give its observations, if any, within 10 (ten) days of receipt of the revised Drawings. In the event the Contractor fails to revise and resubmit such Drawings to the Authority Engineer for review as aforesaid, the Authority Engineer may cause the payment for the affected works to be withheld under and in accordance with the provisions of Clause 17.5.4. If the Contractor disputes any decision, direction or determination of the Authority Engineer hereunder, the Dispute shall be resolved in accordance with the Dispute Resolution Procedure;
- (e) no review and/or observation of the Authority Engineer and/or its failure to review and/or convey its observations on any Drawings shall relieve the Contractor of its obligations and liabilities under this Agreement in any manner nor shall the Authority Engineer or the Authority be liable for the same in any manner; and if errors, omissions, ambiguities, inconsistencies, inadequacies or other Defects are found in the Drawings, they shall, along with the affected Works, be corrected at the Contractor's cost, notwithstanding any review under this Article 10;
- (f) the Contractor shall be responsible for delays in submitting the Drawings, as set forth in Schedule-H, caused by reason of delays in surveys and field investigations, and shall not be entitled to seek any relief in respect thereof from the Authority; and
- (g) the Contractor warrants that its designers, including any third parties engaged by it, shall have the required experience and capability in accordance with Good Industry Practice and it shall indemnify the Authority against any damage, expense, liability, loss or claim, which the Authority might incur, sustain or be subject to arising from any breach of the Contractor's design responsibility and/or warranty as set out in this Clause.

- 10.2.8 Any cost or delay in construction arising from the review by the Authority Engineer shall be borne by the Contractor.
- 10.2.9 Works shall be executed in accordance with the Drawings provided by the Contractor in accordance with the provisions of this Clause 10.2 and the observations of the Authority Engineer thereon as communicated pursuant to the provisions of Clause 10.2.7. Such Drawings shall not be amended or altered without prior written notice to the Authority Engineer. If a Party becomes aware of an error or defect of a technical nature in the design or Drawings, that Party shall promptly give notice to the other Party of such error or defect.
- 10.2.10 Within 90 (ninety) days of the Project Completion Date, the Contractor shall furnish to the Authority and the Authority Engineer a complete set of as-built Drawings, in 2 (two) hard copies and in its editable digital format or in such other medium or manner as may be acceptable to the Authority, including an as-built survey illustrating the layout of the Railway Project and setback lines, if any, of the buildings and structures forming part of Project Facilities, and shall hand them over to the Authority against receipt thereof.
- 10.2.11 The Contractor shall also appoint a safety consultant (the “**Safety Consultant**”), Contractor shall submit the panel within 30 days of Appointed date to the Authority Engineer. after proposing to the Authority a panel of 3 (three) names of qualified and experienced consultants having minimum 10 years’ experience in ensuring safety at work site from whom the Authority may choose 1 (one) to be the Safety Consultant. Provided, however, that if the panel is not acceptable to the Authority and the reasons for the same are furnished to the Contractor, the Contractor shall propose to the Authority a revised panel of 3 (three) names for obtaining the consent of the Authority. The Contractor shall also obtain the consent of the Authority for additional two key personnel of the Safety Consultant who shall have at least 5 years experience in ensuring safety at work site. The Authority shall, within 15 (fifteen) days of receiving a proposal from the Contractor hereunder, convey its decision, with reasons, to the Contractor, and if no such decision is conveyed within the said period, the Contractor may proceed with engaging of the Safety Consultant. The Safety Consultant shall:
- (a) evolve a system approach for undertaking a safety audit of the Railway Project during construction phase; and
  - (b) proof check the detailed safety plan covering all aspects of including safety of Users, workers and equipment.
  - (c) appraise the authority of the progress of various activities under his scope with monthly reports
  - (d) issue activity completion certificate for each activity and one final completion certificate declaring the fitness for antenna / eNode B loading.
  - (e) The scope of the Safety Consultant at various stages is defined as given below:

S.No.	Stage	Scope of Scope Consultant
1	Finalisation of tower locations	Nil
2	Soil Testing	Shall check and certify the documentary evidences of soil testing.
3	Tower foundation – First stage which is PCC completion	Shall check and certify safety precautions exercised, depth of excavation for foundation, quality of cement and other items, workmanship.
4	Tower foundation – Second Stage which is casting of columns	Shall check and certify safety precautions exercised, bar bending, quality of cement and other items, workmanship.
5	Tower foundation – Third Stage which is casting of columns, CIP fixing, back filling	Shall check and certify safety precautions exercised, quality of cement, CIP fixing and other items, workmanship.
6	Tower Erection	Shall check and certify verticality and tightness of members, workmanship.
7	Tower Antenna Bracket Fixing	Shall check and certify the fixing arrangements and issue final completion certificate declaring for fitness for antenna / eNodeB loading.
8	Proposal of pile foundation for tower construction	Shall assess the site specific requirement and recommend the site requirements to the Authority.
9	Proposal of tower construction in cyclonic area as per IS 875 (Part 3) : 2015 or latest.	Shall assess the site specific requirement and recommend the site requirements to the Authority.
10	Proposal of alternate drawings to RDSO approved tower designs	Shall scrutinise the application submitted by the Contractor and submit the same to the Authority.

### 10.3 Construction of the Railway Project

10.3.1 The Contractor shall construct the Railway Project as specified in Schedule-B and Schedule-C, and in conformity with the Specifications and Standards set forth in Schedule-D. The Contractor shall be responsible for the correct positioning of all parts of the Works, and shall rectify any error in the positions, levels, dimensions or alignment of the Works. For works involving existing yards, the non-interlocking programme for each yard shall be drawn by the Authority Engineer and provided to the

Contractor. The Contractor and the Authority Engineer, within a period of 30 days, will discuss the same and issue a jointly agreed NI programme. The execution of work during the non-interlocking period will be the responsibility of the Contractor. The work during non-interlocking period in yards will be executed directly under the supervision of Railways, however, the timely completion of NI working will be the responsibility of the Contractor. **The 900<sup>th</sup> (Nine Hundred day) from the Appointed Date shall be the scheduled completion date** (the “**Scheduled Completion Date**”) and the Contractor agrees and undertakes that the construction shall be completed on or before the Scheduled Completion Date, including any extension thereof, in which case the Scheduled Completion Date will be the extended date as per the time extension granted.

10.3.2 The Contractor shall construct the Railway Project in accordance with the Project Completion Schedule set forth in Schedule-I. In the event that the Contractor fails to achieve any Project Milestone or the Scheduled Completion Date within a period of 30 (thirty) days from the date set forth in Schedule-I, unless such failure has occurred due to Force Majeure or for reasons attributable to the Authority, it shall pay Damages to the Authority in a sum calculated at the rate of 0.05% (zero point zero five per cent) of the Contract Price for delay of each day reckoned from the date specified in Schedule - I and until such Project Milestone is achieved or the Works are completed; provided that if the period for any or all Project Milestones or the Scheduled Completion Date is extended in accordance with the provisions of this Agreement, the dates set forth in Schedule-I shall be deemed to be modified accordingly and the provisions of this Agreement shall apply as if Schedule-I has been amended as above; provided further that in the event the Works are completed within or before the Scheduled Completion Date including any Time Extension, the Damages paid under this Clause 10.3.2 shall be refunded by the Authority to the Contractor, but without any interest thereon. For the avoidance of doubt, it is agreed that recovery of Damages under this Clause 10.3.2 shall be without prejudice to the rights of the Authority under this Agreement including the right of Termination thereof. The Parties further agree that Time Extension hereunder shall only be reckoned for and in respect of the affected Works as specified in Clause 10.4.2.

10.3.3 The Authority shall notify the Contractor of its decision to impose Damages in pursuance of the provisions of this Clause 10.3. Provided, however, that no deduction on account of Damages shall be affected by the Authority without taking into consideration the representation, if any, made by the Contractor within 20 (twenty) days of such notice. The Parties expressly agree that the total amount of Damages under Clause 10.3.2 shall not exceed 10% (ten percent) of the Contract Price.

10.3.4 Certain works, which are executed in the vicinity of running track, may require prior sanction of Commissioner of Railway Safety (CRS) before execution of such works are taken up by the Contractor. Authority Engineer will advise such works to the Contractor. The Contractor shall be responsible to prepare and submit applications to Authority Engineer for obtaining sanction of CRS at least 60 (sixty) days in advance of commencing a work that requires prior sanction of CRS.

#### **10.4 Extension of time for completion**

10.4.1 Without prejudice to any other provision of this Agreement for and in respect of extension of time, the Contractor shall be entitled to extension of time in the Project Completion Schedule (the “**Time Extension**”) to the extent that completion of any Project Milestone is or will be delayed by any of the following, namely:

- (a) delay in providing the Right of Way, approval of Kavach design documentation in accordance with the provisions of this Agreement;
- (b) Change of Scope, unless an adjustment to the Scheduled Completion Date has been agreed under Article 13;
- (c) occurrence of a Force Majeure Event;
- (d) any delay, impediment or prevention caused by or attributable to the Authority, the Authority's personnel or the Authority's other contractors on the Site; and
- (e) any other cause or delay which entitles the Contractor to Time Extension in accordance with the provisions of this Agreement.

10.4.2 The Contractor shall, no later than 30 (thirty) business days from the occurrence of an event or circumstance specified in Clause 10.4.1, inform the Authority Engineer by notice in writing, with a copy to the Authority, stating in reasonable detail with supporting particulars, the event or circumstances giving rise to the claim for Time Extension in accordance with the provisions of this Agreement. Provided that the period of 15 (fifteen) business days shall be calculated from the date on which the Contractor became aware, or should have become aware, of the occurrence of such an event or circumstance.

Provided further that notwithstanding anything to the contrary contained in this Agreement, Time Extension shall be due and applicable only for the Works which are affected by the aforesaid events or circumstances and shall not in any manner affect the Project Completion Schedule for and in respect of the Works which are not affected thereby.

10.4.3 In the event of the failure of the Contractor to issue to the Authority Engineer a notice in accordance with the provisions of Clause 10.4.2 within the time specified therein, the Contractor shall not be entitled to any Time Extension and shall forfeit its right for any such claims in future. For the avoidance of doubt, in the event of failure of the Contractor to issue notice as specified in this Clause 10.4.3, the Authority shall be discharged from all liability in connection with the claim.

10.4.4 The Authority Engineer shall, on receipt of a claim in accordance with the provisions of Clause 10.4.2, examine the claim expeditiously within the time frame specified herein. In the event the Authority Engineer requires any clarifications to examine the claim, the Authority Engineer shall seek the same within 15 (fifteen) days from the date of receiving the claim. The Contractor shall, on the receipt of the communication of the Authority Engineer requesting for clarification, furnish the same to the Authority Engineer within 10 (ten) days thereof. The Authority Engineer shall, within a period of 30 (thirty) days from the date of receipt of such clarifications, forward in writing to the Contractor its determination of Time Extension. For the avoidance of doubt, the Parties agree that the Authority Engineer shall, in accordance with the provisions of this Agreement, notify the Contractor of the aforesaid Time Extension no later than 30 (thirty) days from the date of receipt of the Contractor's claim for Time Extension or the date of receipt of the clarification from the Contractor, as the case may be.

Provided that when determining each extension of time under this Clause 10.4, the Authority Engineer shall review previous determinations and may increase, but shall not decrease, the total Time Extension.

10.4.5 If the event or circumstance giving rise to the notice has a continuing effect:

- (a) the detailed claim shall be considered as interim;
- (b) the Contractor shall, no later than 10 (ten) days after the close of each month, send further interim claims specifying the accumulated delay, the extension of time claimed, and such further particulars as the Authority Engineer may reasonably require; and
- (c) the Contractor shall send a final claim within 30 (thirty) days after the effect of the event or the circumstance ceases.

Upon receipt of the claim hereunder, the Authority Engineer shall examine and determine the same in accordance with the provisions of Clause 10.4.4 within a period of 30 (thirty) days of the receipt thereof.

## **10.5 Incomplete Works**

In the event the Contractor fails to complete the Works in accordance with the Project Completion Schedule, including any Time Extension granted under this Agreement, the Contractor shall endeavour to complete the balance work expeditiously and shall pay Damages to the Authority in accordance with the provisions of Clause 10.3.2 for delay of each day until the Works are completed in accordance with the provisions of this Agreement. Recovery of Damages under this Clause shall be without prejudice to the rights of the Authority under this Agreement including the right to termination under Clause 21.1.

## **10.6 Equipment specific Maintenance Manual**

No later than 90 (ninety) days prior to the Project Completion Date, the Contractor shall, in consultation with the Authority Engineer, evolve an equipment specific maintenance manual for equipment based on a new technology not currently in use in the Railways (the “**Maintenance Manual**”) for the regular operation and maintenance of such equipment in conformity with safety requirements, Good Industry Practice and manufacturer’s manuals and instructions and shall provide 10 (ten) hard copies and 2 (two) USB flash memory thereof to the Authority Engineer.

## ARTICLE 11

### QUALITY ASSURANCE, MONITORING AND SUPERVISION

#### 11.1 Quality of Materials and workmanship

- 11.1.1 The Contractor shall ensure that the Construction, Materials and workmanship are in accordance with the requirements specified in this Agreement, Specifications and Standards and Good Industry Practice.
- 11.1.2 The Contractor warrants that all Materials shall be new, unused, not reconditioned and in conformity with Specification and Standards, Applicable Laws and Good Industry Practice, and that the Contractor shall not use any materials which are generally recognised as being deleterious under Good Industry Practice.

#### 11.2 Quality control system

- 11.2.1 The Contractor shall establish a Quality Control Mechanism, Quality Assurance Plan (the “**Quality Assurance Plan**” or “**QAP**”), Material Testing Plan (the “**Material Testing Plan**” or “**MTP**”) and Method Statements for execution of works (the “**Method Statements**” or “**MS**”) in consultation of Authority Engineer.
- 11.2.2 The Contractor shall, within 30 (thirty) days of the Appointed Date, submit to the Authority Engineer its Quality Control Mechanism, QAP, MTP and MS which shall include the following:
- (a) organisation, duties and responsibilities, procedures, inspections and documentation;
  - (b) quality control mechanism including sampling and testing of Materials, tests required during the execution of works and frequencies by Contractor and Authority Engineer, standards, acceptance criteria, testing facilities, reporting, recording and interpretation of test results, approvals, check list for site activities, and proforma for testing and calibration in accordance with the Specifications and Standards and Good Industry Practice; and
  - (c) internal quality audit system. The Contractor shall carry out internal audits of the Quality management System regularly, and at least once every 6 months. The Contractor shall submit to the Engineer a report listing the results of each internal audit within 7 days of completion. Each report shall include, where appropriate, the proposed measures to improve and/or rectify the Quality Management System and/or its implementation.

The Authority Engineer shall convey its comments to the Contractor within a period of 21 (twenty-one) days of receipt of the QAP stating the modifications, if any, required, and the Contractor shall incorporate those in the QAP to the extent required for conforming with the provisions of this Clause 11.2.

- 11.2.3 The Contractor shall procure all documents, apparatus and instruments, fuel, consumables, water, electricity, labour, Materials, samples, and qualified personnel as are necessary for examining and testing the Project Assets, Materials and workmanship in accordance with the Quality Assurance Plan.



11.2.4 The cost of testing of Construction, Materials and workmanship under this Article 11 shall be borne by the Contractor.

### **11.3 Methodology**

The Contractor shall, at least 15 (fifteen) days prior to the commencement of any construction activity, submit to the Authority Engineer for review the Method Statement proposed to be adopted for executing the Work, giving details of inspection checklist, quality parameters, equipment to be deployed, traffic management and measures for ensuring safety. The Authority Engineer shall complete the review and convey its comments, if any, to the Contractor within a period of 10 (ten) days from the date of receipt of the proposed method statement from the Contractor. The Contractor shall revise the method statements by incorporating these comments or else will advise the Authority Engineer reasons for not/partially including the same.

### **11.4 Inspection and technical audit by the Authority**

The Authority or any representative authorised by the Authority in this behalf may inspect and review the progress and quality of the construction of Works and issue appropriate directions to the Authority Engineer and the Contractor for taking remedial action in the event the Works are not in accordance with the provisions of this Agreement.

### **11.5 External technical audit**

At any time during construction and maintenance period, the Authority may appoint an external technical auditor to conduct an audit of the quality of the Works. The findings of the audit, to the extent accepted by the Authority, shall be notified to the Contractor and the Authority Engineer for taking remedial action in accordance with this Agreement. The Contractor shall provide all assistance as may be required by the auditor in the conduct of its audit hereunder. Notwithstanding anything contained in this Clause 11.5, the external technical audit shall not affect any obligations of the Contractor or the Authority Engineer under this Agreement.

### **11.6 Inspection of construction records**

The Authority shall have the right to inspect the records of the Contractor relating to the Works.

### **11.7 Monthly progress reports**

During the Construction Period, the Contractor shall, no later than 10 (ten) days after the close of each month, furnish to the Authority and the Authority Engineer a monthly report on the progress of Works and shall promptly give such other relevant information as may be required by the Authority Engineer along with all resources deployed and all problems faced during work.

### **11.8 Inspection**

11.8.1 The Authority Engineer and its authorised representative shall at all times:

- (a) have full access to all parts of the Site and to all places from which natural Materials are being obtained for use in the Works; and

- (b) during production, manufacture and construction at the Site and at the place of production, be entitled to examine, inspect, measure and test the Materials and workmanship, and to check the progress of manufacture of Materials.

11.8.2 The Contractor shall give the Authority Engineer and its authorised agents access, facilities and safety equipment for carrying out their obligations under this Agreement.

11.8.3 The Authority Engineer shall submit a monthly inspection report (the “**Inspection Report**”) to the Authority and the Contractor bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies. For the avoidance of doubt, such inspection or submission of Inspection Report by the Authority Engineer shall not relieve or absolve the Contractor of its obligations and liabilities under this Agreement in any manner whatsoever.

## **11.9 Samples**

The Contractor shall submit the following samples of Materials and relevant information to the Authority Engineer for review:

- (a) manufacturer’s test reports and standard samples of manufactured Materials; and
- (b) samples of such other Materials as the Authority Engineer may require.

## **11.10 Tests**

11.10.1 For determining that the Works conform to the Specifications and Standards, the Authority Engineer shall require the Contractor to carry out or cause to be carried out tests, at such time and frequency and in such manner as specified in this Agreement, and in accordance with Good Industry Practice for quality assurance. The Contractor shall submit the schedule for performing such tests to the Authority Engineer well in advance and not less than 7 days prior to conducting such tests. The Contractor shall, with due diligence, carry out all the tests in accordance with the Agreement and furnish the results thereof to the Authority Engineer. Of the total tests for each category or type to be undertaken by the Contractor under the provisions of this Agreement and Good Industry Practice, the Authority Engineer or his authorised representative may witness or participate in such tests conducted or cause to be conducted by the Contractor. Documentation of test records to be maintained by Contractor and Authority Engineer or his authorised representative shall scrutinize 100% Testing records of all tests conducted as per existing guidelines of Indian Railways and Indian Road Congress. A copy of such test records shall be provided to the Authority Engineer.

11.10.2 In the event that results of any tests conducted under this Clause 11.10 establish any Defects or deficiencies in the Works, the Contractor shall carry out remedial measures and furnish a report to the Authority Engineer in this behalf. The Authority Engineer shall require the Contractor to carry out or cause to be carried out tests to determine that such remedial measures have brought the Works into compliance with the Specifications and Standards, and the procedure shall be repeated until such Works conform to the Specifications and Standards. For the avoidance of doubt, the cost of such tests and the remedial measures in pursuance thereof shall be solely borne by the Contractor.

### **11.11 Examination of work before covering up**

In respect of the work which the Authority Engineer is entitled to examine, inspect, measure or test before it is covered up or put out of view or any part of the work is placed thereon, the Contractor shall give notice to the Authority Engineer whenever any such work is ready and before it is covered up. The Authority Engineer shall then either carry out the examination, inspection or testing without unreasonable delay, or promptly give notice to the Contractor that the Authority Engineer does not require to do so. Provided, however, that if any work is of a continuous nature where it is not possible or prudent to keep it uncovered or incomplete, the Contractor shall notify the schedule of carrying out such work to give sufficient opportunity, not being less than 3 (three) business days' notice, to the Authority Engineer to conduct its inspection, measurement or test while the work is continuing. Provided further that in the event the Contractor receives no response from the Authority Engineer within a period of 3 (three) business days from the date on which the Contractor's notice hereunder is delivered to the Authority Engineer, the Contractor shall be entitled to assume that the Authority Engineer would not undertake the said inspection.

### **11.12 Rejection**

11.12.1 If, as a result of an examination, inspection, measurement or testing, any Plant, Material, design or workmanship is found to be defective or otherwise not in accordance with the provisions of this Agreement, the Authority Engineer may reject such Plant, Material, design or workmanship by giving notice to the Contractor, with reasons. The Contractor shall then promptly make good the Defect and ensure that the rejected item complies with the requirements of this Agreement.

11.12.2 If the Authority Engineer requires the Plant, Material, design or workmanship to be retested, the tests shall be repeated on the same terms and conditions, as applicable in each case. If the rejection and retesting cause the Authority to incur any additional costs, such costs shall be recoverable by the Authority from the Contractor and may be deducted by the Authority from any monies due to be paid to the Contractor.

11.12.3 The Contractor shall not be entitled to any extension of time on account of rectifying any Defect or retesting as specified in this Clause 11.12.

11.12.4 No examination, inspection, measurement or testing of any Plant, Material, design or workmanship by the Authority Engineer or its failure to convey its observations or to examine, inspect, measure or test shall relieve the Contractor of its obligations and liabilities under this Agreement in any manner nor shall the Authority be liable for the same in any manner.

### **11.13 Remedial work**

11.13.1 Notwithstanding any previous test or certification, the Authority Engineer may instruct the Contractor to:

- (a) remove from the Site and replace any Plant or Materials which are not in accordance with the provisions of this Agreement;
- (b) remove and re-execute any work which is not in accordance with the provisions of this Agreement and the Specification and Standards; and

- (c) execute any work which is urgently required for the safety of the Railway Project, whether because of an accident, unforeseeable event or otherwise; provided that in case of any work which is required on account of a Force Majeure Event, the provisions of Clause 19.6 shall apply.

11.13.2 If the Contractor fails to comply with the instructions issued by the Authority Engineer under Clause 11.13.1, within the time specified in the Authority Engineer's notice or as mutually agreed, the Authority Engineer may advise the Authority to have the work executed by another agency. The cost so incurred by the Authority for undertaking such work shall, without prejudice to the rights of the Authority to recover Damages in accordance with the provisions of this Agreement, be recoverable from the Contractor and may be deducted by the Authority from any monies due to be paid to the Contractor.

#### **11.14 Delays during construction**

Without prejudice to the provisions of Clause 10.3.2, in the event the Contractor does not achieve any of the Project Milestones within the time period stipulated in Schedule - I or the Authority Engineer shall have reasonably determined that the rate of progress of Works is such that Completion of the Railway Project is not likely to be achieved by the end of the Scheduled Completion Date, it may notify the same to the Contractor, and the Contractor shall, within 15 (fifteen) days of such notice, by a communication inform the Authority Engineer in reasonable detail about the steps it proposes to take to expedite progress and the period within which it shall achieve the Project Completion Date.

#### **11.15 Quality control records and Documents**

The Contractor shall hand over to the Authority Engineer a copy of all its quality control records and documents before the Completion Certificate is issued pursuant to Clause 12.2.

#### **11.16 Video recording**

During the Construction Period, the Contractor shall provide to the Authority for every calendar quarter, a video recording, which will be compiled into a 3 (three) hour digital video in USB flash memory stick or any substitute thereof, covering the status and progress of Works in that quarter. The video recording shall be provided to the Authority no later than 15 (fifteen) days after the close of each quarter after the Appointed Date.

#### **11.17 Suspension of unsafe Construction Works**

11.17.1 Upon recommendation of the Authority Engineer to this effect, or on its own volition in cases of emergency or urgency, the Authority may by notice require the Contractor to suspend forthwith the whole or any part of the Works if, in the reasonable opinion of the Authority Engineer or the Authority, as the case may be, such work threatens the safety of the Users and or other persons on or about the Railway Project.

11.17.2 The Contractor shall, pursuant to the notice under Clause 11.17.1, suspend the Works or any part thereof for such time and in such manner as may be specified by the Authority and thereupon carry out remedial measures to secure the safety of suspended works, the Users, other persons and vehicles on or about the Railway Project including pedestrians. The Contractor may by notice require the Authority Engineer to inspect such remedial measures forthwith and make a report to the Authority recommending whether or not the

suspension hereunder may be revoked. Upon receiving the recommendations of the Authority Engineer, the Authority shall either revoke such suspension or instruct the Contractor to carry out such other and further remedial measures as may be necessary in the reasonable opinion of the Authority, and the procedure set forth in this Clause 11.17 shall be repeated until the suspension hereunder is revoked.

11.17.3 Subject to the provisions of Clause 19.6, all reasonable costs incurred for maintaining and protecting the Works or part thereof during the period of suspension (the “**Preservation Costs**”), shall be borne by the Contractor; provided that if the suspension has occurred as a result of any breach of this Agreement by the Authority, the Preservation Costs shall be borne by the Authority.

11.17.4 If suspension of Works is for reasons not attributable to the Contractor, the Authority Engineer shall determine any Time Extension to which the Contractor is reasonably entitled.

## ARTICLE 12

### COMPLETION CERTIFICATE

#### 12.1 Tests on completion

12.1.1 No later than 30 (thirty) days prior to the likely completion of the Railway Project or a part thereof, the Contractor shall prepare and submit to the Authority Engineer the documents required for seeking approval of the Commissioner of Railway Safety in accordance with the provisions of the Railways Opening for Public Carriage of Passenger Rules, the Indian Railway Permanent Way Manual, the Indian Railways Manual of A.C. Traction, Indian Railways Signal Engineering Manual, Indian Railways Telecom Manual as the case may be, and notify the Authority Engineer of its intent to subject the Railway Project to Tests. After ensuring and procuring that the documents required to be submitted to the Commissioner for Railway Safety meet the requirements of Applicable Laws, the Authority Engineer shall, in consultation with the Contractor, determine the date and time of each of the Tests, and inform the Authority who may designate its representative to witness the Tests. The Contractor shall provide such assistance as the Authority Engineer may reasonably require for conducting the Tests. For avoidance of doubts, the parties agree that in the event of the Contractor and the Authority Engineer failing to mutually agree on the dates for conducting the Tests, the Contractor shall fix the dates by giving not less than 10 (ten) days' notice to the Authority Engineer. Authority will carry out test on completion within 30 days of receiving request from contractor. And if Authority Engineer fails to carry out test within 30 days, the Authority will pay damage to Contractor @ 0.02% of the payment pending for want of test per day.

12.1.2 All Tests shall be conducted in accordance with Schedule-J at the cost and expense of the Contractor; provided, however, that the trial running on railway track shall be undertaken at the cost and expense of the Authority. The Authority Engineer shall observe, monitor and review the results of the Tests to determine compliance of the Railway Project with Specifications and Standards and if it is reasonably anticipated or determined by the Authority Engineer during the course of any Test that the performance of the Railway Project or Section or any part thereof, does not meet the Specifications and Standards, it shall have the right to suspend or delay such Test and require the Contractor to remedy and rectify any Defect or deficiency. Upon completion of each Test, the Authority Engineer shall provide to the Contractor and the Authority copies of all Test data including detailed Test results. For the avoidance of doubt, the Parties expressly agree that the Authority Engineer may require the Contractor to carry out or cause to be carried out additional Tests, in accordance with Good Industry Practice, for determining the compliance of the Railway Project thereof with the Specifications and Standards.

#### 12.2 Provisional Certificate

12.2.1 Upon completion of Tests, the Authority Engineer shall satisfy itself that the Tests have been successful and the Railway Project is fit for opening to traffic. A list of outstanding items signed jointly by the Authority Engineer and the Contractor (called the "**Punch List**") shall be prepared in two parts. The part -1 showing the critical/safety items and the part-2 showing non-critical/non-safety items. The Authority Engineer may issue a Provisional Certificate to the Contractor and the Authority in the form set forth in Schedule-K (the "**Provisional Certificate**"), provided the items figuring in the Punch List of critical/safety items (part-1) have

been fully completed/attended to. The items figuring in the Punch List (part-2) of non-critical/non-safety should be completed by contractor in a time frame as stipulated in Clause 12.3.

- 12.2.2 Upon issuance of the “Provisional Certificate”, the Authority Engineer shall forward to the Authority (i) copies of all Test data including Test results, and (ii) the documents submitted by the Contractor for seeking approval of the Commissioner of Railway Safety in accordance with the provisions of the Railways Opening for Public Carriage of Passenger Rules, the Indian Railway Permanent Way Manual/ or the Indian Railways Manual of A.C. Traction, Indian Railways Signal Engineering Manual, Indian Railways Telecom Manual as the case may be, for obtaining authorisation from the Commissioner for Railway Safety.
- 12.2.3 The Contractor shall assist the Authority during inspection and tests to be conducted by the Commissioner of Railway Safety for determining compliance of the Railway Project with Applicable Laws and the provisions of this Agreement.
- 12.2.4 The Defects Liability Period for the Railway Project shall commence from the date of issue of the Provisional Certificates.
- 12.2.5 The Parties hereto expressly agree that the Authority Engineer may also issue a “part Provisional Certificate” for part of the Railway Project ready for commissioning/opening subject to the provisions of Clauses 12.1 and 12.2 applying mutatis mutandis. The issuance of the part-provisional certificate will however not absolve the contractor in any manner of its obligations to complete the remaining part of Railway Project.
- 12.2.6 The risk of loss or damage to any Materials, Plant or Works in the Railway Project or part thereof, as the case may be, and the care and custody thereof shall pass from the Contractor to the Authority upon issuance of Provisional Certificate for the Railway Project or part thereof.

### **12.3 Completion of Part-2 Punch List items**

All items figuring in the part-2 of Punch List shall be completed by the Contractor within 90 (ninety) days of the date of issuance of the Provisional Certificate for that part and for any delay thereafter, other than for reasons solely attributable to the Authority or due to Force Majeure, the Authority shall be entitled to recover Damages from the Contractor to be calculated and paid for each day of delay until all items are completed, at the rate of 0.2% (zero point two per cent) of the cost of completing such items as estimated by the Authority Engineer. Subject to payment of such Damages, the Contractor shall be entitled to a further period not exceeding 120 (one hundred and twenty) days for completion of the part-2 Punch List items. For the avoidance of doubt, it is agreed that if completion of any item in the part-2 of Punch List is delayed for reasons attributable to the Authority or due to Force Majeure, the completion date thereof shall be determined by the Authority Engineer in accordance with Good Industry Practice, and such completion date shall be deemed to be the date of issue of the Provisional Certificate for the purposes of Damages, if any, payable for such item under this Clause 12.3.

## **12.4 Completion Certificate**

- 12.4.1 Upon completion of all items in the Punch List (part-1 as well as part-2) and issuance of authorisation by the Commissioner of Railway Safety and compliance of all CRS observations pertaining to Contractor if any, the Authority Engineer shall issue forthwith to the Contractor and the Authority; a completion certificate substantially in the form set forth in Schedule-K (the “**Completion Certificate**”) separately in respect of each Provisional Certificate issued. For Avoidance of doubt, Completion Certificate may also be issued for part-commissioning of Project.
- 12.4.2 Upon receiving the Completion Certificate, the Contractor shall remove its equipment, materials, debris and temporary works from the Site, which are not required any more for the Project, within a period of 15 (fifteen) days thereof, failing which the Authority may remove or cause to be removed, such equipment, materials, debris and temporary works and recover from the Contractor an amount equal to 120% (one hundred and twenty per cent) of the actual cost of removal incurred by the Authority.

## **12.5 Rescheduling of Tests**

If the Authority Engineer certifies to the Authority and the Contractor that it is unable to issue the Completion Certificate or Provisional Certificate, as the case may be, because of events or circumstances on account of which the Tests could not be held or had to be suspended, the Contractor shall be entitled to re-schedule the Tests and hold the same as soon as reasonably practicable.

## **12.6 Delayed authorisation**

In the event of delay in issuance of authorisation by the Commissioner of Railway Safety beyond a period of 60 (sixty) days from the date of completion of all safety/critical items of punch list, the Contractor shall be entitled to interest for the period of delay at a rate equal to 3% (three percent) above the Bank Rate on the payment due for integrated testing and commissioning as specified in Schedule-G.



ARTICLE 13  
**CHANGE OF SCOPE**

**13.1 Change of Scope**

13.1.1 The Authority may, notwithstanding anything to the contrary contained in this Agreement, require the Contractor to make modifications or alterations to the Works (“**Change of Scope**”) before the issue of the Completion Certificate either by giving an instruction or by requesting the Contractor to submit a proposal for Change of Scope involving additional cost or reduction in cost. Any such Change of Scope shall be made and valued in accordance with the provisions of this Article 13.

13.1.2 Change of Scope shall mean:

- (a) change in specifications of any item of Works;
- (b) omission of any work from the Scope of the Project except under Clause 8.3.3; provided that, subject to Clause 13.5, the Authority shall not omit any work under this Clause in order to get it executed by any other entity; or
- (c) any additional work, Plant, Materials or services which are not included in the Scope of the Project, including any associated Tests on completion of construction. However, any unsanctioned work which is independent work per se shall not be considered as Change of Scope.

Variation in the quantities of certain items (positive or negative) necessitated due to any change(s) in the L-Section / Alignment / ESPs / gears of interlocking of the Project with respect to those attached with this document. (a) except on account of existing ground conditions mentioned in L-Section / Alignment / ESPs. For avoidance of doubt, it is clarified that the existing ground conditions are to be validated by bidders before bid and hence no change on this account is payable, except for works under schedule G1.

- (d) any change in quantities under Schedule G1

13.1.2.1 Unless parties agree to the contrary, following shall be the limits of variation for items of works under Schedule G1;

For Items in Schedule G1 related to works other than foundation	25%
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13.1.3

- (1) If the Contractor determines at any time that a Change of Scope will, if adopted, (i) accelerate completion, (ii) reduce the cost to the Authority of executing, maintaining or operating the Railway Project, (iii) improve the efficiency or value to the Authority of the completed Railway Project, or (iv) otherwise be of benefit to the Authority, it shall prepare a proposal with relevant details as under:-

- (a) for works under schedule G, and for items covered under schedule G1 beyond the limits of variation mentioned in article 13.1.2.1, at its own cost; or
  - (b) for works under schedule G1 within the limits of variation mentioned in article 13.1.2.1, as per cost derived on the basis of accepted rates of respective items under schedule G1.
- (2) In case Change of Scope is proposed by Authority Engineer to the contractor is for items covered under schedule G1 within the limits of variation mentioned in article 13.1.2.1, the contractor shall accept and continue the works as per rate accepted for those items/schedules under schedule G1.

In case Change of Scope is proposed by Authority Engineer to the contractor is for the items not covered either in the scope of work under schedule G, or within the limits of variation mentioned in article 13.1.2.1 for the items under schedule G1, the contractor shall within 15 (fifteen) days of receipt of such proposal, either accept such change of scope with modifications if any, and initiate proceedings therefore in accordance with this Article 13 or reject the proposal and inform the authority of its decision.

For the avoidance of doubt, the Parties agree that the Contractor shall not undertake any Change of Scope without a Change of Scope Order being issued by the Authority, save and except any Works necessary for meeting any Emergency.

## **13.2 Procedure for Change of Scope**

- 13.2.1 In the event of the Authority determining that a Change of Scope is necessary, it may direct the Authority Engineer to issue to the Contractor a notice specifying in reasonable detail the works and services contemplated thereunder (the “**Change of Scope Notice**”).
- 13.2.2 Upon receipt of a Change of Scope Notice from Authority Engineer, the Contractor shall, with due diligence, provide to the Authority Engineer such information as is necessary, together with preliminary documentation in support of:
- (a) the impact of the Change of Scope on the Project Completion Schedule, if the works or services are required to be carried out during the Construction Period; and
  - (b) the options for implementing the proposed Change of Scope and the effect, if any, each such option would have on the costs and time thereof; including the following details:
    - (i) breakup of the quantities, unit rates and cost for different items of work;
    - (ii) proposed design for the Change of Scope; and
    - (iii) proposed modifications, if any, to the Project Completion Schedule of the Railway Project.

For the avoidance of doubt, the Parties expressly agree that, subject to the provisions of Clause 13.4.2, the Contract Price shall be increased or decreased, as the case may be, on account of Change of Scope.

- 13.2.3 The Contractor’s quotation of rates/costs for the Change of Scope shall be determined on the following principles:

- a) The rate for various items to be executed through change of scope order shall be estimated on the basis of analysis of rates (AOR) of Southern Railway, CORE ,Schedule of rates(SOR) for S & T items / Last Accepted Rates (LARs) of Southern Railway and Other Zonal Railways, whichever is applicable for item other than building works and as per CPWD's SOR for building works and by applying the prevailing market rates of various input construction materials, labour, machinery and T & P.
- b) In case SOR of any items is not available in Southern Railway's or CORE's AOR or SOR/LARs ,other zonal railways AOR then such rates shall be determined as per prevailing market rates in accordance with Good Industry Practice by the Authority Engineer.

13.2.4 Upon reaching an agreement, the Authority shall issue an order (the “**Change of Scope Order**”) requiring the Contractor to proceed with the performance thereof. In the event that the Parties are unable to agree, the Authority may:

- (a) issue a Change of Scope Order requiring the Contractor to proceed with the performance thereof at the rates and conditions approved by the Authority till the matter is resolved in accordance with Article 24; or
- (b) proceed in accordance with Clause 13.5.

13.2.5 The provisions of this Agreement, insofar as they relate to Works and Tests, shall apply *mutatis mutandis* to the works undertaken by the Contractor under this Article 13.

### **13.3 Payment for Change of Scope**

Payment for Change of Scope shall be made in accordance with the payment schedule specified in the Change of Scope Order.

### **13.4 Restrictions on Change of Scope**

13.4.1 No Change of Scope shall be executed unless the Authority has issued the Change of Scope Order save and except any Works necessary for meeting any Emergency.

13.4.2 Unless the Parties mutually agree to the contrary, the total value of all Change of Scope Orders shall not exceed 25% (twenty five per cent) of the Contract Price.

13.4.3 Notwithstanding anything to the contrary in this Article 13, no change arising from any default of the Contractor in the performance of its obligations under this Agreement shall be deemed to be Change of Scope, and shall not result in any adjustment of the Contract Price or the Project Completion Schedule.

### **13.5 Power of the Authority to undertake works**

13.5.1 In the event the Parties are unable to agree to the proposed Change of Scope Orders in accordance with Clause 13.2, the Authority may, after giving notice to the Contractor and considering its reply thereto, award such works or services to any person on the basis of open competitive bidding from amongst bidders who are pre-qualified for undertaking the additional work; provided that the Contractor shall have the option of

matching the first ranked bid in terms of the selection criteria, subject to payment of 2% (two per cent) of the bid amount to the Authority<sup>s</sup>, and thereupon securing the award of such works or services. For the avoidance of doubt, it is agreed that the Contractor shall be entitled to exercise such option only if it has participated in the bidding process and its bid does not exceed the first ranked bid by more than 10% (ten percent) thereof. It is also agreed that the Contractor shall provide assistance and cooperation to the person who undertakes the works or services hereunder, but shall not be responsible for rectification of any Defects and/or maintenance of works carried out by other agencies.

- 13.5.2 The works undertaken in accordance with this Clause 13.5 shall conform to the Specifications and Standards and shall be carried out in a manner that it should not cause any disruption to the Project and also minimise adverse effect to main contractor. The provisions of this Agreement, insofar as they relate to Works and Tests, shall apply mutatis mutandis to the works carried out under this Clause 13.5.

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<sup>s</sup> The Authority shall transfer 75% (seventy five percent) of the amount so received to the first ranked bidder whose bid shall have been matched by the Contractor.

ARTICLE 14  
**TRAFFIC REGULATION**

**14.1 Traffic regulation by the Contractor**

- 14.1.1 The Contractor shall take all the required measures and make arrangements for the safety of any persons and vehicles on or about the Site during the construction of the Railway Project or a Section thereof in accordance with Good Industry Practice, and Applicable Laws. It shall provide, erect and maintain all such barricades, signs, markings, flags, and lights as may be required by Good Industry Practice for the safety of the traffic using any public roads or access along or across the Section under construction.
- 14.1.2 All works shall be carried out in a manner creating least interference to traffic passing along or across the Railway Project or a Section thereof. The Contractor shall ensure that proper passage is provided for the traffic. Where it is not possible or safe to allow traffic on the existing road or passage, a temporary diversion of proper specifications shall be constructed by the Contractor at its own cost. The Contractor shall take prior approval of the Authority Engineer for any proposed arrangement for traffic regulation during Construction, which approval shall not be unreasonably withheld.
- 14.1.3 In the event any construction work is required to be executed in close proximity of an existing operating system of Railways, the Contractor shall make arrangements for the safety of such system in accordance with the provisions of the 'Compendium of Instructions on Safety at work Sites' issued by the Authority and Good Industry Practice.

ARTICLE 15  
**DEFECTS LIABILITY**

**15.1 Defects Liability Period**

15.1.1 The Contractor shall be responsible for all the Defects and deficiencies, except usual wear and tear in the Railway Project or any part thereof, till the expiry of a period of 2 (two) years commencing from the date of Provisional Certificate or expiry of a period 18 (eighteen) months from the date of Completion Certificate, whichever is later (the “**Defects Liability Period**”).

15.1.2 Without prejudice to the provisions of Clause 15.1.1, for KAVACH system the Defects Liability Period shall be commencing from the date of Completion Certificate for a Period of 4 (four) years. For the avoidance of any doubt, any repairs or restoration because of usual wear or tear in the Project or any Section thereof shall form a part of the Maintenance obligations of the Contractor as specified in Article 15A. Defect Liability Period shall also cover the provisions of extensions as in accordance with clause 15.6

15.1.3 -deleted-

15.1.4 -deleted-

**15.2 Remedy and rectification of Defects and deficiencies**

15.2.1 Without prejudice to the provisions of Clause 15.2.2, the Contractor shall repair or rectify all Defects and deficiencies observed by the Authority Engineer during the Defects Liability Period within a period of 15 (fifteen) days from the date of notice issued by the Authority Engineer, or within such reasonable period as may be determined by the Authority Engineer at the request of the Contractor, in accordance with Good Industry Practice. For the purpose of this clause, the time period of 15 days shall be applicable only to those Defects and Deficiencies which are not affecting train operations of safety. For any defect noticed affecting train operation of train safety, the Contractor shall arrange to rectify it within such reasonable period as may be determined by the Authority Engineer. If the Contractor is not able to rectify any fault as decided by the Authority Engineer, the Authority will be at full liberty to make its own efforts to get such defects rectified at Contractor’s cost.

15.2.2 During a period of 2 (two) months from the date of issuance of Completion Certificate, the Contractor shall retain sufficient staff and spares at Project for procuring prompt replacement, installation or re-installation of any defective parts of Stationary and Onboard Kavach equipment including RFID tags. The spares for the purpose of this clause, shall be separate from any spares supplied within the scope of the Project.

**15.3 Cost of remedying Defects**

For the avoidance of doubt, any repair or rectification undertaken in accordance with the provisions of Clause 15.2, including any additional tests, shall be carried out by the Contractor at its own risk and cost, to the extent that such rectification or repair is attributable to:

- (a) the design of the Project;

- (b) Works, Plant, Materials or workmanship not being in accordance with this Agreement and the Specifications and Standards;
- (c) improper maintenance during construction of the Railway Project by the Contractor; or
- (d) failure by the Contractor to comply with any other obligation under this Agreement.

#### **15.4 Contractor's failure to rectify Defects**

In the event that the Contractor fails to repair or rectify such Defect or deficiency within the period specified in Clause 15.2, the Authority shall be entitled to get the same repaired, rectified or remedied at the Contractor's cost so as to make the Railway Project conform to the Specifications and Standards and the provisions of this Agreement. All costs consequent thereon shall, after due consultation with the Authority and the Contractor, be determined by the Authority Engineer. The cost so determined, and an amount equal to 20% (twenty percent) of such cost as Damages, shall be recoverable by the Authority from the Contractor and may be deducted by the Authority from any monies due to the Contractor.

#### **15.5 Contractor to search cause**

- 15.5.1 The Authority Engineer may instruct the Contractor to examine the cause of any Defect in the Works or part thereof before the expiry of the Defects Liability Period.
- 15.5.2 In the event any Defect identified under Clause 15.5.1 is attributable to the Contractor, the Contractor shall rectify such Defect within the period specified by the Authority Engineer, and shall bear the cost of the examination and rectification of such Defect.
- 15.5.3 In the event such Defect is not attributable to the Contractor, the Authority Engineer shall, after due consultation with the Authority and the Contractor, determine the costs incurred by the Contractor on such examination and notify the same to the Contractor, with a copy to the Authority, and the Contractor shall be entitled to payment of such costs by the Authority.

#### **15.6. Extension of Defects Liability Period**

- 15.6.1 The Defects Liability Period shall be deemed to be extended till the identified Defects under Clause 15.2 have been remedied.
- 15.6.2 Any Materials or Works with Defects identified under Clause 15.2 and replaced or repaired during the Defects Liability Period or the extended Defects Liability Period, as the case may be, would be further warranted for a period of twelve (12) months from the date of completion of such repair or replacement.
- 15.6.3 The Contractor shall upon termination or expiry of this Agreement or upon expiry of the Defects Liability Period, assign any outstanding benefit in respect of any subcontract or any warranty, to the Authority or to such other person as the Authority may direct.

## **Article 15A Maintenance**

### **15A.1 Maintenance Obligations of the Contractor**

- (i) The Contractor shall maintain the Project of Modern Signalling System KAVACH for a period of 15 (fifteen) years, commencing from the date of the Completion Certificate (the “Maintenance Period”). For the performance of its Maintenance obligations, the Contractor shall be paid:
  - (a) \$[1.5%] of the total Capital cost of KAVACH equipment as indicated in schedule G per annum, for the Defect Liability Period (i.e. first four years from the date of completion certificate).
  - (b) \$[3%] of the total Capital cost of KAVACH equipment as indicated in schedule G per annum, from completion of Defect Liability Period till completion of Maintenance Period.

\$ This does not include Towers, OFC System and Signalling System other than KAVACH System.

Above amount for the performance of Contractors Maintenance obligations shall be, inclusive of all taxes. The amount payable for maintenance shall be adjusted to reflect any increase or decrease arising out of variation in WPI to be determined in accordance with the provisions of Clause 17.9a. It is further agreed that the Contract Price hereunder shall be reckoned with reference to the amount specified in Clause 17.1.1, which shall be adjusted to the extent of Change of Scope and the works withdrawn under the provisions of Clause 8.3.3, but shall not include any price adjustments in pursuance of Clause 17.8.

- (ii) During the Maintenance Period, the Authority shall provide to the Contractor access to the Site for Maintenance in accordance with this Agreement. The obligations of the Contractor hereunder shall include:
  - (a) permitting safe, smooth and uninterrupted flow of traffic on the Project KAVACH;
  - (b) Undertaking routine maintenance including prompt repairs of Station equipment, LC Gate equipment, Track side equipment, Onboard Locomotive equipment, RF Network equipment. For the avoidance of doubt, the electricity charges for operation of infrastructure installed along the project length, except the infrastructure being used by the Contractor for its own use, shall be borne by the Authority;
  - (c) undertaking repairs to the equipment and structures;
  - (d) informing the Authority of any unauthorised use of the Project [KAVACH].
- (iii) In respect of any Defect or deficiency not specified in Schedule-Q, the Contractor shall, at its own cost, undertake repair or rectification in accordance



with Good Industry Practice, save and except to the extent that such Defect or deficiency shall have arisen on account of any wilful default or neglect of the Authority or a Force Majeure Event.

- (iv) The Contractor shall remove promptly from the Project area any waste materials (including hazardous materials and waste water), rubbish and other debris (including, without limitation, accident debris) and keep the Project area in a clean, tidy and orderly condition, and in conformity with the Applicable Laws, Applicable Permits and Good Industry Practice.

## **15A.2 Maintenance Requirements**

15A.2.1 The Contractor shall ensure and procure that at all times during the Maintenance Period, the Project [KAVACH] conforms to the maintenance requirements set forth in Schedule-Q (the “Maintenance Requirements”).

### **15A.2.2 Maintenance Support for Project [KAVACH] System**

- (i) To provide maintenance support in accordance with the provisions of this Agreement, the Contractor shall, without prejudice to its Maintenance Obligations, set up and operate, round the clock, a control centre (the “Helpline”) connected to the Divisional Control Centre/Test Room of the Authority. The Helpline shall provide such advice and guidance to the Divisional Control Centre/Test Room/ Field Maintainers as may be necessary for performing its Maintenance Obligations hereunder.
- (ii) The Parties agree that the location of the Control Centre (Helpline) shall be restricted to project jurisdiction or Divisional Head Quarter as the case may be.
- (iii) The Authority shall, upon request from the Contractor, provide suitable covered space at Divisional Control Centre to facilitate the Contractor in performing its Maintenance Obligations.

## **15A.3 Maintenance Programme**

- (i) The Contractor shall prepare a monthly maintenance programme (the “Maintenance Programme”) in consultation with the Authority’s Engineer and submit the same to the Authority’s Engineer not later than 10 (ten) days prior to the commencement of the month in which the Maintenance programme is to be executed. For this purpose, a joint monthly inspection by the Contractor and the Authority’s Engineer shall be undertaken. The Maintenance Programme shall contain the following:
  - a) The condition of the [KAVACH] equipment/system in the format prescribed by the Authority’s Engineer;
  - b) The proposed maintenance Works;
  - c) Deployment of resources for maintenance Works.

## **15A.4 System Closure**

- (i) The Contractor shall not close any working or operational equipment/system of the Project for undertaking maintenance works except with the prior written approval of the Authority’s Engineer. Such approval shall be sought by the Contractor through a written request to be made at least 3 (three) days before the

proposed closure of operational equipment/system and shall be accompanied by particulars thereof. Within 3 (three) business days of receiving such request, the Authority's Engineer shall grant permission with such modifications as it may deem necessary, and a copy of such permission shall be sent to the Authority.

- (ii) Upon receiving the permission pursuant to Clause 15A.4 (i), the Contractor shall be entitled to close the designated working or operational equipment/system for the period specified therein, the Contractor shall, in the event of any delay in reopening such equipment/system, pay Damages to the Authority calculated at the rate of 0.1% (zero point one per cent) of the monthly maintenance payment for each hour of delay until the equipment/system has been re-opened for traffic. In the event of any delay in re-opening such equipment/system or in the event of emergency decommissioning and closure to traffic of the whole or any part of the Project KAVACH due to failure of the Contractor, the Contractor shall pay damages to the Authority at double the above rate, without prejudice the rights of the Authority under this Agreement including Termination thereof.

#### **15A.5 Reduction of Payment for Non-performance of Maintenance Obligations**

- (i) In the event that the Contractor fails to repair or rectify any Defect or deficiency set forth in Schedule-Q within the period specified therein, it shall be deemed as failure of performance of Maintenance obligations by the Contractor and the Authority shall be entitled to effect reduction in monthly lump sum payment for maintenance in accordance with Clause 17.5b and Schedule-R, without prejudice to the rights of the Authority under this Agreement, including Termination thereof.
- (ii) If the nature and extent of any Defect justifies more time for its repair or rectification than the time given by the Authorities Engineer's, the Contractor shall be entitled to additional time in conformity with Good Industry Practice. Such additional time shall be determined by the Authority's Engineer and conveyed to the Contractor and the Authority with reasons thereof.

#### **15A.6 Authority's right to take remedial measures**

In the event the Contractor does not maintain and/or repair the Project [KAVACH] or any part thereof in conformity with the Maintenance Requirements, the Maintenance Manual or the Maintenance Programme, as the case may be, and fails to commence remedial works within 10 (ten) days of receipt of the Maintenance Inspection Report under Clause 15B.2 or a notice in this behalf from the Authority or the Authority's Engineer, as the case may be, the Authority shall, without prejudice to its rights under this Agreement including Termination thereof, be entitled to undertake such remedial measures at the cost of the Contractor, and to recover its cost from the Contractor. In addition to recovery of the aforesaid cost, a sum equal to 20% (twenty per cent) of such cost shall be paid by the Contractor to the Authority as Damages.

#### **15A.7 Restoration of loss or damage to Project [KAVACH] System**

Save and except as otherwise expressly provided in this Agreement, in the event that the Project KAVACH or any part thereof suffers any loss or damage during the Maintenance from any cause attributable to the Contractor, the Contractor shall, at its

cost and expense, rectify and remedy such loss or damage forthwith so that the Project KAVACH conforms to the provisions of this Agreement.

#### **15A.8 Overriding powers of the Authority**

- (i) If in the reasonable opinion of the Authority, the Contractor is in material breach of its obligations under this Agreement and, in particular, the Maintenance Requirements, and such breach is causing or likely to cause material hardship or danger to the Users, the Authority may, without prejudice to any of its rights under this Agreement including Termination thereof, by notice require the Contractor to take reasonable measures immediately for rectifying or removing such hardship or danger, as the case may be.
- (ii) In the event that the Contractor, upon notice under Clause 15A.8 (i), fails to rectify or remove any hardship or danger within a reasonable period, the Authority may exercise overriding powers under this Clause 15A.8 (ii) and take over the performance of any or all the obligations of the Contractor to the extent deemed necessary by it for rectifying or removing such hardship or danger; provided that the exercise of such overriding powers by the Authority shall be of no greater scope and of no longer duration than is reasonably required hereunder; provided further that any costs and expenses incurred by the Authority in discharge of its obligations hereunder shall be recovered by the Authority from the Contractor, and the Authority shall be entitled to deduct any such costs and expenses incurred from the payments due to the Contractor under Clause 17.5b for the performance of its Maintenance obligations.
- (iii) In the event of a national emergency, civil commotion or any other circumstances specified in Clause 19.3, the Authority may take over the performance of any or all the obligations of the Contractor to the extent deemed necessary by it, and exercise such control over the Project KAVACH or give such directions to the Contractor as may be deemed necessary; provided that the exercise of such overriding powers by the Authority shall be of no greater scope and of no longer duration than is reasonably required in the circumstances which caused the exercise of such overriding power by the Authority. For the avoidance of doubt, it is agreed that the consequences of such action shall be dealt in accordance with the provisions of Article 19. It is also agreed that the Contractor shall comply with such instructions as the Authority may issue in pursuance of the provisions of this Clause 15A.8 (iii), and shall provide assistance and cooperation to the Authority, on a best effort basis, for performance of its obligations hereunder.
- (iv) Notwithstanding anything hereinabove, the Authority reserves the right to determine the contract as per provisions of Article 21.3 during the maintenance period.

#### **15A.9 Taking over Certificate**

The Maintenance Requirements set forth in Schedule-Q having been duly carried out, Maintenance Period as set forth in Clause 15A.1 having been expired and Authority's Engineer determining the Tests on Completion of Maintenance to be successful in

accordance with Schedule-S, the Authority will issue Taking Over Certificate to the Contractor substantially in the format set forth in Schedule-T.

**ARTICLE 15B**  
**Supervision and Monitoring during Maintenance**

**15B.1 Inspection by the Contractor**

- (i) The Authority's Engineer shall undertake regular inspections to evaluate continuously the compliance with the Maintenance Requirements.
- (ii) The Contractor shall carry out a detailed inspection of designated equipment/system in accordance with Schedule-Q or the guidelines contained in latest RDSO Technical Advisory Notes (TANs) issued time to time. Report of this inspection together with details of proposed maintenance works as required shall be conveyed to the Authority's Engineer forthwith. The Contractor shall complete the proposed maintenance works and send a compliance report to the Authority's Engineer.

**15B.2 Inspection and payments**

- (i) The Authority's Engineer may inspect the Project KAVACH at any time, but at least once every month, to ensure compliance with the Maintenance Requirements. It shall make a report of such inspection ("Maintenance Inspection Report") stating in reasonable detail the Defects or deficiencies, if any, with particular reference to the Maintenance Requirements, the Maintenance Manual, and the Maintenance Programme, and send a copy thereof to the Authority and the Contractor within 10 (ten) days of such inspection.
- (ii) The Authority's Engineer shall compile the inspection reports issued by Railway Personnel from time to time and advise Contractor to undertake corrective action in time bound manner.
- (iii) After the Contractor submits to the Authority's Engineer the Monthly Maintenance Statement for the Project KAVACH pursuant to Clause 17.5a, the Authority's Engineer shall carry out an inspection within 10 (ten) days to certify the amount payable to the Contractor. The Authority's Engineer shall inform the Contractor of its intention to carry out the inspection at least 3 (three) business days in advance of such inspection. The Contractor shall assist the Authority's Engineer in verifying compliance with the Maintenance Requirements.
- (iv) For each case of non-compliance of Maintenance Requirements as specified in the inspection report of the Authority's Engineer, the Authority's Engineer shall calculate the amount of reduction in payment in accordance with the formula specified in Schedule-R.
- (v) Any deduction made on account of non-compliance will not be paid subsequently even after establishing the compliance thereof. Such deductions will continue to be made every month until the compliance is procured.

### **15B.3 Maintenance Report**

No later than 15 (fifteen) days after a Scheduled Maintenance, Unscheduled Maintenance or any maintenance carried out by the Contractor, as the case may be, the Contractor shall submit, in such form as the Authority may specify, a report containing particulars of maintenance carried out by the Contractor including

- (i) An analysis of the defects and deficiencies (if any) affecting the performance or safe operation of the Equipment/System;
- (ii) Details of Failure including date and time of such Failure, time of rectification of failures etc counter signed by Authority's Engineer.

### **15B.4 Reports of Unusual Occurrence**

The Contractor shall, during the Maintenance Period, prior to the close of each day, send to the Authority and the Authority's Engineer, by facsimile or e-mail, a report stating accidents and unusual occurrences on the Project [KAVACH] relating to the safety and security of the Users and Project [KAVACH]. A monthly summary of such reports shall also be sent within 3 (three) business days of the closing of month. For the purposes of this Clause 15B.5, accidents and unusual occurrences on the Project [KAVACH] shall include:

- (1.a) accident/unusual incidences;
- (1.b) damaged/dislodged/fire/theft of fixed equipment;
- (1.c) any prolong/repeated failure of system during the month;
- (1.d) any other unusual occurrence.

**ARTICLE 16**  
**AUTHORITY ENGINEER**

**16.1 Appointment of the Authority Engineer**

- 16.1.1 The Authority shall appoint a railway engineer / Project Management Services (PMS) Agency, to be the engineer under this Agreement (the “**Authority Engineer**”).
- 16.1.2 The appointment of the Authority Engineer shall be made no later than 30 (Thirty) days from the date of this Agreement. The Authority shall notify the appointment or replacement of the Authority Engineer to the Contractor.
- 16.1.3 The staff of the Authority Engineer shall include suitably qualified engineers and other professionals who are competent to assist the Authority Engineer to carry out its duties.

**16.2 Duties and functions of the Authority Engineer**

- 16.2.1 The Authority Engineer shall perform its duties and discharge its functions in accordance with the provisions of this Agreement, and substantially in accordance with the duties and responsibilities set forth in Annex 1 of Schedule L, but subject to obtaining prior written approval of the Authority before determining:
- (a) any Time Extension;
  - (b) any additional cost to be paid by the Authority to the Contractor;
  - (c) the Termination Payment;
  - (d) providing Power Block or Traffic Block or necessary disconnections to the Contractor;
  - (e) approval of signalling & interlocking plan and Kavach control chart; and alterations in ESP if essentially required;
  - (f) approval of disconnections for modification of signalling and telecom works, or
  - (g) any other matter which is not specified in (a) to (f) above and which creates an obligation or liability on either Party for a sum exceeding Rs.5,000,000 (Rupees fifty lakh).
- 16.2.2 No decision or communication of the Authority Engineer shall be effective or valid unless it is accompanied by an attested true copy of the approval of the Authority for and in respect of any matter specified in Clause 16.2.1.
- 16.2.3 The Authority Engineer shall submit regular periodic reports, at least once every month, to the Authority in respect of its duties and functions assigned to him for the project. Such reports shall be submitted by the Authority Engineer within 10 (ten) days of the beginning of every month.
- 16.2.4 A true copy of all communications sent by the Authority to the Authority Engineer and by the Authority Engineer to the Authority shall be sent forthwith by the Authority Engineer to the Contractor.

16.2.5 A true copy of all communications sent by the Authority Engineer to the Contractor and by the Contractor to the Authority Engineer shall be sent forthwith by the Authority Engineer to the Authority.

### **16.3 Authorised signatories**

The Authority Engineer will designate and notify to the Contractor up to 2 (two) persons under him to sign for and on behalf of the Authority Engineer, and any communication or document required to be signed by the Authority Engineer shall be valid and effective only if signed by any of the designated persons; provided that the Authority Engineer may, by notice in writing, substitute any of the designated persons by any of its employees.

### **16.4 Instructions of the Authority Engineer**

16.4.1 The Authority Engineer may issue to the Contractor instructions for remedying any Defect. The Contractor shall take such instructions from the Authority Engineer only.

16.4.2 The instructions issued by the Authority Engineer shall be in writing. However, if the Authority Engineer issues any oral instructions to the Contractor, it shall confirm in writing the oral instructions within 2 (two) working days of issuing them.

16.4.3 In case the Contractor does not receive the confirmation of the oral instructions within the time specified in Clause 16.4.2, the Contractor shall seek the written confirmation of the oral instructions from the Authority Engineer and shall obtain acknowledgement from the Authority Engineer of the communication seeking written confirmation. In case of failure of the Authority Engineer to reply to the Contractor within 2 (two) days of the receipt of the communication from the Contractor, the Contractor may not carry out the instruction.

### **16.5 Determination by the Authority Engineer**

16.5.1 The Authority Engineer shall consult with each Party in an endeavour to reach agreement wherever this Agreement provides for the determination of any matter by the Authority Engineer. If such agreement is not achieved, the Authority Engineer shall make a fair determination in accordance with this Agreement having due regard to all relevant circumstances. The Authority Engineer shall give notice to both the Parties of each such agreement or determination, with supporting particulars.

16.5.2 Each Party shall give effect to each agreement or determination made by the Authority Engineer in accordance with the provisions of this Agreement. Provided, however, that if any Party disputes any instruction, decision, direction or determination of the Authority Engineer, the Dispute shall be resolved in accordance with the Dispute Resolution Procedure as per article 24.

### **16.6 Remuneration of the Authority Engineer**

The remuneration, cost and expenses of the Authority Engineer shall be borne by the Authority.

### **16.7 Replacement of the Authority Engineer**

16.7.1 The Authority may, in its discretion, replace the Authority Engineer at any time, but only upon appointment of another Authority Engineer in accordance with Clause 16.1.



16.7.2 If the Contractor has reasons to believe that the Authority Engineer is not discharging its duties and functions in accordance with the provisions of this Agreement, it may make a written representation to the Authority and seek replacement of the Authority Engineer. Upon receipt of such representation, the Authority shall hold a tripartite meeting with the Contractor and Authority Engineer and make best efforts for an amicable resolution of the Dispute. After due consideration, The Authority will decide about the replacement of Authority Engineer or otherwise. However, if Contractor is not satisfied with decision of Authority, the Dispute shall be resolved in accordance with Depute Resolution Procedure as per article 24. In the event that the Authority Engineer is to be replaced, the Authority shall appoint forthwith another Authority Engineer in accordance with Clause 16.1.

## **16.8 Interim Arrangement**

In the event that the Authority has not appointed an Authority Engineer, or the Authority Engineer so appointed has relinquished its functions, the Authority may, in the interim, designate and authorise any person to discharge the functions of the Authority Engineer in accordance with the provisions of this Agreement, save and except that such person shall not exercise any functions relating to review, comment, approval or inspection as specified in this Agreement for and in respect of the Authority Engineer, and such functions shall be discharged as and when an Authority Engineer is appointed in accordance with the provisions of this Agreement. Provided, however, that nothing contained in this Clause 16.8 shall in any manner restrict the rights of the Authority to enforce compliance of the provisions of this Agreement.

Part IV

**Financial Covenants**

## ARTICLE 17

### PAYMENTS

#### 17.1 Contract Price

- 17.1.1 The Authority shall make payments to the Contractor for the Works on the basis of the lump sum price accepted by the Authority in consideration of the obligations specified in this Agreement for an amount of Rs. \*\*\*\*\* (Rs. \*\*\*\*\*) (the “**Contract Price**”), of Rs. \*\*\*\*\* (Rs. \*\*\*\*\*) under schedule G and on the basis of actual work done for an amount of Rs. \*\*\*\*\*] (the “**Contract Price**” [= Sum of schedule G and Schedule G1= Rs \*\*\*\*\* Rs \*\*\*\*\*]), which shall be subject to adjustments in accordance with the provisions of this Agreement. For the avoidance of doubt, the Parties expressly agree that the Contract Price shall not include the cost of Maintenance, which shall be paid separately in accordance with the provisions of Clause 17.5b. The Parties further agree that save and except as provided in this Agreement, the Contract Price shall be valid and effective until issue of Completion Certificate.
- 17.1.2 The Contract Price includes all duties, taxes, royalty, and fees that may be levied in accordance with the laws and regulations in force as on the Base Month on the Contractor’s equipment, Plant, Materials and supplies acquired for the purpose of this Agreement and on the on the Works undertaken under this Agreement. Nothing in this Agreement shall relieve the Contractor from its responsibility to pay any tax including any tax that may be levied in India on profits made by it in respect of this Agreement.
- 17.1.3 The Contract Price shall not be adjusted for any change in duties, taxes etc. specified in Clause 17.1.2 above, save and except as specified in Clauses 17.8 and 17.13.
- 17.1.4 The Contract Price shall not be adjusted to take account of any unforeseen difficulties or costs, unless otherwise provided for in this Agreement.
- 17.1.5 Unless otherwise specified in this Agreement, the Contract Price covers all the Contractor’s obligations for the Works under this Agreement and all things necessary for the Construction thereof and for the rectification of any Defects in the Railway Project.
- 17.1.6 All payments under this Agreement shall be made in Indian Rupees.

#### 17.2 Advance Payment

- 17.2.1 Upon receiving request from Contractor, the Authority shall make an advance payment (the “**Advance Payment**”), up to 10% (ten percent)<sup>14</sup> of the Contract Price, for mobilisation expenses and for acquisition of equipment, which shall carry simple interest at the rate of Bank Rate plus 4% per annum and shall be made in two instalments of upto maximum 5% (five per cent) of the contract price each.
- 17.2.2 The Contractor may apply to the Authority for the first instalment of the Advance Payment at any time after the Appointed Date, along with an irrevocable and unconditional guarantee from a Bank for an amount equivalent to 110% (one hundred

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<sup>14</sup>For large value (Contract price not less than 500 cr.) or complex projects, the Advance Payment may be increased from 10% (ten per cent) to up to 15% (fifteen per cent) of the Contract Price.

and ten per cent) of such instalment, substantially in the form provided at Annex-III of Schedule-F, to remain effective till the complete and full repayment thereof.

- 17.2.3 At any time, after 60 (sixty) days from the Appointed Date, the Contractor may apply to the Authority for the second instalment of the Advance Payment along with an irrevocable and unconditional guarantee from a Bank for an amount equivalent to 110% (one hundred and ten per cent) of such instalment, substantially in the form provided at Annex-III of Schedule-F, to remain effective till the complete and full repayment thereof along with proof of utilization of 1<sup>st</sup> instalment.
- 17.2.4 The instalments of Advance Payment shall generally be paid by the Authority to the Contractor within 15 (fifteen) days of the receipt of its respective requests in accordance with the provisions of this Clause 17.2.
- 17.2.5 The Advance Payment shall be recovered through proportionate deductions to be made in the Interim Payments Certificates issued in accordance with the provisions of Clause 17.5.2. Deductions of Advance Payment shall commence from the Interim Payment Certificate in which the cumulative interim payments certified shall have reached 50% (fifty per cent) of the Contract Price. The total amount recovered in each Interim Payment Certificate shall be equal to 30% (thirty per cent) of the amount of interim payment due and payable under such Interim Payment Certificate, and interest on the amount being recovered to be calculated from the date of disbursement of the Advance Payment to the date of recovery until the entire Advance Payment together with interest is recovered. For the avoidance of doubt, the Parties agree that in the event the total payment specified in any Interim Payment Certificate exceeds the limit of 50% (fifty per cent) of the Contract Price, the proportionate of recovery hereunder shall be restricted to the amount exceeding 50% (fifty per cent) of the Contract Price. By way of illustration, the Parties agree that if the first recovery of say, Rupees 'x' is made after 20 (twenty) months from the date of 1<sup>st</sup> (first) instalment of the Advance Payment, the interest will be recovered on Rupees 'x' for a period of 20 (twenty) months; and when the next recovery is made in the following month for say, Rupees 'y', interest on Rupees 'y' will be computed for a period of 21 (twenty one) months. The Parties further agree that no payments in excess of 90% (ninety per cent) of the Contract Price shall be released until the Advance Payment, including interest thereon, has been fully recovered.
- 17.2.6 If the Advance Payment has not been fully repaid prior to Termination under Clause 19.7 or Article 21, as the case may be, the whole of the balance then outstanding shall immediately become due and payable by the Contractor to the Authority. In the event of Termination due to Contractor's Default, the Advance Payment shall be deemed to carry interest at an annual rate of 4% (four per cent) above the Bank Rate from the date of Advance Payment to the date of recovery by encashment of bank guarantee for the Advance Payment. For the avoidance of doubt, the aforesaid interest shall be payable on each instalment of the Advance Payment, regardless of whether the instalment or any part thereof has been repaid to the Authority prior to Termination.

### **17.3 Procedure for estimating the payment for the Works**

- 17.3.1 The Authority shall make interim payments to the Contractor, as certified by the Authority Engineer on completion of a Stage, for a length, number or area as specified, and valued in accordance with the proportion of the Contract Price assigned to each item

and its stage and payment procedure in Schedule-G or/and as per actual execution of items as specified for works under schedule G1..

17.3.2 The Contractor shall base its claim for interim payment for the stages completed for works under schedule G or/and as per execution of items for works under schedule G1 till the end of the month for which the payment is claimed, valued in accordance with Clause 17.3.1, supported with necessary particulars and documents in accordance with this Agreement.

17.3.3 Any reduction in the Contract Price arising out of Change of Scope or the Works withdrawn under Clause 8.3, as the case may be, shall not affect the amounts payable for the items or stage payments thereof which are not affected by such Change of Scope or withdrawal. For the avoidance of doubt and by way of illustration, the Parties agree that if the amount assigned to Important Bridges and/or Major Bridges is reduced from Rs.100 crore to Rs. 80 crores owing to Change of Scope or withdrawal of Works, as the case may be, the reduction in payment shall be restricted to the relevant payments for Important Bridges and/or Major Bridges and the payment due in respect of all other stage payments under the item Important Bridges and/or Major Bridges shall not be affected in any manner. The Parties further agree that the adjustments arising out of the aforesaid modifications shall be carried out in a manner that the impact of such modifications is restricted to the said Change of Scope or withdrawal, as the case may be, and does not alter the payments due for and in respect of items or stage payments which do not form part of such Change of Scope or withdrawal.

#### **17.4 Stage Payment Statement for Works**

The Contractor shall submit a statement (the “**Stage Payment Statement**”), in 3 copies, by the 7<sup>th</sup> (seventh) day of a month to the Authority Engineer in the form set forth in Schedule-M, showing the amount calculated in accordance with Clause 17.3 to which the Contractor considers itself entitled for the completed stage(s) of Works under schedule G or/and completed items of works under schedule G1. The Stage Payment Statement shall be accompanied with the progress reports and any other supporting documents. The Contractor shall not submit any claim for payment of incomplete stages of work. In the event that there is no claim for a month in accordance with the provisions of this Clause 17.4, the Contractor shall submit a nil claim to the Authority Engineer.

#### **17.5 Stage Payment for Works**

17.5.1 Within 10 (ten) days of receipt of the Stage Payment Statement from the Contractor pursuant to Clause 17.4, the Authority Engineer shall broadly determine the amount due to the Contractor and recommend the release of 80 (eighty) percent of the amount so determined as part payment against the Stage Payment Statement, pending issue of the Interim Payment Certificate (IPC) by the Authority Engineer. Within 5 (five) days of the receipt of recommendation of the Authority Engineer as above, the Authority shall make electronic payment directly to the Contractor’s bank account.

17.5.2 Within 20 (twenty) days of the receipt of the Stage Payment Statement referred to in Clause 17.4, the Authority Engineer shall determine and shall deliver to the Authority and the Contractor an IPC certifying the amount due and payable to the Contractor, after adjusting the payments already released to the Contractor against the said statement. For the avoidance of doubt, the Parties agree that the IPC shall specify all the amounts that have been deducted from the Stage Payment Statement and the reasons therefor.

17.5.3 In cases where there is a difference of opinion as to the value of any stage, the opinion of the Authority Engineer shall prevail and interim payments shall be made to the Contractor on this basis; provided that the foregoing shall be without prejudice to the Contractor's right to raise a Dispute.

17.5.4 The Authority Engineer may, for reasons to be recorded, withhold from payment:

- (a) the estimated value of work or obligation that the Contractor has failed to perform in accordance with this Agreement and in respect of which the Authority Engineer had notified the Contractor; and
- (b) the estimated cost of rectification of any Works which have not been constructed in accordance with this Agreement.

17.5.5 Payment by the Authority shall not be deemed to indicate the Authority acceptance, approval, consent or satisfaction with the work done.

17.5.6 In the event the amounts released by the Authority under Clause 17.5.1 exceed the amount finally determined by the Authority Engineer pursuant to Clauses 17.5.2 to 17.5.4, the difference thereof shall be accounted for in the next IPC.

#### **17.5a Monthly Maintenance Statement of the Project KAVACH**

The Contractor shall submit to the Authority's Engineer a monthly maintenance statement ("Monthly Maintenance Statement") in 3 (three) copies by the 7 (seventh) day of each month in the format set forth in Schedule-M for the Maintenance of the Project KAVACH during the previous month.

#### **17.5b Payment for Maintenance of the Project KAVACH**

(i) Within 15 (fifteen) days of receipt of the Monthly Maintenance Statement from the Contractor pursuant to Clause 17.5a, the Authority's Engineer shall verify the Contractor's monthly maintenance statement and certify the amount to be paid to the Contractor taking into account:

- (a) Compliance with the Maintenance Requirements; and
- (b) reduction for non-compliance with the Maintenance Requirement in accordance with Clause 17.5b.

The Authority's Engineer shall deliver to the Authority an IPC approving or amending the monthly maintenance statement to reflect the amount due to the Contractor in accordance with this Agreement.

(ii) If the Maintenance Requirements set forth in Schedule-Q are not met, reduction in payments shall be made in accordance with the provisions of Schedule-R. The reductions for non-compliance with the Maintenance Requirements shall be applied on the basis of monthly inspections by the Authority's Engineer.

(iii) The deduction made on account of non-compliance with the Maintenance Requirements shall not be subsequently considered for payment after the compliance is achieved by repair or rectification.

(iv) The monthly lump sum amount payable for Maintenance shall be 1/12<sup>th</sup> (one-twelfth) of the annual cost of Maintenance as specified in Clause 15A.1.

The Authority shall pay to the Contractor every quarter any amount due under any IPC under this Clause 17.5b. The payment shall be made no later than 30 (thirty) days from the date of submission of the last IPC for the relevant quarter.

#### **17.6 Payment of Damages**

17.6.1 The Contractor as well as the Authority may claim Damages due and payable to it in accordance with the provisions of this Agreement.

17.6.2 The Authority Engineer shall verify and check the claim and issue the IPC within 20 (twenty) days of the receipt of the claim under Clause 17.6.1, after making adjustments in accordance with the provisions of this Agreement. The Authority shall pay to the Contractor the amount due under such IPC within a period of 30 (thirty) days from the date of the submission of the claim under this Clause 17.6. In the event of the failure of the Authority to make payment to the Contractor within the specified time, the Authority shall be liable to pay to the Contractor interest thereon and the provisions of Clause 17.7 shall apply *mutatis mutandis* thereto.

#### **17.7 Time of payment and interest**

17.7.1 The Authority shall pay to the Contractor any amount due under any payment certificate issued by the Authority Engineer in accordance with the provisions of this Article 17, or in accordance with any other clause of this Agreement as follows:

- (a) Payment shall be made no later than 30 (thirty) days from the date of submission of the Stage Payment Statement by the Contractor to the Authority Engineer for certification in accordance with the provisions of Clause 17.4 for an IPC; provided, however, that in the event the IPC is not issued by the Authority Engineer within the aforesaid period of 30 (thirty) days, the Authority shall pay the amount shown in the Contractor's Stage Payment Statement and any discrepancy therein shall be adjusted in the next payment certificate; and
- (b) payment shall be made no later than 30 (thirty) days from the date of submission of the Final Payment Certificate for Works along with the discharge submitted to the Authority Engineer for certification in accordance with the provisions of Clause 17.12.

17.7.2 In the event of failure of the Authority to make payment to the Contractor within the time period specified in this Clause 17.7, the Authority shall be liable to pay to the Contractor interest at a rate equal to the Bank Rate plus 3%, calculated at quarterly rests, on all sums remaining unpaid from the date by which the same should have been paid, calculated in accordance with the provisions of Clause 17.7.1 (a) and (b) and till the date of actual payment.

#### **17.8 Price adjustment for Works**

Not Applicable for KAVACH work.

#### **17.9 Restrictions on price adjustment**

Price adjustment shall be due and payable only in respect of the stages of Works for which the Stage Payment Statement has been submitted by the Contractor no later than 30 (thirty) days from the date of the applicable Project Milestone or the Scheduled Completion Date, as the case may be, including any Time Extension granted there for in accordance with the provisions of this Agreement. For the avoidance of doubt, in the

event of submission of any Stage Payment Statement after the period specified herein, price adjustment shall be applicable only until the date of the respective Project Milestone or the Scheduled Completion Date, as the case may be.

#### **17.9a Price adjustment for Maintenance of Project KAVACH**

Lump sum payment for Maintenance shall be adjusted every quarter for changes in rates and prices of various inputs in accordance with the formula given below:

$$V = P \times (W_i - W_0) / W_0$$

Where

V = Increase or decrease in the quarterly lump sum payment

P = Quarterly lump sum payment due to the Contractor after adjusting any reduction in payment for non-compliance of the Maintenance Requirements

$W_0$  = The wholesale price index (all commodities) for the month of the Base Date.

$W_i$  = The wholesale price index (all commodities) for the first day of the quarter under consideration for determining the price adjustment.

#### **17.10 Final Payment Statement**

17.10.1 Within 60 (sixty) days of receiving the Completion Certificate under Clause 12.4, the Contractor shall submit to the Authority Engineer six copies of a final payment statement (the “**Final Payment Statement**”), with supporting documents, in the form prescribed by the Authority Engineer:

- (a) the summary of Contractor’s Stage Payment Statements for Works as submitted in accordance with Clause 17.4;
- (b) the amounts received from the Authority against each claim; and
- (c) any further sums which the Contractor considers due to it from the Authority.

17.10.2 If the Authority Engineer disagrees with or cannot verify any part of the Final Payment Statement, the Contractor shall submit such further information as the Authority Engineer may reasonably require. The Authority Engineer shall deliver to the Authority:

- (i) an IPC for those parts of the Final Payment Statement which are not in dispute, along with a list of disputed items which shall then be settled in accordance with the provisions of Article 24; or
- (ii) a Final Payment Certificate in accordance with Clause 17.15, if there are no disputed items.

17.10.3 If the Authority Engineer does not prescribe the form referred to in Clause 17.10.1 within 7 (Seven) days of the date of issue of the Completion Certificate, the Contractor shall submit the statement in such form as it deems fit.



### **17.11 Discharge**

Upon submission of the Final Payment Statement under Clause 17.10, the Contractor shall give to the Authority, with a copy to the Authority Engineer, a written discharge confirming that the total of the Final Payment Statement represents full and final settlement of all monies due to the Contractor in respect of this Agreement for all the Works arising out of this Agreement, except for any monies due to either Party on account of any Defect. Provided that such discharge shall become effective only after the payment due has been made in accordance with the Final Payment Certificate issued pursuant to Clause 17.12.

### **17.12 Final Payment Certificate**

17.12.1 Within 30 (thirty) days after receipt of the Final Payment Statement under Clause 17.10, and the written discharge under Clause 17.11, and there being no disputed items of claim, the Authority Engineer shall deliver to the Authority, with a copy to the Contractor, a final payment certificate (the “**Final Payment Certificate**”) stating the amount which, in the opinion of the Authority Engineer, is finally due under this Agreement or otherwise. For the avoidance of doubt, before issuing the Final Payment Certificate, the Authority Engineer shall ascertain from the Authority all amounts previously paid by the Authority, all sums due to the Authority, and the balance, if any, due from the Authority to the Contractor or from the Contractor to the Authority, as the case may be.

17.12.2 The Authority shall, in accordance with the provisions of Clause 17.7, pay to the Contractor the amount which is specified as being finally due in the Final Payment Certificate.

#### **17.12a Final payment statement for Maintenance**

(i) Within 30 (thirty) days after completion of the Maintenance Period, the Contractor shall submit to the Authority’s Engineer 6 (six) copies of the final payment statement for Maintenance of the Project KAVACH, with supporting documents showing the details set forth below in the form prescribed by the Authority’s Engineer:

- (a) the total amount claimed in accordance with clause 17.5b (i) and
- (b) any sums which the Contractor considers to be due to it, with supporting documents.

(ii) The Authority’s Engineer shall certify final payment within 30 (thirty) days of the receipt of the final payment statement of Maintenance under Clause 17.13 (i), segregating the items of amount payable from the items of amount disallowed. The Authority shall make payment on the basis of the final payment authorised by the Authority’s Engineer within a period of 30 (thirty) days of the receipt of the Final Payment Statement from the Authority’s Engineer.

(iii) If the Authority’s Engineer does not prescribe the form within 15 (fifteen) days of the date of issue of the Completion Certificate, the Contractor shall submit the statement in such form as it deems fit.

### **17.13 Change in law**

17.13.1 If as a result of Change in Law, the Contractor suffers any additional costs in the execution of the Works or in relation to the performance of its other obligations under this Agreement, the Contractor shall, within 15 (fifteen) days from the date it becomes reasonably aware of such addition in costs, notify the Authority with a copy to the Authority Engineer of such additional costs due to Change in Law.

17.13.2 If as a result of Change in Law, the Contractor benefits from any reduction in costs for the execution of this Agreement or in accordance with the provisions of this Agreement, either Party shall, within 15 (fifteen) days from the date it becomes reasonably aware of such reduction in costs, notify the other Party with a copy to the Authority Engineer of such reduction in costs due to Change in Law.

17.13.3 The Authority Engineer shall, within 15 (fifteen) days from the date of receipt of notice from the Contractor or the Authority, as the case may be, determine any addition or reduction to the Contract Price, as the case may be, due to the Change in Law.

#### **17.14 Correction of Interim Payment Certificates**

The Authority Engineer may by an Interim Payment Certificate make any correction or modification in any previous Interim Payment Certificate issued by the Authority Engineer.

#### **17.15 Authority's claims**

If the Authority considers itself to be entitled to any payment from the Contractor under any Clause of this Agreement, it shall give notice and particulars to the Contractor 20 (twenty) days before making the recovery from any amount due to the Contractor, and shall take into consideration the representation, if any, made by the Contractor in this behalf, before making such recovery.

#### **17.16 Bonus for early completion**

In the event that the Project Completion Date occurs prior to the Scheduled Completion Date, the Contractor shall be entitled to receive a payment of bonus equivalent to 0.03% (zero point zero three per cent) of the Contract Price for each day by which the Project Completion Date precedes the Scheduled Completion Date, but subject to a maximum of 5% (five per cent) of the Contract Price. Provided, however, that the payment of bonus, if any, shall be made only after the issue of the Completion Certificate. For the avoidance of doubt, the Parties agree that for the purpose of determining the bonus payable hereunder, the Contract Price shall always be deemed to be the amount specified in Clause 17.1.1, and shall exclude any revision thereof for any reason.

ARTICLE 18  
INSURANCE

**18.1 Insurance for Works**

18.1.1 The Contractor shall affect and maintain at its own cost the insurances specified in Schedule-N and as per the requirements of Applicable Laws.

18.1.2 Subject to the provisions of Clause 19.6, the Contractor shall, in accordance with the provisions of this Agreement, be liable to bear the cost of any loss or damage that does not fall within the scope of this Article 18 or cannot be recovered from the insurers.

18.1.3 Subject to the exceptions specified in Clause 18.1.4 below, the Contractor shall fully indemnify, hold harmless and defend the Authority from and against any and all losses, damages, costs, charges and/or claims with respect to:

- (a) the death of or injury to any person; or
- (b) the loss of or damage to any property;

that may arise out of or in consequence of any breach by the Contractor of this Agreement during the execution of the Works or the remedying of any Defects therein.

18.1.4 Notwithstanding anything stated above in Clause 18.1.3, the Authority shall fully indemnify the Contractor from and against any and all losses, damages, costs, charges, proceedings and/or claims arising out of or with respect to

- (a) the use or occupation of land or any part thereof by the Authority;
- (b) the damage to property which is the unavoidable result of the execution and completion of the Works, or the remedying of any Defects therein, in accordance with this Agreement; and
- (c) the death of or injury to persons or loss of or damage to property resulting from any act or neglect of the Authority, its agents, servants or other contractors, not being employed by the Contractor.

Provided, that in the event of any injury or damage as a result of the contributory negligence of the Contractor, the Authority shall be liable to indemnify the Contractor from and against any and all losses, damages, costs, charges, proceedings and/or claims to the extent proportionate to the liability of the Authority, its servants or agents or other contractors not associated with the Contractor in such injury or damage.

18.1.5 Without prejudice to the obligations of the parties as specified under Clauses 18.1.3 and 18.1.4, the Contractor shall maintain or effect such third party insurances as may be required under Applicable Laws.

18.1.6 The Contractor shall provide to the Authority, within 30 days of the Appointed Date, evidence of professional liability insurance maintained by its Design Director and/or consultants to cover the risk of professional negligence in the design of Works. The professional liability cover shall be for a sum of not less than [3% (three per cent)] of the Contract Price and shall be maintained until the end of the Defects Liability Period.

## **18.2 Notice to the Authority**

No later than 15 (fifteen) days after the date of this Agreement, the Contractor shall by notice furnish to the Authority, in reasonable detail, information in respect of the insurances that it proposes to effect and maintain in accordance with this Article 18. Within 15 (fifteen) days of receipt of such notice, the Authority may require the Contractor to effect and maintain such other insurances as may be necessary pursuant hereto, and in the event of any difference or disagreement relating to any such insurance, the Dispute Resolution Procedure shall apply.

## **18.3 Evidence of Insurance Cover**

18.3.1 All insurances obtained by the Contractor in accordance with this Article 18 shall be maintained with insurers on terms consistent with Good Industry Practice. Within 10(ten) days of obtaining any insurance cover, the Contractor shall furnish to the Authority notarised true copies of the certificate(s) of insurance, copies of insurance policies and premia payment receipts in respect of such insurance, and no such insurance shall be cancelled, modified, or allowed to expire or lapse until the expiration of at least 45 (forty-five) days after notice of such proposed cancellation, modification or non-renewal has been delivered by the Contractor to the Authority. The Contractor shall act in accordance with the directions of the Authority.

18.3.2 The Contractor shall procure and ensure the adequacy of the insurances at all times in accordance with the provisions of this Agreement.

## **18.4 Remedy for failure to insure**

If the Contractor shall fail to effect and keep in force all insurances for which it is responsible pursuant hereto, the Authority shall have the option to either keep in force any such insurances, and pay such premia and recover the costs thereof from the Contractor, or in the event of computation of a Termination Payment, treat an amount equal to the Insurance Cover as deemed to have been received by the Contractor. If either the Contractor or the Authority fails to comply with any condition of the insurances effected under the contract, the Party so failing to comply shall indemnify the other Party against all direct losses and claims (including legal fees and expenses) arising from such failure.

## **18.5 Waiver of subrogation**

All insurance policies in respect of the insurance obtained by the Contractor pursuant to this Article 18 shall include a waiver of any and all rights of subrogation or recovery of the insurers thereunder against, inter alia, the Authority, and its assigns, successors, undertakings and their subsidiaries, Affiliates, employees, insurers and underwriters, and of any right of the insurers to any set-off or counterclaim or any other deduction, whether by attachment or otherwise, in respect of any liability of any such person insured under any such policy or in any way connected with any loss, liability or obligation covered by such policies of insurance.

## **18.6 Contractor's waiver**

The Contractor hereby further releases, assigns and waives any and all rights of subrogation or recovery against, inter alia, the Authority and its assigns, undertakings and their subsidiaries, Affiliates, employees, successors, insurers and underwriters,

which the Contractor may otherwise have or acquire in or from or in any way connected with any loss, liability or obligation covered by policies of insurance maintained or required to be maintained by the Contractor pursuant to this Agreement (other than third party liability insurance policies) or because of deductible clauses in or inadequacy of limits of any such policies of insurance.

#### **18.7 Cross liabilities**

Any such insurance maintained or effected in pursuance of this Article 18 shall include a cross liability clause such that the insurance shall apply to the Contractor and to the Authority as separately insured.

#### **18.8 Accident or injury to workmen**

Notwithstanding anything contained in this Agreement, it is hereby expressly agreed between the Parties that the Authority shall not be liable for or in respect of any damages or compensation payable to any workman or other person in the employment of the Contractor or Sub-contractor, save and except as for death or injury resulting from any act, omission or default of the Authority, its agents or servants. The Contractor shall indemnify and keep indemnified the Authority from and against all such claims, proceedings, damages, costs, charges, and expenses whatsoever in respect of the above save and except for those acts, omissions or defaults for which the Authority shall be liable.

#### **18.9 Insurance against accident to workmen**

The Contractor shall affect and maintain during the Agreement such insurances as may be required to insure the Contractor's personnel and any other persons employed by it on the Railway Project from and against any liability incurred in pursuance of this Article 18 Provided that for the purposes of this Clause 18.9, the Contractor's personnel/any person employed by the Contractor shall include the Sub-contractor and its personnel. Provided further that in respect of any persons employed by any Sub-contractor, the Contractor's obligations to insure as aforesaid under this Clause 18.9 shall be discharged if the Sub-contractor shall have insured against any liability in respect of such persons in such manner that the Authority is indemnified under the policy. The Contractor shall require such Sub-contractor to produce before the Authority, when required, such policy of insurance and the receipt for payment of the current premium within 10 (ten) days of such demand being made by the Authority.

#### **18.10 Application of insurance proceeds**

The proceeds from all insurance claims, except for life and injury, shall be applied for any necessary repair, reconstruction, reinstatement, replacement, improvement, delivery or installation of the Railway Project and the provisions of this Agreement in respect of construction of Works shall apply *mutatis mutandis* to the Works undertaken out of the proceeds of insurance.

#### **18.11 Compliance with policy conditions**

The Contractor expressly acknowledges and undertakes to fully indemnify the Authority from and against all losses and claims arising from the Contractor's failure to comply with conditions imposed by the insurance policies effected in accordance with this Agreement.

Part V

**Force Majeure and Termination**

ARTICLE 19  
**FORCE MAJEURE**

**19.1 Force Majeure**

As used in this Agreement, the expression “**Force Majeure**” or “**Force Majeure Event**” shall mean occurrence in India of any or all of Non-Political Event, Indirect Political Event and Political Event, as defined in Clauses 19.2, 19.3 and 19.4 respectively, if it affects the performance by the Party claiming the benefit of Force Majeure (the “**Affected Party**”) of its obligations under this Agreement and which act or event (a) is beyond the reasonable control of the Affected Party, and (b) the Affected Party could not have prevented or overcome by exercise of due diligence and following Good Industry Practice, and (c) has Material Adverse Effect on the Affected Party.

**19.2 Non-Political Event**

A Non-Political Event shall mean one or more of the following acts or events:

- (a) act of God, epidemic, extremely adverse weather conditions, lightning, earthquake, landslide, cyclone, flood, volcanic eruption, chemical or radioactive contamination or ionising radiation, fire or explosion (to the extent of contamination or radiation or fire or explosion originating from a source external to the Site);
- (b) strikes or boycotts (other than those involving the Contractor, Sub-contractors or their respective employees/representatives, or attributable to any act or omission of any of them) interrupting supplies and services to the Railway Project for a continuous period of 24 (twenty-four) hours and an aggregate period exceeding 10 (ten) days in an Accounting Year, and not being an Indirect Political Event set forth in Clause 19.3;
- (c) any failure or delay of a Sub-contractor but only to the extent caused by another Non-Political Event;
- (d) any judgement or order of any court of competent jurisdiction or statutory authority made against the Contractor in any proceedings for reasons other than (i) failure of the Contractor to comply with any Applicable Law or Applicable Permit, or (ii) on account of breach of any Applicable Law or Applicable Permit or of any contract, or (iii) enforcement of this Agreement, or (iv) exercise of any of its rights under this Agreement by the Authority; or (v) breach of its obligations by the Contractor under its sub-contracts;
- (e) the discovery of geological conditions, toxic contamination or archaeological remains on the Site that could not reasonably have been expected to be discovered through a site inspection; or
- (f) any event or circumstances of a nature analogous to any of the foregoing.

### **19.3 Indirect Political Event**

An Indirect Political Event shall mean one or more of the following acts or events:

- (a) an act of war (whether declared or undeclared), invasion, armed conflict or act of foreign enemy, blockade, embargo, riot, insurrection, terrorist or military action, civil commotion or politically motivated sabotage;
- (b) industry-wide or State-wide strikes or industrial action for a continuous period of 24 (twenty-four) hours and exceeding an aggregate period of 10 (ten) days in an Accounting Year;
- (c) any civil commotion, boycott or political agitation which prevents construction of the Railway Project by the Contractor for an aggregate period exceeding 10 (ten) days in an Accounting Year;
- (d) failure of the Authority to permit the Contractor to continue with its Construction Works, with or without modifications, in the event of stoppage of such work after discovery of any geological or archaeological finds;
- (e) any failure or delay of a Sub-contractor to the extent caused by any Indirect Political Event;
- (f) any Indirect Political Event that causes a Non-Political Event; or
- (g) any event or circumstances of a nature analogous to any of the foregoing.

### **19.4 Political Event**

A Political Event shall mean one or more of the following acts or events by or on account of any Government Instrumentality:

- (a) Change in Law, only if consequences thereof cannot be dealt with under and in accordance with the provisions of Clause 17.13;
- (b) compulsory acquisition in national interest or expropriation of any Project Assets or rights of the Contractor or of the Sub-Contractors;
- (c) unlawful or unauthorised or without jurisdiction revocation of, or refusal to renew or grant without valid cause, any clearance, licence, permit, authorisation, no objection certificate, consent, approval or exemption required by the Contractor or any of the Sub-contractors to perform their respective obligations under this Agreement; provided that such delay, modification, denial, refusal or revocation did not result from the Contractor's or any Sub-contractor's inability or failure to comply with any condition relating to grant, maintenance or renewal of such clearance, licence, authorisation, no objection certificate, exemption, consent, approval or permit;
- (d) any failure or delay of a Sub-contractor but only to the extent caused by another Political Event; or
- (e) any event or circumstances of a nature analogous to any of the foregoing.



## **19.5 Duty to report Force Majeure Event**

19.5.1 Upon occurrence of a Force Majeure Event, the Affected Party shall by notice report such occurrence to the other Party forthwith. Any notice pursuant hereto shall include full particulars of:

- (a) the nature and extent of each Force Majeure Event which is the subject of any claim for relief under this Article 19 with evidence in support thereof;
- (b) the estimated duration and the effect or probable effect which such Force Majeure Event is having or will have on the Affected Party's performance of its obligations under this Agreement;
- (c) the measures which the Affected Party is taking or proposes to take for alleviating the impact of such Force Majeure Event; and
- (d) any other information relevant to the Affected Party's claim.

19.5.2 The Affected Party shall not be entitled to any relief for or in respect of a Force Majeure Event unless it shall have notified the other Party of the occurrence of the Force Majeure Event as soon as reasonably practicable, and in any event no later than 10 (ten) days after the Affected Party knew, or ought reasonably to have known, of its occurrence, and shall have given particulars of the probable material effect that the Force Majeure Event is likely to have on the performance of its obligations under this Agreement.

19.5.3 For so long as the Affected Party continues to claim to be affected by such Force Majeure Event, it shall provide the other Party with regular (and not less than weekly) reports containing information as required by Clause 19.5.1, and such other information as the other Party may reasonably request the Affected Party to provide.

## **19.6 Effect of Force Majeure Event on the Agreement**

19.6.1 Upon the occurrence of any Force Majeure

- (a) prior to the Appointed Date, both Parties shall bear their respective Force Majeure costs.
- (b) after the Appointed Date, the costs incurred and attributable to such event and directly relating to this Agreement (the "**Force Majeure costs**") shall be allocated and paid as follows:
  - (i) upon occurrence of a Non-Political Event, the Parties shall bear their respective Force Majeure costs and neither Party shall be required to pay to the other Party any costs thereof;
  - (ii) upon occurrence of an Indirect Political Event, all Force Majeure costs attributable to such Indirect Political Event, and not exceeding the Insurance Cover for such Indirect Political Event, shall be borne by the Contractor, and to the extent Force Majeure costs exceed such Insurance Cover, one half of such excess amount shall be reimbursed by the Authority to the Contractor for the Force Majeure events; and
  - (iii) upon occurrence of a Political Event, all Force Majeure costs attributable to such Political Event shall be reimbursed by the Authority to the Contractor.

For the avoidance of doubt, Force Majeure costs may include costs directly attributable to the Force Majeure Event, but shall not include debt repayment obligations, if any, of the Contractor.

- 19.6.2 Save and except as expressly provided in this Article 19, neither Party shall be liable in any manner whatsoever to the other Party in respect of any loss, damage, cost, expense, claims, demands and proceedings relating to or arising out of occurrence or existence of any Force Majeure Event or exercise of any right pursuant hereto.
- 19.6.3 Upon the occurrence of any Force Majeure Event during the Construction Period, the Project Completion Schedule for and in respect of the affected Works shall be extended on a day for day basis for such period as performance of the Contractor's obligations is affected on account of the Force Majeure Event or its subsisting effects, as may be determined by the Authority Engineer.
- 19.6.4 Force Majeure costs for any event which results in any offsetting compensation being payable to the Contractor by or on behalf of its sub-contractors shall be reduced by such amounts that are payable to the Contractor by its Sub-contractors.

#### **19.7 Termination Notice for Force Majeure Event**

If a Force Majeure Event subsists for a period of 60 (sixty) days or more within a continuous period of 120 (one hundred and twenty) days, either Party may in its discretion terminate this Agreement by issuing a Termination Notice to the other Party without being liable in any manner whatsoever, save as provided in this Article 19, and upon issue of such Termination Notice, this Agreement shall, notwithstanding anything to the contrary contained herein, stand terminated forthwith; provided that before issuing such Termination Notice, the Party intending to issue the Termination Notice shall inform the other Party of such intention and grant 15 (fifteen) days' time to make a representation, and may after the expiry of such 15 (fifteen) days period, whether or not it is in receipt of such representation, in its sole discretion issue the Termination Notice.

#### **19.8 Termination Payment for Force Majeure Event**

- 19.8.1 In the event of this Agreement being terminated on account of a Non-Political Event, the Termination Payment shall be an amount equal to the sum payable under Clause 21.5.
- 19.8.2 If Termination is on account of an Indirect Political Event, the Termination Payment shall include:
- (a) any sums due and payable under Clause 21.5; and
  - (b) the reasonable cost, as determined by the Authority Engineer, of the Plant and Materials procured by the Contractor and transferred to the Authority for use in Construction, only if such Plant and Materials are in conformity with the Specifications and Standards;
- 19.8.3 If Termination is on account of a Political Event, the Authority shall make a Termination Payment to the Contractor in an amount that would be payable under Clause 21.6.2 as if it were an Authority Default.

## **19.9 Dispute resolution**

In the event that the Parties are unable to agree in good faith about the occurrence or existence of a Force Majeure Event, such Dispute shall be finally settled in accordance with the Dispute Resolution Procedure; provided that the burden of proof as to the occurrence or existence of such Force Majeure Event shall be upon the Party claiming relief and/or excuse on account of such Force Majeure Event.

## **19.10 Excuse from performance of obligations**

If the Affected Party is rendered wholly or partially unable to perform its obligations under this Agreement because of a Force Majeure Event, it shall be excused from performance of such of its obligations to the extent it is unable to perform on account of such Force Majeure Event; provided that:

- (a) the suspension of performance shall be of no greater scope and of no longer duration than is reasonably required by the Force Majeure Event;
- (b) the Affected Party shall make all reasonable efforts to mitigate or limit damage to the other Party arising out of or as a result of the existence or occurrence of such Force Majeure Event and to cure the same with due diligence; and
- (c) when the Affected Party is able to resume performance of its obligations under this Agreement, it shall give to the other Party notice to that effect and shall promptly resume performance of its obligations hereunder.

## ARTICLE 20

### SUSPENSION OF CONTRACTOR'S RIGHTS

#### 20.1 Suspension upon Contractor Default

Upon occurrence of a Contractor Default, the Authority shall be entitled, without prejudice to its other rights and remedies under this Agreement including its rights of Termination hereunder, to (a) suspend carrying out of the Works or any part thereof, and (b) carry out such Works itself or authorise any other person to exercise or perform the same on its behalf during such suspension (the “**Suspension**”). Suspension hereunder shall be effective forthwith upon issue of notice by the Authority to the Contractor and may extend up to a period not exceeding 90 (ninety) days from the date of issue of such notice.

#### 20.2 Authority to act on behalf of Contractor

During the period of Suspension hereunder, all rights and liabilities vested in the Contractor in accordance with the provisions of this Agreement shall continue to vest in the Contractor and all things done or actions taken, including expenditure incurred by the Authority for discharging the obligations of the Contractor under and in accordance with this Agreement shall be deemed to have been done or taken for and on behalf of the Contractor and the Contractor undertakes to indemnify the Authority for all costs incurred during such period. The Contractor hereby licences and sub-licences respectively, the Authority or any other person authorised by it under Clause 20.1 to use during Suspension, all Intellectual Property belonging to or licenced to the Contractor with respect to the Railway Project and its design, engineering, construction and maintenance, and which is used or created by the Contractor in performing its obligations under the Agreement.

#### 20.3 Revocation of Suspension

20.3.1 In the event that the Authority shall have rectified or removed the cause of Suspension within a period not exceeding 60 (sixty) days from the date of Suspension, it shall revoke the Suspension forthwith and restore all rights of the Contractor under this Agreement. For the avoidance of doubt, the Parties expressly agree that the Authority may, in its discretion, revoke the Suspension at any time, whether or not the cause of Suspension has been rectified or removed hereunder.

20.3.2 Upon the Contractor having cured the Contractor Default within a period not exceeding 60 (sixty) days from the date of Suspension, the Authority shall revoke the Suspension forthwith and restore all rights of the Contractor under this Agreement.

#### 20.4 Termination

20.4.1 At any time during the period of Suspension under this Article 20, the Contractor may by notice require the Authority to revoke the Suspension and issue a Termination Notice. The Authority shall, within 15 (fifteen) days of receipt of such notice, terminate this Agreement under and in accordance with Article 21 as if it is a Contractor Default under Clause 21.1.

20.4.2 Notwithstanding anything to the contrary contained in this Agreement, in the event that Suspension is not revoked within 90 (ninety) days from the date of Suspension

hereunder, the Agreement shall, upon expiry of the aforesaid period, be deemed to have been terminated by mutual agreement of the Parties and all the provisions of this Agreement shall apply, *mutatis mutandis*, to such Termination as if a Termination Notice had been issued by the Authority upon occurrence of a Contractor Default.

ARTICLE 21  
**TERMINATION**

**21.1 Termination for Contractor Default**

21.1.1 Save as otherwise provided in this Agreement, in the event that any of the defaults specified below shall have occurred, and the Contractor fails to cure the default within the Cure Period set forth below, or where no Cure Period is specified, then within a Cure Period of 60 (sixty) days, the Contractor shall be deemed to be in default of this Agreement (the “**Contractor Default**”), unless the default has occurred as a result of any breach of this Agreement by the Authority or due to Force Majeure. The defaults referred to herein shall include:

- (a) The Contractor fails to provide, extend or replenish, as the case may be, the Performance Security in accordance with this Agreement;
- (b) subsequent to the replenishment or furnishing of fresh Performance Security in accordance with Clause 7.3, the Contractor fails to cure, within a Cure Period of 30 (thirty) days, the Contractor Default for which the whole or part of the Performance Security was appropriated;
- (c) the Contractor does not achieve the latest outstanding Project Milestone due in accordance with the provisions of Schedule-I, subject to any Time Extension, and continues to be in default for 45 (forty five) days;
- (d) the Contractor abandons or manifests intention to abandon the construction of the Railway Project without the prior written consent of the Authority;
- (e) the Contractor fails to proceed with the Works in accordance with the provisions of Clause 10.1 or stops Works for 30 (thirty) days without reflecting the same in the current programme and such stoppage has not been authorised by the Authority Engineer;
- (f) the Project Completion Date does not occur within the period specified in Schedule-I for the Scheduled Completion Date, or any extension thereof;
- (g) failure to complete the Punch List items within the periods stipulated therefor in Clause 12.3;
- (h) the Contractor fails to rectify any Defect, the non-rectification of which shall have a Material Adverse Effect on the Project, within the time specified in this Agreement or as directed by the Authority Engineer;
- (i) the Contractor subcontracts the Works or any part thereof in violation of this Agreement or assigns any part of the Works without the prior approval of the Authority;
- (j) the Contractor creates any Encumbrance in breach of this Agreement;
- (k) an execution levied on any of the assets of the Contractor has caused a Material Adverse Effect;
- (l) the Contractor is adjudged bankrupt or insolvent, or if a trustee or receiver is appointed for the Contractor or for the whole or material part of its assets that has a material bearing on the Project;

- (m) the Contractor has been, or is in the process of being liquidated, dissolved, wound-up, amalgamated or reconstituted in a manner that would cause, in the reasonable opinion of the Authority, a Material Adverse Effect;
- (n) a resolution for winding up of the Contractor is passed, or any petition for winding up of the Contractor is admitted by a court of competent jurisdiction and a provisional liquidator or receiver is appointed and such order has not been set aside within 90 (ninety) days of the date thereof or the Contractor is ordered to be wound up by a court except for the purpose of amalgamation or reconstruction; provided that, as part of such amalgamation or reconstruction, the entire property, assets and undertaking of the Contractor are transferred to the amalgamated or reconstructed entity and that the amalgamated or reconstructed entity has unconditionally assumed the obligations of the Contractor under this Agreement; and provided that:
  - (i) the amalgamated or reconstructed entity has the capability and experience necessary for the performance of its obligations under this Agreement; and
  - (ii) the amalgamated or reconstructed entity has the financial standing to perform its obligations under this Agreement and has a credit worthiness at least as good as that of the Contractor as at the Appointed Date;
- (o) any representation or warranty of the Contractor herein contained which is, as of the date hereof, found to be materially false or the Contractor is at any time hereafter found to be in breach thereof;
- (p) the Contractor submits to the Authority any statement, notice or other document, in written or electronic form, which has a material effect on the Authority's rights, obligations or interests and which is false in material particulars;
- (q) the Contractor has failed to fulfil any obligation, for which failure Termination has been specified in this Agreement;
- (r) the Contractor has failed to make any payment to the Authority within the period specified in this Agreement; or
- (s) the Contractor commits a default in complying with any other provision of this Agreement if such a default causes a Material Adverse Effect on the Project or on the Authority.

21.1.2 Without prejudice to any other rights or remedies which the Authority may have under this Agreement, upon occurrence of a Contractor Default, the Authority shall be entitled to terminate this Agreement by issuing a Termination Notice to the Contractor; provided that before issuing the Termination Notice, the Authority shall by a notice inform the Contractor of its intention to issue such Termination Notice and grant 15 (fifteen) days to the Contractor to make a representation, and may after the expiry of such 15 (fifteen) days, whether or not it is in receipt of such representation, issue the Termination Notice.

21.1.3 After termination of this Agreement for Contractor Default, the Authority may complete the Works and/or procure its completion through any other entity. The Authority and such entity may, for this purpose, use any Materials, Plant and equipment, Contractor's documents and other design documents made by or on behalf of the Contractor.

## **21.2 Termination for Authority Default**

21.2.1 In the event that any of the defaults specified below shall have occurred, and the Authority fails to cure such default within a Cure Period of 90 (ninety) days or such longer period as has been expressly provided in this Agreement, the Authority shall be deemed to be in default of this Agreement (the “**Authority Default**”) unless the default has occurred as a result of any breach of this Agreement by the Contractor or due to Force Majeure. The defaults referred to herein shall include:

- (a) the Authority commits a material default in complying with any of the provisions of this Agreement and such default has a Material Adverse Effect on the Contractor;
- (b) the Authority has failed to make payment of any amount due and payable to the Contractor within the period specified in this Agreement;
- (c) the Authority has failed to provide, within a period of 180 (one hundred and eighty) days from the Appointed Date, the environmental clearances and forest clearances required for construction of the Railway Project;
- (d) the Authority repudiates this Agreement or otherwise takes any action that amounts to or manifests an irrevocable intention not to be bound by this Agreement; or
- (e) the Authority Engineer fails to issue the relevant Interim Payment Certificate within 60 (sixty) days after receiving a statement and supporting documents.

21.2.2 Without prejudice to any other right or remedy which the Contractor may have under this Agreement, upon occurrence of an Authority Default, the Contractor shall be entitled to terminate this Agreement by issuing a Termination Notice to the Authority; provided that before issuing the Termination Notice, the Contractor shall by a notice inform the Authority of its intention to issue the Termination Notice and grant 15 (fifteen) days to the Authority to make a representation, and may after the expiry of such 15 (fifteen) days, whether or not it is in receipt of such representation, issue the Termination Notice.

## **21.3 Right of Authority to Determine the Contract**

Notwithstanding anything hereinabove, the Authority shall be entitled to determine and terminate the contract at any time should, in the Authority’s opinion, the cessation of work becomes necessary owing to paucity of funds or from any other cause whatever, in which case it shall be treated as Authority Default and Termination Payment shall be made as per clause 21.6 below. Notice in writing from the Authority of such determination and the reasons therefor shall be conclusive evidence thereof. The termination shall take effect 30 (thirty) days from the date of notice hereunder.

## **21.4 Requirements after Termination**

Upon Termination of this Agreement in accordance with the provisions of this Article 21, the Contractor shall comply with and conform to the following:

- (a) deliver to the Authority all Plant and Materials which shall have become the property of the Authority under this Article 21;
- (b) deliver all relevant records, reports, Intellectual Property and other licences pertaining to the Works, other design documents and in case of Termination



occurring after the Provisional Certificate has been issued, the “as built” Drawings for the Works;

- (c) transfer and/or deliver all Applicable Permits to the Authority to the extent permissible under Applicable Laws; and
- (d) vacate the Site within 15 (fifteen) days.

## **21.5 Valuation of Unpaid Works**

21.5.1 Within a period of 45 (forty-five) days after Termination under Clause 21.1, 21.2 or 21.3, as the case may be, has taken effect, the Authority Engineer shall proceed in accordance with Clause 16.5 to determine as follows the valuation of unpaid Works (the “**Valuation of Unpaid Works**”):

- (a) value of the completed stage of the Works under Schedule-G or / and as per actual execution of items as specified for works under Schedule-G1, less payments already made; and
- (b) reasonable value of the partially completed stages of works as on the date of Termination, only if such works conform with the Specifications and Standards.

and shall adjust from the sum thereof (i) any other amounts payable or recoverable, as the case may be, in accordance with the provisions of this Agreement; and (ii) all taxes due to be deducted at source.

21.5.2 The Valuation of Unpaid Works shall be communicated to the Authority, with a copy to the Contractor, within a period of 45 (forty five) days from the date of Termination.

## **21.6 Termination Payment**

21.6.1 Upon Termination on account of Contractor Default under Clause 21.1, the Authority shall:

- (a) encash and appropriate the Performance Security and Retention Money and in the event the Contractor has failed to replenish or extend the Performance Security, claim the amount stipulated in Clause 7.1.1, as agreed pre-determined compensation to the Authority for any losses, delays and cost of completing the Works, if any;
- (b) encash and appropriate the bank guarantee, if any, to the extent of the outstanding Advance Payment and interest thereon; and
- (c) pay to the Contractor, by way of Termination Payment, an amount equivalent to the Valuation of Unpaid Works after adjusting any other sums payable or recoverable, as the case may be, in accordance with the provisions of this Agreement, and all taxes due to be deducted at source.

21.6.2 Upon Termination on account of an Authority Default under Clause 21.2 or under Clause 21.3, the Authority shall:

- (a) return the Performance Security/ Maintenance Security and Retention Money forthwith;
- (b) encash and appropriate the bank guarantee, if any, to the extent of the outstanding Advance Payment, including interest thereon; and

- (c) pay to the Contractor, by way of Termination Payment, an amount equal to:
  - (i) Valuation of Unpaid Works;
  - (ii) the reasonable cost, as determined by the Authority Engineer, of the Plant and Materials procured by the Contractor and transferred to the Authority for its use, only if such Plant and Materials are in conformity with the Specifications and Standards;
  - (iii) the reasonable cost of temporary works, as determined by the Authority Engineer; and

shall adjust from the sum thereof (i) any other amounts payable or recoverable, as the case may be, in accordance with the provisions of this Agreement, and (ii) all taxes due to be deducted at source.

21.6.3 Termination Payment shall become due and payable to the Contractor within 30 (thirty) days of a demand being made by the Contractor to the Authority with the necessary particulars, after the Valuation of Unpaid Works has been communicated by the Authority Engineer, and in the event of any delay, the Authority shall pay interest at the Bank Rate plus 3% (three percent), calculated at quarterly rests, on the amount of Termination Payment remaining unpaid; provided that such delay shall not exceed 90 (ninety) days. For the avoidance of doubt, it is expressly agreed that Termination Payment shall constitute full discharge by the Authority of its payment obligations in respect thereof hereunder.

21.6.4 The Contractor expressly agrees that Termination Payment under this Article 21 shall constitute a full and final settlement of all claims of the Contractor on account of Termination of this Agreement and that it shall not have any further right or claim under any law, treaty, convention, contract or otherwise.

## **21.7 Other rights and obligations of the Parties**

Upon Termination for any reason whatsoever

- (a) property and ownership in all Materials, Plant and Works and the Railway Project shall, as between the Contractor and the Authority, vest in the Authority in whole, free from any and all Encumbrances; provided that the foregoing shall be without prejudice to Clause 21.6;
- (b) risk of loss or damage to any Materials, Plant or Works and the care and custody thereof shall pass from the Contractor to the Authority; and
- (c) the Authority shall be entitled to restrain the Contractor and any person claiming through or under the Agreement from entering upon the Site or any part of the Project except for taking possession of materials, stores, implements, construction plants and equipment of the Contractor, which have not been vested in the Authority in accordance with the provisions of this Agreement.

## **21.8 Survival of rights**

Notwithstanding anything to the contrary contained in this Agreement any Termination pursuant to the provisions of this Agreement shall be without prejudice to the accrued rights of either Party including its right to claim and recover money damages, insurance proceeds, security deposits, and other rights and remedies, which it may have in law or Agreement. All rights and obligations of either Party under this Agreement, including

Termination Payments, shall survive the Termination to the extent such survival is necessary for giving effect to such rights and obligations.

Part VI

**Other Provisions**

## ARTICLE 22

### ASSIGNMENT AND CHARGES

#### **22.1 Restrictions on assignment and charges**

This Agreement shall not be assigned by the Contractor to any person, save and except with the prior consent in writing of the Authority, which consent the Authority shall be entitled to decline without assigning any reason.

#### **22.2 Hypothecation of Materials or Plant**

Notwithstanding the provisions of Clause 22.1, the Contractor may pledge or hypothecate to its lenders, any Materials or Plant prior to their incorporation in the Works. Further, the Contractor may, by written notice to the Authority, assign its right to receive payments under this Agreement either absolutely or by way of charge, to any person providing financing to the Contractor in connection with the performance of the Contractor's obligations under this Agreement. The Contractor acknowledges that any such assignment by the Contractor shall not relieve the Contractor from any obligations, duty or responsibility under this Agreement. For the avoidance of doubt, all Materials and Plants shall, upon their incorporation into Works, be free from any and all Encumbrances without the Authority being required to make any payment to any person on account of any costs, compensation, expenses and charges for such Materials, Plants and Works.

## ARTICLE 23

### LIABILITY AND INDEMNITY

#### 23.1 General indemnity

The Contractor will indemnify, defend, save and hold harmless the Authority and its officers, servants, agents, Government Instrumentalities and Government owned and/or controlled entities/enterprises, (the “**Authority Indemnified Persons**”) against any and all suits, proceedings, actions, demands and third party claims for any loss, damage, cost and expense of whatever kind and nature, whether arising out of any breach by the Contractor of any of its obligations under this Agreement or from any negligence under the Agreement, including any errors or deficiencies in the design documents, or tort or on any other ground whatsoever, except to the extent that any such suits, proceedings, actions, demands and claims have arisen due to any negligent act or omission, or breach or default of this Agreement on the part of the Authority Indemnified Persons.

#### 23.2 Indemnity by the Contractor

23.2.1 Without limiting the generality of Clause 23.1, the Contractor shall fully indemnify, hold harmless and defend the Authority and the Authority Indemnified Persons from and against any and all loss and/or damages arising out of or with respect to:

- (a) failure of the Contractor to comply with Applicable Laws and Applicable Permits;
- (b) payment of taxes required to be made by the Contractor in respect of the income or other taxes of the Sub-contractors, suppliers and representatives; or
- (c) non-payment of amounts due as a result of Materials or services furnished to the Contractor or any of its Sub-contractors which are payable by the Contractor or any of its Sub-contractors.

23.2.2 Without limiting the generality of the provisions of this Article 23, the Contractor shall fully indemnify, hold harmless and defend the Authority Indemnified Persons from and against any and all suits, proceedings, actions, claims, demands, liabilities and damages which the Authority Indemnified Persons may hereafter suffer, or pay by reason of any demands, claims, suits or proceedings arising out of claims of infringement of any domestic or foreign patent rights, copyrights or other Intellectual Property, proprietary or confidentiality rights with respect to any materials, information, design or process used by the Contractor or by the Sub-contractors in performing the Contractor's obligations or in any way incorporated in or related to the Project. If in any such suit, action, claim or proceedings, a temporary restraint order or preliminary injunction is granted, the Contractor shall make every reasonable effort, by giving a satisfactory bond or otherwise, to secure the revocation or suspension of the injunction or restraint order. If, in any such suit, action, claim or proceedings, the Railway Project, or any part thereof or comprised therein, is held to constitute an infringement and its use is permanently enjoined, the Contractor shall promptly make every reasonable effort to secure for the Authority a licence, at no cost to the Authority, authorising continued use of the infringing work. If the Contractor is unable to secure such licence within a reasonable time, the Contractor shall, at its own expense, and without impairing the Specifications

and Standards, either replace the affected work, or part, or process thereof with non-infringing work or part or process, or modify the same so that it becomes non-infringing.

### **23.3 Notice and contest of claims**

In the event that either Party receives a claim or demand from a third party in respect of which it is entitled to the benefit of an indemnity under this Agreement (the “**Indemnified Party**”) it shall notify the other Party (the “**Indemnifying Party**”) within 15 (fifteen) days of receipt of the claim or demand and shall not settle or pay the claim without the prior approval of the Indemnifying Party, which approval shall not be unreasonably withheld or delayed. In the event that the Indemnifying Party wishes to contest or dispute the claim or demand, it may conduct the proceedings in the name of the Indemnified Party, subject to the Indemnified Party being secured against any costs involved, to its reasonable satisfaction.

### **23.4 Defence of claims**

- 23.4.1 The Indemnified Party shall have the right, but not the obligation, to contest, defend and litigate any claim, action, suit or proceeding by any third party alleged or asserted against such Party in respect of, resulting from, related to or arising out of any matter for which it is entitled to be indemnified hereunder, and reasonable costs and expenses thereof shall be indemnified by the Indemnifying Party. If the Indemnifying Party acknowledges in writing its obligation to indemnify the Indemnified Party in respect of loss to the full extent provided by this Agreement, the Indemnifying Party shall be entitled, at its option, to assume and control the defence of such claim, action, suit or proceeding, liabilities, payments and obligations at its expense and through the counsel of its choice; provided it gives prompt notice of its intention to do so to the Indemnified Party and reimburses the Indemnified Party for the reasonable cost and expenses incurred by the Indemnified Party prior to the assumption by the Indemnifying Party of such defence. The Indemnifying Party shall not be entitled to settle or compromise any claim, demand, action, suit or proceeding without the prior written consent of the Indemnified Party, unless the Indemnifying Party provides such security to the Indemnified Party as shall be reasonably required by the Indemnified Party to secure the loss to be indemnified hereunder to the extent so compromised or settled.
- 23.4.2 If the Indemnifying Party has exercised its rights under Clause 23.3, the Indemnified Party shall not be entitled to settle or compromise any claim, action, suit or proceeding without the prior written consent of the Indemnifying Party (which consent shall not be unreasonably withheld or delayed).

23.4.3 If the Indemnifying Party exercises its rights under Clause 23.3, the Indemnified Party shall nevertheless have the right to employ its own counsel, and such counsel may participate in such action, but the fees and expenses of such counsel shall be at the expense of the Indemnified Party, when and as incurred, unless:

- (a) the employment of counsel by such party has been authorised in writing by the Indemnifying Party; or
- (b) the Indemnified Party shall have reasonably concluded that there may be a conflict of interest between the Indemnifying Party and the Indemnified Party in the conduct of the defence of such action; or
- (c) the Indemnifying Party shall not, in fact, have employed independent counsel reasonably satisfactory to the Indemnified Party, to assume the defence of such action and shall have been so notified by the Indemnified Party; or
- (d) the Indemnified Party shall have reasonably concluded and specifically notified the Indemnifying Party either:
  - (i) that there may be specific defences available to it which are different from or additional to those available to the Indemnifying Party; or
  - (ii) that such claim, action, suit or proceeding involves or could have a material adverse effect upon it beyond the scope of this Agreement:

Provided that if Sub-clauses (b), (c) or (d) of this Clause 23.4.3 shall be applicable, the counsel for the Indemnified Party shall have the right to direct the defence of such claim, demand, action, suit or proceeding on behalf of the Indemnified Party, and the reasonable fees and disbursements of such counsel shall constitute legal or other expenses hereunder.

## **23.5 No consequential claims**

Notwithstanding anything to the contrary contained in this Article 23, the indemnities herein provided shall not include any claim or recovery in respect of any cost, expense, loss or damage of an indirect, incidental or consequential nature, including loss of profit, except as expressly provided in this Agreement.

## **23.6 Survival on Termination**

The provisions of this Article 23 shall survive Termination.



## **ARTICLE 24**

### **DISPUTE RESOLUTION**

#### **24.1 Conciliation of Disputes**

- 24.1.1 All disputes and differences of any kind whatsoever arising out of or in connection with the contract, whether during the progress of the work or after its completion and whether before or after the determination of the contract, shall be referred by the Contractor to the "Authority" through "Notice of Dispute" provided that no such notice shall be served later than 30 days after the date of issue of Completion Certificate by the Authority Engineer. Authority shall, within 30 days after receipt of the Contractor's "Notice of Dispute", notify the name of conciliator(s) to the Contractor. In case Authority fails to fix Conciliator within 30 days, Contractor shall be free to approach Dispute Adjudication Board (DAB) for adjudication of Dispute.
- 24.1.2 The Conciliator(s) shall assist the parties to reach an amicable settlement in an independent and impartial manner within the terms of contract. If the parties reach agreement on a settlement of the dispute, they shall draw up and sign a written settlement agreement duly signed by Authority Engineer, Contractor and conciliator(s). When the settlement agreement is signed, it shall be final and binding on the parties. The conciliators shall be paid fee as fixed by Ministry of Railways time to time, which shall be shared equally by the parties.
- 24.1.3 The parties shall not initiate, during the conciliation proceedings, any reference to DAB or arbitral or judicial proceedings in respect of a dispute that is the subject matter of the conciliation proceedings.
- 24.1.4 The conciliation shall be carried out as per 'The Arbitration and Conciliation Act, 1996' and the proceedings may be terminated as per Section 76 of the above Act.

#### **24.2 Dispute Adjudication Board (DAB)**

- 24.2.1 A dispute/s if not settled through conciliation, shall be referred to DAB. The DAB shall consist of a panel of three Retired Railway Officers not below senior administrative grade (SAG). The DAB shall be formed within 90 days of signing of Contract Agreement. For this purpose, the Authority will maintain a panel of DAB members. The complete panel, which shall not be less than five members, shall be sent by Authority to the Contractor to nominate one member of the DAB from the panel as Contractor's nominee within two weeks of receipt of the panel. On receipt of Contractor's nominee, the Authority shall nominate one member from the same panel as Authority's nominee for the DAB. Both above nominees shall jointly select presiding member of the DAB from the same panel.
- 24.2.2 The appointment of DAB shall be effectuated by way of a tri-partite agreement among the Authority, Contractor and the respective DAB members. The terms of the remuneration of each member shall be as fixed by Ministry of Railways from time to time. Each party shall be responsible for paying one-half of this remuneration.
- 24.2.3 If one or more of the members appointed refuses to act as DAB member, or is unable or unwilling to perform his functions as DAB member for any reason whatsoever or dies or in the opinion of the Authority fails to act without undue delay, the parties shall terminate the mandate of such DAB member and thereupon new DAB member shall be appointed in the same manner, as the outgoing DAB member had been appointed.

- 24.2.4 The appointment of any member may be terminated by mutual agreement of both Parties, but not by the Authority or the Contractor acting alone. Unless otherwise agreed by both the Parties, the appointment of the DAB (including each member) shall expire upon expiry of this Contract Agreement.
- 24.2.5 Before start of DAB proceedings, each DAB member shall give the following certificate to the Authority and the Contractor:
- “I have no any past or present relationship in relation to the subject matter in dispute, whether financial, business, professional or other kind. Further, I have no any past or present relationship with or interest in any of the parties whether financial, business, professional or other kind, which is likely to give rise to justifiable doubts as to my independence or impartiality.”*
- 24.2.6 DAB proceedings shall be conducted as decided by the DAB. The DAB shall give its decision within 90 days of a Dispute referred to it by any of the Parties, duly recording the reasons before arriving at the decision. The DAB shall decide the issue within terms and conditions of the contract. This time limit shall be extendable subject to the Parties mutual agreement.
- 24.2.7 The DAB decision shall not be binding on both the Parties. In case any party is not satisfied by the decision of DAB, then the aggrieved party may approach Standing Arbitral Tribunal for arbitration proceedings. However, even if the aggrieved party had proceeded for Arbitration as per provisions of this agreement, 75% of award amount, pending adjudication by Standing Arbitral Tribunal/Court of Law, shall be made by party to other party. In case payment is to be made by Authority to Contractor, the terms & conditions as incorporated in the Ministry of Railways letter No. 2016/CE(I)/CT/ARB/3(NITI Aayog)/Pt. dated 08<sup>th</sup> Mar,2017 as amended time to time shall be followed. However, in case Contractor has to pay to the Authority, then 75% of the award amount shall be deducted by the Authority from the running bills or other dues of the Contractor, pending adjudication by Standing Arbitral Tribunal/Court of Law.
- 24.2.8 No dispute shall be referred to Standing Arbitral Tribunal unless the same has been referred to DAB for adjudication. However, in case DAB is not formed due to any reason, the disputes can be directly referred to Standing Arbitral Tribunal to adjudicate the dispute.
- 24.2.9 In the specific cases of any misconduct by any of the members of the DAB, the parties shall have the right to specifically bring it to the notice of the DAB such conduct, through a statement filed with necessary documents in proof of such misconduct and the DAB, after taking NOTICE of such conduct initiate the replacement of the member concerned, in the same manner the member to be replaced was appointed.
- 24.2.10 Once the decision is given by DAB, DAB cannot review the decision at its own or on the request of one party, unless both parties agree for review of decision by DAB.
- 24.2.11 In case DAB decision is not challenged by either party within 180 days of receipt of decision of DAB, the decision shall be considered as final and parties would be barred for referring the same to Standing Arbitral Tribunal for adjudication.
- 24.2.12 The obligation of the Authority and the Contractor shall not be altered by reasons of issue being or under reference to DAB.
- 24.2.13 The DAB shall conduct the proceedings at [Chennai] or any other convenient venue which shall be decided by DAB in consultations with parties.

24.2.14 It is a term of this contract that the Parties shall not approach any Court of Law for settlement of such disputes or differences unless an attempt has first been made by the parties to settle such disputes or differences through DAB and Standing Arbitral Tribunal.

### **24.3 Standing Arbitral Tribunal**

24.3.1 The arbitration proceedings shall be conducted as per 'The Arbitration and Conciliation Act, 1996'. The Arbitral Tribunal shall consist of a panel of three Retired Railway Officers not below senior administrative grade (SAG). The Standing Arbitral Tribunal shall be formed within 90 days of signing of Contract document. For this purpose, the Authority shall maintain a panel of arbitrators. The complete panel, which shall not be less than five members, shall be sent by Authority to the Contractor to nominate one arbitrator from the panel as Contractor's nominee within two weeks of receipt of the panel. On receipt of Contractor's nominee, the Authority shall appoint above contractor's nominee as well as another from the same panel as Authority's nominee as arbitrators. Both above arbitrators shall jointly select presiding arbitrator from the same panel.

24.3.2 If the Contractor fails to select the contractor's nominee from the panel within two weeks of the receipt of the said panel, the Authority shall, after giving one more opportunity to contractor to nominate one as contractor's nominee within next two weeks, appoint two arbitrators from the same panel. Both above arbitrators shall jointly select presiding arbitrator from the same panel.

24.3.3 If one or more of the Arbitrators appointed refuses to act as Arbitrator, withdraws from his office as Arbitrator, or vacates his office or is unable or unwilling to perform his functions as Arbitrator for any reason whatsoever or dies or in the opinion of the Authority fails to act without undue delay, the parties shall terminate the mandate of such arbitrator and thereupon new arbitrator shall be appointed in the same manner, as the outgoing arbitrator had been appointed.

24.3.4 Before start of arbitration proceedings, each appointed arbitrator shall give the following certificate to the Authority and the Contractor:

*"I have no any past or present relationship in relation to the subject matter in dispute, whether financial, business, professional or other kind. Further, I have no any past or present relationship with or interest in any of the parties whether financial, business, professional or other kind, which is likely to give rise to justifiable doubts as to my independence or impartiality in terms of The Arbitration and Conciliation Act, 1996."*

24.3.5 In the specific cases of any misconduct by any of the members of the TRIBUNAL, the parties shall have the right to specifically bring it to the notice of the TRIBUNAL such conduct, through a statement filed with necessary documents in proof of such misconduct and the TRIBUNAL, after taking NOTICE of such conduct initiate the replacement of the member concerned, in the same manner the member to be replaced was appointed.

24.3.6 Each party has to prepare and furnish to Standing Arbitral Tribunal and other party, once in a every six months, an account giving full and detailed particulars of all claims, which even after decision of DAB are unsettled, to which the parties may consider themselves entitled to during the last preceding six months. If any dispute has arisen as regards execution of the works under the contract, while submitting the said half yearly claims, the parties shall give full particulars of such dispute in the said submission. After signing Contract agreement, within 6 months, the parties shall submit all the claims from date of award of contract in first submission of claims.

- 24.3.7 The said communication will be the reference of the dispute to the ARBITRAL TRIBUNAL appointed under the present agreement.
- 24.3.8 The parties shall submit all the relevant documents in support of their claims and the reasons for raising the dispute to the TRIBUNAL.
- 24.3.9 The said claims of the parties so referred to ARBITRAL TRIBUNAL so far it relates to the disputed claims, shall be treated as Statement of Claims of the parties and the ARBITRAL TRIBUNAL shall call upon the other party to submit its reply. The ARBITRAL TRIBUNAL after giving an opportunity of being heard to both the parties, decide the dispute within a period of Four months from the date of communication of the dispute under clause 24.3.6 above. The Arbitral Tribunal will pass a reasoned award in writing, while deciding the Dispute. Once the award is declared, the Arbitral Tribunal cannot review the same except what is permissible in terms of provisions contained in Arbitration and Conciliation Act. The parties shall be entitled to the remedies under the Arbitration and Conciliation Act 1996 or any amendment thereof.
- 24.3.10 The parties agree that all the claims of any nature whatsoever, which the parties may have in respect of the work of the preceding six months, should be made in the said Statements of half yearly claims. If the parties do not raise the claim, if any, arising from the work done in the preceding six months in the statement of half yearly claim, to Standing Arbitral Tribunal, the parties shall be deemed to have waived and given up the claims. The ARBITRAL TRIBUNAL shall not entertain such disputes, which have not been raised in the statement of half yearly Claim before the Standing Arbitral Tribunal and such claims will stand excluded from the scope of arbitration and beyond the terms of reference to the ARBITRAL TRIBUNAL.
- 24.3.11 The parties agree that where the Arbitral award is for payment of money, no interest shall be payable on the whole or any part of the money for any period till the date on which the award is made.
- 24.3.12 The obligation of the Authority and the Contactor shall not be altered by reasons of arbitration being conducted during the progress of work. Neither party shall be suspended the work on account of arbitration and payments to the contractor shall continue to be made in terms of the contract and /or as awarded (except when Award is challenged in the Court in which case the payments would be as per the court's orders)
- 24.3.13 The ARBITRAL TRIBUNAL shall remain in force during the entire period the PRINCIPAL CONTRACT is in force and until the closure of the PRINCIPAL CONTRACT with the final no claim certificate, which will be filed with ARBITRAL TRIBUNAL.
- 24.3.14 The Arbitral Tribunal shall conduct the Arbitration proceedings at Chennai or any other convenient venue which shall be decided by Tribunal in consultation with both parties.
- 24.3.15 The cost of arbitration shall be borne equally by the respective parties. The cost shall inter-alia include fee of the arbitrators as per the rates fixed by the Indian Railways from time to time.
- 24.3.16 It is a term of this contract that the Contractor shall not approach any Court of Law for settlement of such disputes or differences unless an attempt has first been made by the parties to settle such disputes or differences through conciliation, DAB and Standing Arbitral Tribunal.
- 24.3.17 Even in case arbitration award is challenged by a party in the Court of Law, 75% of award amount, pending adjudication by Court of Law, shall be made by party to other party. In case payment is to be made by Authority to Contractor, the terms & conditions as incorporated in the Ministry of Railways letter No.

2016/CE(I)/CT/ARB/3(NITI Aayog)/Pt. dated 08<sup>th</sup> Mar,2017 as amended time to time shall be followed. However, in case Contractor has to pay to the Authority, then 75% of the award amount shall be deducted by the Authority from the running bills or other dues of the Contractor, pending adjudication by Court of Law.

- 24.3.18 The contract shall be governed by the law for the time being in force in the Republic of India. In case of any disputes/differences resulting in court cases between Contractor & Authority, the jurisdiction shall be of Courts at Chennai only.

**ARTICLE 25**  
**MISCELLANEOUS**

**25.1 Governing law and jurisdiction**

This Agreement shall be construed and interpreted in accordance with and governed by the laws of India, and the courts at Chennai shall have exclusive jurisdiction over matters arising out of or relating to this Agreement.

**25.2 Waiver of immunity**

Each Party unconditionally and irrevocably:

- (a) agrees that the execution, delivery and performance by it of this Agreement constitute commercial acts done and performed for commercial purpose;
- (b) agrees that, should any proceedings be brought against it or its assets, property or revenues in any jurisdiction in relation to this Agreement or any transaction contemplated by this Agreement, no immunity (whether by reason of sovereignty or otherwise) from such proceedings shall be claimed by or on behalf of the Party with respect to its assets;
- (c) waives any right of immunity which it or its assets, property or revenues now has, may acquire in the future or which may be attributed to it in any jurisdiction; and
- (d) consents generally in respect of the enforcement of any judgement or award against it in any such proceedings to the giving of any relief or the issue of any process in any jurisdiction in connection with such proceedings (including the making, enforcement or execution against it or in respect of any assets, property or revenues whatsoever irrespective of their use or intended use of any order or judgement that may be made or given in connection therewith).

**25.3 Delayed payments**

The Parties hereto agree that payments due from one Party to the other Party under the provisions of this Agreement shall be made within the period set forth therein, and if no such period is specified, within 30 (thirty) days of receiving a demand along with the necessary particulars. In the event of delay beyond such period, the defaulting Party shall pay interest for the period of delay calculated at a rate equal to Bank Rate plus 3% (three percent), save and except as otherwise specified in this Agreement. All interest payment under this Agreement shall, save and except as otherwise specified, be calculated at quarterly rests, and recovery thereof shall be without prejudice to the rights of the Parties under this Agreement including Termination thereof.

## **25.4 Waiver**

25.4.1 Waiver, including partial or conditional waiver, by either Party of any default by the other Party in the observance and performance of any provision of or obligations under this Agreement:

- (a) shall not operate or be construed as a waiver of any other or subsequent default hereof or of other provisions of or obligations under this Agreement;
- (b) shall not be effective unless it is in writing and executed by a duly authorised representative of the Party; and
- (c) shall not affect the validity or enforceability of this Agreement in any manner.

25.4.2 Neither the failure by either Party to insist on any occasion upon the performance of the terms, conditions and provisions of this Agreement or any obligation thereunder nor time or other indulgence granted by a Party to the other Party shall be treated or deemed as waiver of such breach or acceptance of any variation or the relinquishment of any such right hereunder.

## **25.5 Liability for review of Documents and Drawings**

Except to the extent expressly provided in this Agreement:

- (a) no review, comment or approval by the Authority or the Authority Engineer of any Document or Drawing submitted by the Contractor nor any observation or inspection of the construction of the Railway Project nor the failure to review, approve, comment, observe or inspect hereunder shall relieve or absolve the Contractor from its obligations, duties and liabilities under this Agreement, Applicable Laws and Applicable Permits; and
- (b) the Authority shall not be liable to the Contractor by reason of any review, comment, approval, observation or inspection referred to in Sub-clause (a) above.

## **25.6 Exclusion of implied warranties etc.**

This Agreement expressly excludes any warranty, condition or other undertaking implied at law or by custom or otherwise arising out of any other agreement between the Parties or any representation by either Party not contained in a binding legal agreement executed by both Parties.

## **25.7 Survival**

25.7.1 Termination shall:

- (a) not relieve the Contractor or the Authority, as the case may be, of any obligations hereunder which expressly or by implication survive Termination hereof; and
- (b) except as otherwise provided in any provision of this Agreement expressly limiting the liability of either Party, not relieve either Party of any obligations or liabilities for loss or damage to the other Party arising out of, or caused by, acts or omissions of such Party prior to the effectiveness of such Termination or arising out of such Termination.

25.7.2 All obligations surviving Termination shall only survive for a period of 3 (three) years following the date of such Termination.

## **25.8 Entire Agreement**

This Agreement and the Schedules together constitute a complete and exclusive statement of the terms of the agreement between the Parties on the subject hereof, and no amendment or modification hereto shall be valid and effective unless such modification or amendment is agreed to in writing by the Parties and duly executed by persons especially empowered in this behalf by the respective Parties. All prior written or oral understandings, offers or other communications of every kind pertaining to this Agreement are abrogated and withdrawn. For the avoidance of doubt, the Parties hereto agree that any obligations of the Contractor arising from the Request for Proposal and bid submissions, as the case may be, shall be deemed to form part of this Agreement and treated as such.

## **25.9 Severability**

If for any reason whatsoever, any provision of this Agreement is or becomes invalid, illegal or unenforceable or is declared by any court of competent jurisdiction or any other instrumentality to be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected in any manner, and the Parties will negotiate in good faith with a view to agreeing to one or more provisions which may be substituted for such invalid, unenforceable or illegal provisions, as nearly as is practicable to such invalid, illegal or unenforceable provision. Failure to agree upon any such provisions shall not be subject to the Dispute Resolution Procedure set forth under this Agreement or otherwise.

## **25.10 No partnership**

This Agreement shall not be interpreted or construed to create an association, joint venture or partnership between the Parties, or to impose any partnership obligation or liability upon either Party, and neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as or be an agent or representative of, or to otherwise bind, the other Party.

## **25.11 Third parties**

This Agreement is intended solely for the benefit of the Parties, and their respective successors and permitted assigns, and nothing in this Agreement shall be construed to create any duty to, standard of care with reference to, or any liability to, any person not a Party to this Agreement.

## **25.12 Successors and assigns**

This Agreement shall be binding upon, and inure to the benefit of the Parties and their respective successors and permitted assigns.



### **25.13 Notices**

Any notice or other communication to be given by any Party to the other Party under or in connection with the matters contemplated by this Agreement shall be in writing and shall:

- (a) in the case of the Contractor, be given by facsimile or e-mail and by letter delivered by hand to the address given and marked for attention of the person set out below or to such other person as the Contractor may from time to time designate by notice to the Authority; provided that notices or other communications to be given to an address outside Chennai may, if they are subsequently confirmed by sending a copy thereof by registered acknowledgement due, air mail or by courier, be sent by facsimile or e-mail to the person as the Contractor may from time to time designate by notice to the Authority;

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- (b) in the case of the Authority, be given by facsimile or e-mail and by letter delivered by hand and be addressed to the CSTE/P&P/MAS with a copy delivered to the Authority Representative or such other person as the Authority may from time to time designate by notice to the Contractor; provided that if the Contractor does not have an office in Chennai , it may send such notice by facsimile or e-mail and by registered acknowledgement due, air mail or by courier; and
- (c) any notice or communication by a Party to the other Party, given in accordance herewith, shall be deemed to have been delivered when in the normal course of post it ought to have been delivered and in all other cases, it shall be deemed to have been delivered on the actual date and time of delivery; provided that in the case of facsimile or e-mail, it shall be deemed to have been delivered on the working day following the date of its delivery.

### **25.14 Language**

All notices required to be given by one Party to the other Party and all other communications, Documentation and proceedings which are in any way relevant to this Agreement shall be in writing and in English language.

### **25.15 Counterparts**

This Agreement may be executed in two counterparts, each of which, when executed and delivered, shall constitute an original of this Agreement.

### **25.16 Confidentiality**

The Parties shall treat the details of this Agreement as private and confidential, except to the extent necessary to carry out obligations under it or to comply with Applicable Laws. The Contractor shall not publish, permit to be published, or disclose any particulars of the Works in any trade or technical paper or elsewhere without the previous consent of the Authority.

## **25.17 Copyright and Intellectual Property rights**

25.17.1 As between the Parties, the Contractor shall retain the copyright and other Intellectual Property rights in the Contractor's Documents and other design documents made by (or on behalf of) the Contractor. The Contractor shall be deemed (by signing this Agreement) to give to the Authority a non-terminable transferable non-exclusive royalty-free licence to copy, use and communicate the Contractor's Documents, including making and using modifications of them. This licence shall:

- (a) apply throughout the actual or intended working life (whichever is longer) of the relevant parts of the Works,
- (b) entitle any person in proper possession of the relevant part of the Works to copy, use and communicate the Contractor's Documents for the purposes of completing, operating, maintaining, altering, adjusting, repairing and demolishing the Works, and
- (c) in the case of Contractor's Documents which are in the form of computer programs and other software, permit their use on any computer on the Site and other places as envisaged by this Agreement, including replacements of any computers supplied by the Contractor:

25.17.2 The Contractor's Documents and other design documents made by (or on behalf of) the Contractor shall not, without the Contractor's consent, be used, copied or communicated to a third party by (or on behalf of) the Authority for purposes other than those permitted under this Clause 25.17.

25.17.3 As between the Parties, the Authority shall retain the copyright and other Intellectual Property rights in this Agreement and other documents made by (or on behalf of) the Authority. The Contractor may, at its cost, copy, use, and obtain communication of these documents for the purposes of this Agreement. They shall not, without the Authority's consent, be copied, used or communicated to a third party by the Contractor, except as necessary for the purposes of the contract.

## **25.18 Limitation of Liability**

25.18.1 Neither Party shall be liable to the other Party for loss of use of any Works, loss of profit, loss of any contract or for any indirect or consequential loss or damage which may be suffered by the other Party in connection with this Agreement.

25.18.2 The total liability of one Party to the other Party under and in accordance with the provisions of this Agreement, save and except as provided in Articles 21 and 23, shall not exceed the Contract Price. For the avoidance of doubt, this Clause shall not limit the liability in any case of fraud, deliberate default or reckless misconduct by the defaulting Party.

ARTICLE 26  
**DEFINITIONS**

**26.1 Definitions**

In this Agreement, the following words and expressions shall, unless repugnant to the context or meaning thereof, have the meaning hereinafter respectively assigned to them:

**“Accounting Year”** means the financial year commencing from the first day of April of any calendar year and ending on the thirty-first day of March of the next calendar year;

**“Advance Payment”** shall have the meaning as set forth in Clause 17.2.1;

**“Affected Party”** shall have the meaning as set forth in Clause 19.1;

**“Affiliate”** means, in relation to either Party {and/or Members}, a person who controls, is controlled by, or is under the common control with such Party {or Member} (as used in this definition, the expression “control” means, with respect to a person which is a company or corporation, the ownership, directly or indirectly, of more than 50% (fifty per cent) of the voting shares of such person, and with respect to a person which is not a company or corporation, the power to direct the management and policies of such person, whether by operation of law or by contract or otherwise);

**“Agreement”** means this Agreement, its Recitals, the Schedules hereto and any amendments thereto made in accordance with the provisions contained in this Agreement;

**“Applicable Laws”** means all laws, brought into force and effect by GOI or the State Government(s) including rules, regulations and notifications made thereunder, and judgements, decrees, injunctions, writs and orders of any court of record, applicable to this Agreement and the exercise, performance and discharge of the respective rights and obligations of the Parties hereunder, as may be in force and effect during the subsistence of this Agreement;

**“Applicable Permits”** means all clearances, licences, permits, authorisations, no objection certificates, consents, approvals and exemptions required to be obtained or maintained under Applicable Laws in connection with the construction of the Railway Project during the subsistence of this Agreement;

**“Appointed Date”** means that date which is later of:

- (a) the 15<sup>th</sup> day from the date of signing of this Agreement,
- (b) the 30<sup>th</sup> day from the date on which the Contractor has delivered the Performance Security in accordance with the provisions of Article 7;
- (c) the date on which the Authority has provided the Right of Way and environmental and forest clearances of at least 95% (ninety five per cent) of the core land length and 90% (ninety percent ) of the non-core land length of the Railway Project in conformity with the provisions of Clause 4.3 and 8.2;

**“Arbitration Act”** means the Arbitration and Conciliation Act, 1996 and shall include modifications to or any re-enactment thereof, as in force from time to time;

**“Authority”** shall have the meaning attributed thereto in the array of Parties hereinabove as set forth in the Recitals;

**“Authority Default”** shall have the meaning as set forth in Clause 21.2;

**“Authority Engineer”** shall have the meaning as set forth in Clause 16.1;

**“Authority Representative”** means such person or persons as may be authorised in writing by the Authority to act on its behalf under this Agreement and shall include any person or persons having authority to exercise any rights or perform and fulfil any obligations of the Authority under this Agreement;

**“Bank”** means a Nationalised bank incorporated in India when a Bank Guarantee for Advance Payment (Clause 17.2) is to be submitted and a Scheduled Commercial Bank incorporated in India for all other purposes, or any other bank acceptable to the Authority;

**“Bank Rate”** means the rate of interest specified by the Reserve Bank of India from time to time in pursuance of section 49 of the Reserve Bank of India Act, 1934 or any replacement of such Bank Rate for the time being in effect;

**“Base Month”** means the month just prior to Bid Due Date month. The Quarter for applicability of price adjustment shall be commence from next month after Base Month;

**“Bid”** means the documents in their entirety comprised in the bid submitted by the selected bidder/Consortium in response to the Request for Proposal in accordance with the provisions thereof;

**“Bid Security”** means the bid security provided by the Contractor to the Authority in accordance with the Request for Proposal, and which is to remain in force until substituted by the Performance Security;]

**“Change in Law”** means the occurrence of any of the following after the Base Month:

- (a) the enactment of any new Indian law;
- (b) the repeal, modification or re-enactment of any existing Indian law;
- (c) the commencement of any Indian law which has not entered into effect until the Base Month;
- (d) a change in the interpretation or application of any Indian law by a judgement of a court of record which has become final, conclusive and binding, as compared to such interpretation or application by a court of record prior to the Base Month; or
- (e) any change in the rates of any of the Taxes or royalties that have a direct effect on the Project;

**“Change of Scope”** shall have the meaning as set forth in Article 13;

**“Change of Scope Notice”** shall have the meaning asset forth in Clause 13.2.1;

**“Change of Scope Order”** shall have the meaning asset forth in Clause 13.2.4;

**“Completion Certificate”** shall have the meaning as set forth in Clause 12.4;

{**“Consortium/Joint Venture”** means the Consortium/Joint Venture of entities which have formed a consortium/joint venture for implementation of this Project;}<sup>s</sup>

**“Construction”** shall have the meaning as set forth in Clause 1.2.1 (f);

**“Construction Period”** means the period commencing from the Appointed Date and ending on the date of the Completion Certificate;

**“Contract Price”** means the amount as specified in Clause 17.1.1;

**“Contractor”** shall have the meaning attributed thereto in the array of Parties hereinabove as set forth in the Recitals;

**“Contractor Default”** shall have the meaning as set forth in Clause 21.1;

**“Core Land”** means the part of Land essentially needed to open & operationalize the mainline for traffic including the Land required for laying the mainline tracks and its Signalling/ Telecom/ Overhead Electrification/ Power Supply Installations, Operational Buildings (station building, huts, gumties etc), as shown in item No. 3(a) of Annexure-I of Schedule-A;

**“Cure Period”** means the period specified in this Agreement for curing any breach or default of any provision of this Agreement by the Party responsible for such breach or default and shall:

- (a) commence from the date on which a notice is delivered by one Party to the other Party asking the latter to cure the breach or default specified in such notice;
- (b) not relieve any Party from liability to pay Damages or compensation under the provisions of this Agreement; and
- (c) not in any way be extended by any period of Suspension under this Agreement; provided that if the cure of any breach by the Contractor requires any reasonable action by the Contractor that must be approved by the Authority or the Authority Engineer hereunder, the applicable Cure Period shall be extended by the period taken by the Authority or the Authority Engineer to accord their approval;

**“Damages”** shall have the meaning as set forth in paragraph (w) of Clause 1.2.1;

**“Defect”** means any defect or deficiency in Construction of the Works or any part thereof, which does not conform with the Specifications and Standards;

**“Defects Liability Period”** shall have the meaning as set forth in Clause 15.1;

**“Dispute”** shall have the meaning as set forth in Clause 24.1.1;

**“Dispute Resolution Procedure”** means the procedure for resolution of Disputes as set forth in Article 24;

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<sup>s</sup> This definition may be omitted if the Contractor is not a Consortium/Joint Venture.

**“Drawings”** means all of the drawings, calculations and documents pertaining to the Railway Project as set forth in Schedule-H, and shall include ‘as built’ drawings of the Railway Project;

**“Document” or “Documentation”** means documentation in printed or written form, or in tapes, discs, drawings, computer programmes, writings, reports, photographs, films, cassettes, or expressed in any other written, electronic, audio or visual form;

**“Emergency”** means a condition or situation that is likely to endanger the safety or security of the individuals on or about the Railway Project, including Users thereof, or which poses an immediate threat of material damage to the Works or any of the Project Assets;

**“Encumbrances”** means, in relation to the Railway Project, any encumbrances such as mortgage, charge, pledge, lien, hypothecation, security interest, assignment, privilege or priority of any kind having the effect of security or other such obligations, and shall include any designation of loss payees or beneficiaries or any similar arrangement under any insurance policy pertaining to the Railway Project, where applicable herein but excluding utilities referred to in Clause 9.1;

**“EPC”** means engineering, procurement and construction;

**“Final Payment Certificate”** shall have the meaning as set forth in Clause 17.12.1;

**“Final Payment Statement”** shall have the meaning as set forth in Clause 17.10.1;

**“Force Majeure” or “Force Majeure Event”** shall have the meaning ascribed to it in Clause 19.1;

**“GAD” or “General Arrangement Drawings”** shall have the meaning as set forth in Clause 4.1.3 (c);]

**“GOI” or “Government”** means the Government of India;

**“Good Industry Practice”** means the practices, methods, techniques, designs, standards, skills, diligence, efficiency, reliability and prudence which are generally and reasonably expected from a reasonably skilled and experienced contractor engaged in the same type of undertaking as envisaged under this Agreement and which would be expected to result in the performance of its obligations by the Contractor in accordance with this Agreement, Applicable Laws and Applicable Permits in reliable, safe, economical and efficient manner;

**“Government Instrumentality”** means any department, division or sub-division of the Government or the State Government and includes any commission, board, authority, agency or municipal and other local authority or statutory body, including panchayat, under the control of the Government or the State Government, as the case may be, and having jurisdiction over all or any part of the Railway Project or the performance of all or any of the services or obligations of the Contractor under or pursuant to this Agreement;

**“IEEMA”** means Indian Electrical and Electronics Manufacturers Association

**“Important Bridge”** means a bridge having a linear waterway of 300 metres or a total water way of 1000 sqm or more;

**“Indemnified Party”** means the Party entitled to the benefit of an indemnity pursuant to Article 23;

**“Indemnifying Party”** means the Party obligated to indemnify the other Party pursuant to Article 23;

**“Indirect Political Event”** shall have the meaning as set forth in Clause 19.3;

**“Insurance Cover”** means the aggregate of the maximum sums insured under the insurances taken out by the Contractor pursuant to Article 18, and includes all insurances required to be taken out by the Contractor under Clauses 18.1 and 18.9 but not actually taken, and when used in the context of any act or event, it shall mean the aggregate of the maximum sums insured and payable or deemed to be insured and payable in relation to such act or event;

**“Intellectual Property”** means all patents, trademarks, service marks, logos, get-up, trade names, internet domain names, rights in designs, blue prints, programmes and manuals, drawings, copyright (including rights in computer software), database rights, semi-conductor, topography rights, utility models, rights in know-how and other intellectual property rights, in each case whether registered or unregistered and including applications for registration, and all rights or forms of protection having equivalent or similar effect anywhere in the world;

**“Interim Payment Certificate”** or **“IPC”** means the interim payment certificate issued by the Authority Engineer for payment to the Contractor in respect of Contractor’s claims for payment raised in accordance with the provisions of this Agreement;

**“Lead Member”** shall, in the case of a Consortium/Joint Venture, mean the member of such Consortium/Joint Venture who shall have the authority to bind the contractor and each member of the Consortium/Joint Venture; and shall be deemed to be the Contractor for the purposes of this Agreement; }<sup>\$</sup>

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<sup>\$</sup> This definition may be omitted if the Contractor is not a Consortium/Joint Venture.

**“LOA” or “Letter of Acceptance”** means the letter of acceptance referred to in Recital (D);

**“Maintenance Manual”** shall have the meaning ascribed to it in Clause 10.6;

**“Major Bridge”** means a bridge having a linear waterway of 18 metres or more or which has a clear opening of 12 metres or more in spans;

**“Manuals”** shall mean the manuals specified in Schedule-D;

**“Material Adverse Effect”** means a material adverse effect of any act or event on the ability of either Party to perform any of its obligations under and in accordance with the provisions of this Agreement and which act or event causes a material financial burden or loss to either Party;

**“Materials”** are all the supplies used by the Contractor for incorporation in the Works or for the maintenance of the Railway Project;

**“Minor Bridge”** means a bridge having a linear waterway of less than 18 metres or which has a clear opening of less than 12 metres or in spans;

**“Non-Core Land”** means the Land required for the project line other than the Core-Land, as shown in item No. 3(b) of Annexure-I of Schedule-A;

**“Non-Political Event”** shall have the meaning as set forth in Clause 19.2;

**“Parties”** means the parties to this Agreement collectively and “Party” shall mean any of the parties to this Agreement individually;

**“Performance Security”** shall have the meaning as set forth in Clause 7.1;

**“Plant”** means the apparatus and machinery intended to form or forming part of the Works;

**“Political Event”** shall have the meaning as set forth in Clause 19.4;

**“Power Block”** means the length of the railway line between two railway stations, on which the overhead equipment (OHE) is de-energised and earthed to enable the Contractor to execute construction or maintenance works;

**“Programme”** shall have the meaning as set forth in Clause 10.1.3;

**“Project”** means the construction and maintenance of the Railway Project in accordance with the provisions of this Agreement, and includes all works, services and equipment relating to or in respect of the Scope of the Project;

**“Project Assets”** means all physical and other assets relating to (a) tangible assets such as such as Kavach equipment which includes Stationary and Onboard Kavach and RFID tags; and (b) tangible assets such as civil works and equipment including foundations, pavements, road surface, LC Gate road warning signals, sign boards, electrical systems, signals, LC Gates, Kavach and 4G LTE-R towers, S&T gears, Kavach equipment along with the buildings accommodating them and(c) Project Facilities situated on the Site;



**“Project Completion Date”** means the date on which the last Completion Certificate is issued;

**“Project Completion Schedule”** means the progressive Project Milestones set forth in Schedule-I for completion of the Railway Project on or before the Scheduled Completion Date;

**“Project Facilities”** means all the amenities and facilities to be constructed on the Site, as described in Schedule-C;

**“Project Milestone”** means the project milestone set forth in Schedule-I and includes the Scheduled Completion Date;

**“Proof Consultant”** shall have the meaning as set forth in Clause 10.2.2;

**“Provisional Certificate”** shall have the meaning as set forth in Clause 12.2;

**“Punch List”** shall have the meaning as set forth in Clause 12.2.1;

**“Quality Assurance Plan”** or **“QAP”** shall have the meaning as set forth in Clause 11.2.1;

**“Railway Project”** means the Works specified in this Agreement on the railway line from 213.02 (JTJ Jolarpettai Junction) to km 392.31 (Erode Junction), having a length of 179.29 (179 RKM) in Southern Railway Zone;

**“Re.”, “Rs.” Or “Rupees”** or **“Indian Rupees”** means the lawful currency of the Republic of India;

**“Request for Proposals”** or **“RFP”** shall have the meaning as set forth in Recital ‘C’;

**“Retention Money”** shall have the meaning set forth in Clause 7.5.1;

**“Right of Way”** means the constructive possession of the Site free from encroachments and encumbrances, together with all way leaves, easements, unrestricted access and other rights of way, howsoever described, necessary for construction of the Railway Project in accordance with this Agreement;

**“RINL”** means Rashtriya Ispat Nigam Limited

**“Safety Consultant”** shall have the meaning as set forth in clause 10.2.11

**“Scheduled Completion Date”** shall be the date as set forth in Clause 10.3.1;

**“Scope of the Project”** shall have the meaning as set forth in Clause 2.1;

**“Section”** means the portion of the railway line between two block stations;

**“Site”** shall have the meaning as set forth in Clause 8.1;

**“Specifications and Standards”** means the specifications and standards relating to the quality, quantity, capacity and other requirements for the Railway Project, as set forth in Schedule-D, and any modifications thereof, or additions thereto, as included in the design and engineering for the Railway Project submitted by the Contractor to, and expressly approved by, the Authority;

**“Stage Payment Statement”** shall have the meaning as set forth in Clause 17.4;

**“Structures”** means an elevated railway line or a flyover, as the case may be;

**“Sub-contractor”** means any person or persons to whom a part of the Works has been subcontracted by the Contractor and the permitted legal successors in title to such person, but not an assignee to such person;

**“Suspension”** shall have the meaning as set forth in Article 20;

**“Taxes”** means any Indian taxes including excise duties, customs duties, value added tax, sales tax, local taxes, cess and any impost or surcharge of like nature (whether Central, State or local) on the goods, Materials, equipment and services incorporated in and forming part of the Railway Project charged, levied or imposed by any Government Instrumentality, but excluding any interest, penalties and other sums in relation thereto imposed on any account whatsoever. For the avoidance of doubt, Taxes shall not include taxes on corporate income;

**“Termination”** means the expiry or termination of this Agreement;

**“Termination Notice”** means the communication issued in accordance with this Agreement by one Party to the other Party terminating this Agreement;

**“Termination Payment”** means the amount payable by either Party to the other upon Termination in accordance with Article 21;

**“Terms of Reference” or “TOR”** shall have the meaning as set forth in Clause 16.2.1;

**“Tests”** means the tests set forth in Schedule-J to determine the completion of Works in accordance with the provisions of this Agreement;

**“Time Extension”** shall have the meaning as set forth in Clause 10.4.1;

**“Traffic Block”** means the length of railway line between two railway stations, on which traffic is blocked with or without OHE being de-energised to enable construction or maintenance works to be undertaken.

**“User”** means a person who travels or intends to travel on the Railway Project or any part thereof on any train or vehicle;

**“Valuation of Unpaid works”** shall have the meaning as set forth in Clause 21.5.1;

**“Works”** means all works including survey and investigation, design, engineering, procurement, construction, Plant, Materials, temporary works and other things necessary to complete the Railway Project in accordance with this Agreement; and

**“WPI”** means the wholesale price index for various commodities as published by the Ministry of Commerce and Industry, GOI and shall include any index which substitutes the WPI, and any reference to WPI shall, unless the context otherwise requires, be construed as a reference to the WPI published for the period ending with the preceding month.

**IN WITNESS WHEREOF THE PARTIES HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DAY, MONTH AND YEAR FIRST ABOVE WRITTEN.**

SIGNED, SEALED AND  
DELIVERED

For and on behalf of

The President of India, represented by the  
Ministry of Railways, Chief Signal and  
Telecommunication Engineer, Projects &  
Planning, Southern Railway by:

SIGNED, SEALED AND  
DELIVERED

For and on behalf of

THE CONTRACTOR by:

(Signature)

(Name)

(Designation)

(Signature)

(Name)

(Designation)

In the presence of:

1.

2.

{COUNTERSIGNED and accepted by:

Name and particulars of other members of the Consortium/Joint Venture}

## **Schedules**

SCHEDULE - A  
*(See Clauses 2.1 and 8.1)*  
**SITE OF THE PROJECT**

**1 The Site**

- 1.1 Site of the Railway Project shall include the land, buildings, structures and track works as described in Annex-I of this Schedule-A.
- 1.2 The dates of handing over Right of Way to the Contractor are specified in Annex-II of this Schedule-A.
- 1.3 An inventory of the Site including the land, buildings, structures, track works, trees and any other immovable property on, or attached to, the Site shall be prepared jointly by the Authority's Representative and the Contractor, and such inventory shall form part of the memorandum referred to in Clause 8.2.1 of this Agreement.
- 1.4 The alignment plans of the Railway Project are specified in Annex-III.
- 1.5 The status of the environment clearances and forest clearances obtained or awaited is given in Annex IV. (Not required for KAVACH Project).

Annex - I  
(Schedule-A)  
**Site<sup>16</sup>**

**For KAVACH**

**1. Site**

The Site of the Railway Project comprises the section from km 213.02 (Jolarpettai-JTJ) to km 392.31 (Erode-ED) having a length of 179.29 RKM in the States of Tamil Nadu in the Southern Railway Zone. The land and other structures comprising the Site are described below.

**2. Route Length**

The route length of the Railway Project comprises the section as described below:

S.No	Name of Location From	Name of location To	Start Chainage (km)	End Chainage (km)	Length (km)	Remarks
1	Jolarpettai-JTJ	Erode-ED	213.02	392.31	179.29	21 Block Sections

**3. a. Core Land**

*Not Applicable for the KAVACH Project*

**b. Non-Core Land**

*Not Applicable for the KAVACH Project*

**4. Details of existing structures and facilities on adjoining railway track**

**4.1 Permanent Way**

*Not Applicable for this KAVACH Project*

**4.2 Important Bridges**

*Not Applicable for this KAVACH Project*

**4.3 Major Bridges**

*Not Applicable for this KAVACH Project*

**4.4 Minor Bridges/culverts**

*Not Applicable for this KAVACH Project*

**4.5 Tunnels**

*Not Applicable for this KAVACH Project*

#### 4.6 Railway Flyovers

*Not Applicable for this KAVACH Project*

#### 4.7 Road under-bridges (RUB)/ road over-bridges (ROB)

*Not Applicable for this KAVACH Project*

#### 4.8 Railway level crossings

The Site includes the following railway level crossings:

Sl No.	LC No.	Location in Km	Between Stations	Dept	Class	Normal Condition	TVUs
1	94	232/100-200	KEY Yard	T	B	Open	24454.5
2	103	279/700-800	BDY Yard	T	SPL	Open	125129
3	115	337/400-500	SA-VRPD	E	B	Open	30361
4	118 DN	375/20-22	SGE-ANU	E	A	Open	34233.8
5	118C UP	378/35-37	SGE-ANU	E	C	Open	1730.75
6	119 DN	379/8-10	ANU Yard	T	SPL	Open	120003
7	119A UP	379/9-11	ANU Yard	T	SPL	Open	122556
8	119B UP	385/1-3	ANU-CV	E	C	Open	4009.75
9	121A DN	384/6-8	ANU-CV	E	C	Open	7672.75
10	120A UP	385/27-29	ANU-CV	E	C	Open	2047.5
11	120B UP	386/41-43	ANU-CV	E	C	Open	2958.75
12	122 UP	390/25-27	CV-ED	E	SPL	Open	102250
13	121D DN	390A/20-22	CV-ED	E	SPL	Open	100764
14	123 UP	391/7-9	CV-ED	E	C	Open	1878.75
1	94	232/100-200	KEY Yard	T	B	Open	24454.5
2	103	279/700-800	BDY Yard	T	SPL	Open	125129

Dept : 'T' indicates Traffic LC Gate ; 'E' indicates Engineering LC Gate

TVU : Train Vehicle Units

#### 4.9 Railway stations on Railway Project

*As per para-No.4.14 of this document*

#### 4.10 Railway yards

*As per para-No.4.14 of this document*

#### 4.11 Foot over bridges on Railway Project

*Not Applicable for the KAVACH Project*

#### 4.12 Transmission lines crossing the Right of Way

*Not Applicable for the KAVACH Project*

#### 4.13 Underground power line crossing the Right of Way

*Not Applicable for the KAVACH Project*

#### 4.14 Signalling infrastructure

The Site includes the following signalling infrastructure:

Station/Block Section	Chainage	Railway/ Divn	Std of Interlocking	Type of Interlocking	LC gates	Make of IPS/ Battery Capacity	No of functional Lines
Jolarpettai (JTJ)	213.02	Chennai	II	EI (Kyosan)	1	IPS –Statcon 21.05.2020 Battery – 200AH	-
Tirupattur (TPT)	220.4	Salem	II	EI (Hitachi)	0	IPS – Statcon 02.09.22 Battery – 200AH	5
Kagankarai (KEY)	231.78	Salem	III	EI (Hitachi)	1	IPS –Amararaja 25.04.23 Battery – 200AH	4
Samalpatti (SLY)	243.66	Salem	III	RRI	0	IPS – Statcon 16.07.15 Battery – 200AH	4
Dasampatti (DST)	252.01	Salem	II	EI (Hitachi)	0	IPS –Amararaja 26-06-22 Battery – 200AH	4
Doddamapatti (DPI)	260.29	Salem	II	EI (Hitachi)	0	IPS –Amararaja 22.07.19 Battery – 200AH	4
Morappur (MAP)	267.28	Salem	II	EI (Hitachi)	0	IPS –Amararaja 20.05.22 Battery – 200AH	4
Buddireddipatti (BDY)	279.83	Salem	II	EI (Hitachi)	1	IPS –Amararaja 05.07.22 Battery – 200AH	4
Bommidi (BQI)	289.97	Salem	II	EI (Hitachi)	0	IPS –Amararaja 25.03.23	4



						Battery – 200AH	
Lokur (LCR)	300.01	Salem	II	EI (Kyosan)	0	IPS –Amararaja 19.03.19 Battery – 200AH	4
Danishpet (DSPT)	309.35	Salem	II	PI	1 (Under closure)	IPS – Statcon 19.06.15 Battery – 200AH	4
Tinnapatti (TNT)	316.34	Salem	II	EI (Kyosan)	0	IPS –Amararaja 30.12.18 Battery – 200AH	4
Karuppur (KPPR)	326.35	Salem	II	RRI	0	IPS –Amararaja 15.02.17 Battery – 200AH	6
Magnesite Jn (MGSJ)	329.52	Salem	II	EI (Siemens)	0	IPS – Statcon 28.02.23 Battery – 200AH	6
Salem (SA)	333.06	Salem	II	EI (Siemens)	1	IPS – Statcon (03 Nos) 03.12.22 Battery – 200AH	8
Virapandy Road (VRPD)	343.03	Salem	II	RRI	0	IPS –Amararaja 23.05.16 Battery – 200AH	3
Magudan- chavadi (DC)	353.72	Salem	II	PI	0	IPS –Amararaja 28.06.16 Battery – 200AH	4
Mavelipalaiyam (MVPM)	366.15	Salem	II	RRI	0	IPS –Amararaja 20.07.16 Battery – 200AH	4
Sankaridrug (SGE)	371.23	Salem	II	RRI	0	IPS – Statcon 25.06.15 Battery – 200AH	5
Anangur (ANU)	378.96	Salem	II	RRI	5	IPS –Amararaja 23.04.16 Battery – 200AH	5
Cauvery (CV)	387.48	Salem	II	RRI	4	IPS – Statcon 09.01.23 Battery – 200AH	5
Erode (ED)	392.31	Salem	I	EI (Kyosan)	3	IPS –Amararaja (3 Nos) 09.02.17 Battery – 200AH	8

#### 4.15 Telecommunication infrastructure

The Site includes the following telecommunication infrastructure:

Station	Control Communication	25 WVHF radio	Any other Communication	6Q Cable	OFC	STM make
Jolarpettai (JTJ)	Section Control, Traction Power Control	Available	BSNL Landline	Available	Available	Tejas TJ-1400
Tirupattur (TPT)	Traction Power, Traction Power Control	Available	BSNL FCT	Available	Available	
Kagankarai (KEY)	Section Control, Traction Power Control	Available	BSNL Landline	Available	Available	
Samalpatti (SLY)	Section Control, Traction Power Control	Available	BSNL Landline	Available	Available	
Dasampatti (DST)	Section Control, Traction Power Control	Available	BSNL FCT	Available	Available	
Doddamapatti (DPI)	Section Control, Traction Power Control	Available	BSNL FCT	Available	Available	
Morappur (MAP)	Section Control, Traction Power Control	Available	BSNL Landline	Available	Available	
Buddireddipatti (BDY)	Section Control, Traction Power Control	Available	BSNL FCT	Available	Available	
Bommidi (BQI)	Section Control, Traction Power Control	Available	BSNL Landline	Available	Available	
Lokur (LCR)	Section Control, Traction Power Control	Available	BSNL FCT	Available	Available	
Danishpet (DSPT)	Section Control, Traction Power Control	Available	BSNL FCT	Available	Available	

Tinnapatti (TNT)	Section Control, Traction Power Control	Available	BSNL FCT	Available	Available	Tejas TJ-1400
Karuppur (KPPR)	Section Control, Traction Power Control	Available	BSNL Landline	Available	Available	
MagnesiteJn (MGSJ)	Section Control, Traction Power Control	Available	BSNL Landline	Available	Available	
Salem (SA)	Section Control, Traction Power Control	Available	BSNL Landline	Available	Available	
Virapandy Road (VRPD)	Section Control, Traction Power Control	Available	BSNL FCT	Available	Available	
Magudanchavadi (DC)	Section Control, Traction Power Control	Available	BSNL Landline	Available	Available	
Mavelipalaian (MVPM)	Section Control, Traction Power Control	Available	BSNL FCT	Available	Available	
Sankaridrug (SGE)	Section Control, Traction Power Control	Available	BSNL Landline	Available	Available	
Anangur (ANU)	Section Control, Traction Power Control	Available	BSNL FCT	Available	Available	Tejas TJ-1400
Cauvery (CV)	Section Control, Traction Power Control	Available	BSNL Landline	Available	Available	
Erode (ED)	Section Control, Traction Power Control	Available	BSNL FCT	Available	Available	

**4.16 Details of existing data loggers at stations is given below:**

Sl. No	Station / LC	Make	Capacity	
			Digital	Analog
1	Jollarpettai			
2	Tirupattur (TPT)	Efftronics	512	32
3	Kagankarai (KEY)		512	32
4	Samalpatti (SLY)		1024	32
5	Dasampatti (DST)		512	32
6	Doddamapatti (DPI)		512	32
7	Morappur (MAP)		512	32
8	Buddireddipatti (BDY)		512	32
9	Bommidi (BQI)		1024	32
10	Lokur (LCR)		512	32
11	Danishpet (DSPT)		1024	32
12	Tinnapatti (TNT)	Efftronics	512	32
13	Karuppur (KPPR)		1024	32
14	MagnesiteJn (MGSJ)		1024	32
15	Salem (SA) – JTJ Side Hut		512	32
16	Salem (SA) – Central		1024	32
17	Salem (SA) – ED		512	32

Sl. No	Station / LC	Make	Capacity	
			Digital	Analog
	Side Hut			
18	Virapandy Road (VRPD)		1024	32
19	Magudanchavadi (DC)		1024	32
20	Mavelipalaiyam (MVPM)		1024	32
21	Sankaridrug (SGE)		1024	32
22	Anangur (ANU)		512	32
23	Cauvery (CV)	Efftronics	512	32
24	Erode (ED)		1024	32

#### 4.17 Any Other Structures

The details of Signalling Infrastructure of the site are provided in Feasibility Report

#### 5. Locomotives

The Site includes 10 locomotives of loco sheds of Southern Railway nominated for fitment of Onboard Kavach.

#### 6. Disclaimer

Although utmost care has been taken to include all the infrastructure details of the Site in this document, the contractor shall carry out his / their own survey to assess the quantum of work and report to the Authority Engineer any other infrastructure details that are required to be worked upon for the completion of the Project. Further action regarding such infrastructure shall be taken as advised by the Authority Engineer in light of the conditions of the Agreement. The above infrastructure details of the Site are being provided only as a preliminary reference by way of assistance to the Bidders who are expected to carry out their own surveys, investigations and other detailed examination of the Site before submitting their Bids. Nothing contained in the above infrastructure details shall be binding on the Authority nor confer any right on the Bidders, and the Authority shall have no liability whatsoever in relation to or arising out of any or all contents.

Annex - II  
(Schedule-A)

**Dates for providing Right of Way**

The following are complete details of the Right of Way showing the dates on which the Authority shall provide the different sections of the Right of Way to the Contractor.

S.No.	From km to km	Length (km)	Distance of Railway Boundary from C/L of outermost line (in m)		Date of Providing Right of Way
			Right Hand Side	Left Hand Side	
1	2	3	4	5	6
Part A:					
Right of Way being 95% (ninety-five per cent) of the core land length and 90% (ninety per cent) of non-core length of the Project, under Clauses 4.1.3 read with Clauses 8.2 and 8.3 of the Agreement		Not Applicable as railway land is available for carrying out S&T works.			
Part B:					
Balance of the Right of Way not covered in Part A above.		Not Applicable as railway land is available for carrying out S&T works.			

Annex - III  
(Schedule-A)

**Plan and Profile**

The proposed Signalling Interlocking Plans (SIPs) of the Railway Project Line are attached. This is based on survey conducted by the Authority. The Contractor shall verify SIPs for ensuring technical feasibility within the Right of Way boundaries. (Any deviation [positive/negative] from the enclosed Signal Interlocking Plan will be treated as Change of scope.) Technical upgrades to Kavach RDSO specification including the latest amendments / Technical Advisory Notes (TANs) will not be treated as change of scope.

The tentative list of tower locations is enclosed below. The Contractor shall verify the same for ensuring technical feasibility and communicate the date of commencement of works for approval of the Authority. The agreement considers the construction of 64 towers and provision of ODC (Out Door Cabinet).

Any changes, whether positive or negative in the signal interlocking plan (SIP), Engineering scale plan (ESP) and PSRs after the commissioning of ABS in the JTJ-ED section will be considered as change in the scope of the work.

The deviations positive / negative from the said quantities required for completion of ground infrastructure works will be treated as Change of Scope.

Annex - IV  
(Schedule-A)

**Environment Clearances and Forest Clearances**

**1. Environment clearances**

*Not applicable for the KAVACH project*

**2. Forest clearances**

*Not applicable for the KAVACH project*



**Schedule-B**  
*(See Clause 2.1)*

**Development of the Railway Project**

Development of the Railway Project shall include design and construction of the Railway Project as described in Annex-I to this Schedule-B and in Schedule-C.

SCHEDULE - B  
(See Clause 2.1)

**Description of the Railway Project**

**Description of Railway Project:**

Provision of KAVACH (Train Collision Avoidance System) including Tower in Jolarpettai (JTJ) to Erode (ED) Section of Salem Division in Southern Railway. The system and equipments supplied against this contract and execution shall conform to RDSO/SPN/196/2020, Ver.4.0 or latest with amendments, and shall comply with all the Technical Advisory Notes, Guidelines, Specifications, Standards issued by RDSO and Railway Board from time to time.

All signalling works for TCAS including Survey, design, supply, installation, testing and commissioning shall be executed in accordance with the provisions of the Indian Railway Signal Engineering Manual, Indian Railway Telecom Manual, RDSO Specifications, Technical Advisory Notes (TAN), Railway Board Guidelines, testing formats issued on the subject by RDSO/Railway Board from time to time and prevailing specifications, guidelines/policy & practice of Southern Railway.

This work also involves necessary KAVACH modifications/alterations for interfacing the TPT station KAVACH system with the existing commissioned KAVACH system at JTJ station. This includes providing the facility for the seamless handover and takeover of STCAS in the JTJ-TPT section. All necessary modifications, including both hardware and software, required for this purpose will be addressed in this work.

This work must be carried out in accordance with the ongoing Automatic Block Signalling work in the JTJ-ED section.

**1. Survey and Design**

Survey and design shall be done for the fitment and commissioning of Kavach in the Site of this Project. Survey and design of the following shall be done for Kavach fitment.

1. Absolute Location Survey including OHE mast to mast distances
2. Radio Signal Strength Survey
3. Cable Route Plan
4. Kavach Deployment Plan with Details of Stationary KAVACH / Remote Interface Units
5. Kavach Multiple Access Plan
6. Kavach Tag / TIN Allotment Plan
7. RFID Tag / TIN Layout
8. RFID Tag Data
9. Kavach Table of Control (TOC)
10. Kavach Track Profile
11. Interface Circuits
12. Datalogger / Remote Terminal Unit (RTU) Wiring and Validation Plan

13. Station Working Rules (SWR)
14. Specific Application Safety Case by Independent Safety Assessor
15. Power Supply Scheme
16. Floor Plans
17. Network Monitoring System (NMS) Connectivity Scheme

The tenderer may undertake study/survey of Signalling systems/practices used in Railways and makes his own assessment of the work. Any equipment/design/component needed to make the entire system successfully functional shall be supplied by the tenderer. In the event of the tenderer desiring to have a field visit before furnishing his offer, he may apply for permission in this regard. Such permission shall be granted by the Railway but the expenses in this regard shall be borne by the tenderer completely.

This includes site survey to finalize the location for erection of tower adhering to the stated guidelines and in agreement with Electrical, S&T and Civil engineering department and furnish details to Railways for necessary approval. In case the site for tower erection is not accessible by train, the contractor will arrange suitable vehicle for the survey of tower locations.

After the survey, the contractor will propose the location for tower erection, type of RF cable along with db loss, specification of radio modem along with forward and reverse power, etc. in accordance with RDSO specification RDSO/SPN/196/2020 version 4 or latest and advisory Note STS/E/TAN/5001, Ver 1.0, dt. 20/02/2019 or latest as on date of tender opening. The scheme for installation will be approved by the competent authority in Railways.

The track survey shall be conducted using Aerial Drone Vehicle to study the complete track layout and identify curves. The complete mapping of absolute location of the entire track for TCAS territory shall be done in the aerial survey. This should help in identifying the absolute location of nominated position of RFID tags and location of signals, points, LC Gates, dead ends, fouling marks & center line of the station. All the locations of Kilometer stones/ Traction masts are to be mapped to the absolute locations by carrying out survey using Drone/Loco mounted camera/ foot survey with odometer/surveyor wheel and not on the basis of SIP/ESP data. After the conduct of aerial survey, the contractor shall submit:

- a) Orthophotography of entire TCAS section
- b) High Definition Videography in two copies of Hard Disk Drive for the entire section.
- c) Photo booklet
- d) Project booklet
- e) Complete mapping of RFID tags and signals, points, LC Gates, dead ends, fouling marks & centre line of the station as per absolute location

However, Railways shall extend assistance for necessary permission from concerned Govt Authority in case of Drone survey required in sensitive / Defence Area.

## **2. Supply, Installation, Testing, Deployment and Commissioning**

Supply, installation, testing, deployment and commissioning of stationary / trackside Kavach system shall be done for the provision of Kavach in the Site of this Project.

KAVACH can work on UHF (400MHz) for interim commissioning of KAVACH followed by final porting and commissioning on LTE. It shall also be possible for direct commissioning of KAVACH system on LTE, in case LTE works advance sufficiently ahead of KAVACH works. Necessary alterations / upgradation of stationary / trackside Kavach from UHF to LTE shall be provided such that hardware modifications at Stationary Kavach and Onboard Kavach shall be “Nil”. Only software shall be needed to be updated in Stationary Kavach and Onboard Kavach to ensure compatibility and integration with LTE network as per RDSO Letter RDSO TELE0LKO(TECH)/10/2023-S and T Directorate dated 13.07.2024.

### **3. Building Construction and Electrification works**

All items of building works shall conform to specification of works of Southern railway. The building work shall include electrical internal wiring with allied work, system electrical power supply arrangement and other works incidental to buildings. Building works shall be deemed to include buildings required for installation of equipment for signalling, telecommunication and facilities along the railway line.

Tentative Space availability/ non-availability for provision of Stationary KAVACH/RIU in JTJ-ED section are shown in the para 4.14 of Schedule-A, Annexure-I of this agreement. However, bidder shall survey the actual space availability and construct building as per the actual requirement of site. The total building so constructed shall be 910 Sq.meter.

However this total building work may be constructed at single location or at multiple locations including building requirements at Stations/Auto huts location with approval of the authority engineer. Land for the same shall be made available by Railways free of cost. Further The Contractor shall conduct a survey to assess the requirement Service Building for installation of TCAS equipments before Bidding. Buildings required for provision of above signalling system (TCAS), if required, shall be provided by the contractor for housing of new S&T gears. PORTA Huts are not acceptable. All items of building works shall conform to specification of works of Southern railway. The building work shall include provision of electrical arrangements such as lights, fan, exhaust fan, power supply extension, wiring with allied work, Railway's decision regarding requirement of building at Station/Auto hut/LC gate shall be final.

Detailed guidelines for building construction and general electrical work is given in Schedule-C.

### **4. RFID Tag:**

RFID tags shall be fitted on the sleepers between the track in both stations and block section for giving trackside information to Onboard KAVACH as per para 3.4.2 of RDSO/SPN/196/2020 Version 4.0 or latest with Technical Advisory Notes (TAN) and Guidelines issued by RDSO and Railway Board from time to time.

### **5. Stationary KAVACH Unit:**

Stationary KAVACH Unit comprising of Station/ LC/ IB KAVACH Vital Computer, Stationary KAVACH Radio Unit and Station Master Operation and Indication Panel shall be as per para 3.4.4, 3.4.5 & 3.4.6 of RDSO/SPN/196/2020 Version 4.0 or latest with Technical Advisory Notes (TAN) and Guidelines issued by RDSO and Railway Board from time to time.

**6. Remote Interface Unit (RIU)**

Remote Interface Unit (RIU) to be used where remote signalling functions are required to be fetched to a nearby Stationary KAVACH shall be as per para 3.4.7 of RDSO/SPN/196/2020 Version 4.0 or latest with Technical Advisory Notes (TAN) and Guidelines issued by RDSO and Railway Board from time to time.

**7. Tower and Antenna**

Tower construction and erection is part of this contract. However, the location of tower construction as per the KAVACH requirement shall be identified duly carrying RSS survey as per the laid down guidelines of Railway Board and RDSO. Number of Towers and its locations shall be designed in a way that, KAVACH can work on UHF (400MHz) for interim commissioning of KAVACH followed by final porting and commissioning on LTE without any additional towers/ KAVACH equipment. It shall also be possible for direct commissioning of KAVACH system on LTE, in case LTE works advance sufficiently ahead of KAVACH works.

It shall be the responsibility of the contractor under this agreement to ensure seamless communication for KAVACH application as per the laid guidelines of RDSO and Railway Board from time to time. The antenna for UHF shall be as per para 3.4.8 of RDSO/SPN/196/2020 Version 4.0 or latest with Technical Advisory Notes (TAN) and Guidelines issued by RDSO and Railway Board from time to time.

All items of tower works shall conform to the specification of works as per specification in Schedule-D, RDSO & Railway Board guidelines, updated time to time and any other specifications of EPC. The tower works shall, inter alia, include the following works:

1. Fabrication, supply, erection and painting of 40 m towers as per the Approved Tower Site Plan proposed by RDSO shortlisted firms for 4G LTE-R.
2. Supply and installation of Outdoor Cabinet (ODC) for housing power supply and telecom equipment near constructed towers.
3. Earthing of towers and ODCs.
4. Fencing of Towers

**8. Onboard KAVACH unit**

The onboard KAVACH unit comprising of Onboard KAVACH Vital Computer, RFID reader, Onboard KAVACH Radio Unit , Loco Pilot's Operation -cum-indication panel (LP-OCIP), Brake Interface Unit (BIU), Brake Characteristics, etc. shall be as per para 3.5 of RDSO/SPN/196/2020 Version 4.0 or latest with Technical Advisory Notes (TAN) and Guidelines issued by RDSO and Railway Board from time to time.

**9. On Board Units Configuration Kit:**

Kits for configuring, programming & downloading the execution & application data & VSC.

- a) Kit for configuring, reading, programming and downloading the execution and application data in Loco The kit will consist of a loco configuration data generation tool that enables conversion of loco configuration data from alphanumeric characters to bit file. The tool for entering different parameters of loco configuration data shall be GUI based and user friendly. The bit file shall then be loaded into Loco TCAS using a light and portable machine. The working manuals of this complete equipment shall be approved by Railways. RDSO issued guidelines will be followed while accepting the same. - Configuring kit (1 number) need to be supplied as mentioned in Schedule C (project facilities) of

EPC document in this work. Approval of Authority Engineer to be taken for Make and Model for configuration kit before supply.

- b) Supply of (VSC) Video Surveillance Cameras (Two pair)-it should have distance coverage of 300 mtrs, 15 days memory, Make CP Plus or similar, 12 MP HD or higher with night vision, with dual audio/video channels and connectivity over internet.

#### **10. Radio Communication Security and Key Management System**

The Radio Communication Security and Key Management System for KAVACH system shall be as per para 4 of RDSO/SPN/196/2020 Version 4.0 or latest with Technical Advisory Notes (TAN) and Guidelines issued by RDSO and Railway Board from time to time.

The provision for Payment of various charges and fees towards hiring of server space for Key Management System (KMS) from Railtel Data Centre for entire section shall be done by the contractor. In this tender the Contractor has to supply the SIMs (and arrange for their recharges up to project completion date or extended project completion date) and make all the necessary arrangements for KMS and get it linked with Railtel Data Centre. The payment towards SIMs and KMS charges shall be made by the Railways directly.

#### **11. Scope & Specification of OFC Cables, Equipments & laying:**

In the JTJ-ED section, as part of the Automatic Block station work currently in progress, 2 x 48-core Optical Fiber Cable will be laid on each side of the line. This cable will be utilized for the KAVACH work .

#### **12. Scope & Specification of Signalling Items (Indoor)**

- a) Relays (fixing & wiring)-Relays required for commissioning of TCAS (Wherever direct interfacing is not feasible) should be QN1 (8F/8B) (for internal relays) and QNA1(8F/8B) (for external relays) as per specification no. BRS/930A (Inspection by RDSO) with plug board, retaining clip & connectors conforming to BRS: 930, IRS S34 & IRS: S 23 (as applicable).
- b) Relay Racks – Relay Rack required for fixing Relays for commissioning of TCAS should be Relay racks assembly complete with scaffolding bus bars, fuse strips, fuses, resistors, capacitors, insulators, grouting bolts, tripods etc. [Scaffolding should include 20% extra (with minimum of 2 relay rack positions) as spare for future expansion]. Relay rack shall be Powder Coated.
- c) Erection of Relay rack with scaffolding suitably concreting tri-pod bases using J-bolts. Reel insulators are to be provided for insulating the rack from the scaffolding & tri-pod bases.
- d) PVC insulated wire copper conductor 16/0.2 mm - Wiring of relays shall be done by PVC insulated wire copper conductor 16/0.2 mm confirming to IS: 694 to RDSO spec no IRS S76/89. Each coil of 100 Mtrs. in length. Wire to be procured from RDSO approved firms with inspection by RDSO.
- e) Non-deteriorating type of fuse holders and fuse links. Non-deteriorating type of fuse holders and fuse links-electric fuse for Railway signaling voltage 240 AC/DC as per RDSO spec IRS S.78/92 (IRS-S-78/97 Tentative) IS: 13703 (part 2

sec2):1993 suitable for E1 fuse 20 Amps SC-20 Holder Safe clip/ knife edge type size E1 (R-SS) amp. (D) Fuse links 2 amps, shall be used wherever required for commissioning of TCAS (Material shall be Inspected by RDSO).

- f) Disconnect Terminal Block (WAGO or better make) – Disconnect Terminal Block, Screw less type, as per RDSO Spec. No. RDSO/SPN/189/2004. With latest amendments. Disconnect terminal consist:
- (i) Disconnect Terminal Block, screw less type, 4-wire front entry (Two input & two out-put) the color will be decided by Engineer - in - Charge. (Preferably In Blue, Red & Grey Colors in the ratio of 1:2:3)
  - (ii) Supply of End plate for above item (I) 2.5mm/0.091 in thick as per site requirement.
  - (iii) Supply of End Stopper for above item (I) 10mm/0.0394 in width as per site requirement.
  - (iv) Supply of Carrier Rails for above 35mm x 7.5mm, 1mm/0.039 in thickness un-slotted type as per site requirement.
  - (v) Markers strip for above item (i) (Disconnect Terminal Block shall be inspected by RDSO).
- g) Functions Description Writing for the installations shall be as per Railway Board Lr. No. 2023/Sig/17-Sig Equip/Maintenance/Part Dt.06.11.2023
- h) All the circuit design/wiring documents proposed to be submitted by the contractor for approval of Railways should be certified/pre-approved by personnel holding a valid IRSTELO license or by a retired Railway officer of minimum ADSTE level having more than five years of experience in drawing and design. Further details can be seen at <https://irstelicensing.org.in>.

### **13 Scope & Specification of Signalling Items (Outdoor)**

- a) Supply, foundation and erection of Full/Half size LB - Supply, foundation and erection of Full size Location Box as per drawing of Southern Railway for termination of various cables required for commissioning of TCAS. This includes fixing of E-type locks, painting of box and termination and other particulars, numbering of box etc and all other items as instructed by engineer in charge.
- b) Terminal block 6 Way PBT-Terminal block 6 Way PBT 25mm as per RDSO Drg. No SA 23756/Alt 3 & IRS S 75/91 & IRS S 23 with amendment 2 or latest shall be used to connect wiring/ cables core wherever required for commissioning of TCAS. (Inspection by RDSO)
- c) Terminal block 1 Way PBT-Terminal block 1 Way PBT 60mm as per RDSO Drg No SA 23745/Alt 5 & IRS S 75/91 & IRS S 23 with latest amendment shall be used to connect wiring/ cables core wherever required for commissioning of TCAS. (Material shall be inspected by RDSO).
- d) E type locks -E type locks of ward (as per requirement), with key for each E-type lock to Drg.No.S A.3376/M/Latest and RDSO spec no IRS. S.30/64, for locking arrangement in Location box or wherever required for commissioning of TCAS.

- e) Numbering in location box- Numbering location box shall be done as per standard practice of Southern Railway and writing all termination particulars inside the location box as per details. This includes all main and tail cable particulars, writing of cable numbering of cables.
- f) Functions Description Writing for the installations shall be as per Railway Board Lr. No. 2023/Sig/17-Sig Equip/Maintenance/Part Dt.06.11.2023
- g) All the circuit design/wiring documents proposed to be submitted by the contractor for approval of Railways should be certified/pre-approved by personnel holding a valid IRSTELO license or by a retired Railway officer of minimum ADSTE level having more than five years of experience in drawing and design. Further details can be seen at <https://irstelicensing.org.in>.

#### **14. Scope & Specification of Cable trenching & laying (general)**

- a) PVC insulated underground unscreened armoured railway signalling cable copper conductor size 12 core x 1.5 sq mm as per RDSO spec. No. IRS-S-63/2014 rev. 4.0 or latest (Inspection by RDSO) shall be used for distributing power supply from station/LC to tower location, terminating in location boxes or wherever required for commissioning of TCAS.
- b) Track crossing, road crossing, platform crossing, trenching in circulating area shall be carried out by micro-tunnelling / trenchless laying/HDD Boring to the extent possible as specified in Signal Engineering Manual.
- c) Micro-tunnelling / trenchless laying shall also be adopted in difficult terrains / marshy areas / water logged areas if it is found advantageous for quick delivery of this Project.
- d) Cable trenching and laying shall be by means of micro tunneling/ HDD to the extent possible.
- e) Jungle cutting along with the cable route to be carried out for laying of various types of cables required for commissioning of TCAS or for the clearance required for the installation of tower.
- f) GI pipes shall be used for crossing the culverts, bridges etc. and concreting of ends with brick masonry at both ends wherever required along with the cable route. Medium Class G.I. Pipes as per IS: 1239 (Pt.I)-2004 or latest; 100mm dia. (int. dia) 3.65 mm+/- 10% thick with coupling or of size as per the site requirement shall be used. G.I. pipes shall have ISI mark on it and require manufacturer's test certificate of G.I. pipes.
- g) DWC split pipe of 120/103 mm dia or of size as per the site requirement shall be used in already dug cable trenches for protection of cables wherever required.



- h) GI troughing and channel - Cable should be protected on Girder bridges along with the route of cable by GI troughing & Channel of size 100 mm x 50 mm x 06 mm, 1.2 Mtr. Long on girder bridges for carrying cables. Fixing of channel with Girder to be done with hook/ 'J' bolts of suitable size to hold the load of the troughing as per as per Southern Railway drawings. This item also includes the filling one layer of Bitumen compound as per extant practice.
- i) Laying of different cables in trench - S&T Cables of various cores/ pairs/ quads required for commissioning of TCAS shall be laid in trenches/ GI pipes/ RCC pipes/ DWC pipes/ Trunking/Concreting as per RDSO guideline & Standard practice of Southern Railway. This also includes laying of cables in track crossings & road crossings. (Cables shall be meggered before and after its laying by under supervision of Railway Representative and he will submit the meggering report of each testing). Length of the cable laid includes the length of the cable coiled for termination purposes.
- j) Cable termination including fixing - S&T Cables of various cores/ pairs/ quads required for commissioning of TCAS shall be terminated in location boxes, Cable termination rack etc at both ends on ARA terminal or on 8-way terminals or on screw less connectors. This includes all associated works of pulling out the cable from underground, peeling off insulation, dressing of cable core supported on sting rod as per Standard practice of Southern railway. The work shall be done as per instructions of Rly engineer at site. Cable termination including fixing terminals, fuses, LD etc. Meggering the cables and recording the readings.
- k) Procedure for undertaking digging work in the vicinity of Signalling, Electrical and Telecommunication cables should be as per letter No.2021/Tele/5(2)/-3-Part (1) (3425647) dated 12.06.2023. The penalty in case cables are damaged by the contractor during execution of the work as per the above mentioned R.B. Lr. shall be.

Sl.No.	Cable Damaged	Penalty per location
1	Only Quad cable or Signalling cable	Rs. 1.0 Lakh
2	Only OFC	Rs. 1.25 Lakh
3	Both OFC & Quad	Rs. 1.5 Lakh
4	Electrical Cable	Rs. 1.0 Lakh

- l) Trenching, Cable laying, track crossing, Concreting need to be done as per SEM chapter 15 & TCM chapter 13

- m) For locations with space constraints where trenching/HDD is not possible due to the presence of existing cables, the cables should be routed through GI (galvanized iron) pipes of the required size. These pipes should be encased in concrete continuously, with a minimum dimension of 300mm x 300mm. All such locations shall be clearly indicated in the cable route plan while submitting for approval.
- n) Cable Markers shall be placed at an interval of 20 m with in station section, 50 m in block section and at diversion points to mark the route. Additional markers shall be provided to indicate important points like cable joints, water and sewage mains, power cable, crossings, alignment bends/curves, etc. The RCC cable marker shall be as per Drawing no. Drg.No.15-D1 of IR-SEM.

## **15. Earthing for S&T equipments**

- a) Earth resistance up to 10 ohm is normally permissible for protective earth except when specified otherwise. For electronic equipment, Earth resistance shall not be more than one ohm. Earthing for S&T equipment's shall be as per Chapter 19 Section 11 of IR-SEM 2021.
- b) All apparatus cases, CT boxes, armours of cables, Cable Termination Rack, Relay Racks, etc., shall be earthed. If number of apparatus cases is grouped at a place, one earth shall be provided for all. Otherwise, separate earth is to be provided for each apparatus case. The earth resistance shall not be more than 10 Ohms. This work includes excavation of pit at a given location as per Drg.No.SG/CN/02/13 on natural soil, supply and fixing earth pipe covering the same with the mixture of 2kgs. of charcoal, 2 kgs. of common salt and earth. A concrete enclosure has to be provided around the earth pipe as per drawing. The earthing shall be done with MS flat of size 35mmx6mm/19 C cable as required by Railways.
- c) Maintenance Free Earth - Supply and installation of Maintenance free earth wherever required for commissioning of TCAS shall be as per as per Drg. No. SDO / RDSO/ E&B/001 and RDSO Spec No. RDSO/SPN/197 Ver.1.0 or latest with recent amendments. All materials shall be supplied with RDSO Inspection and the execution/ installation shall be carried out with OEM supervision. This will be consisting of following items:
  - (i) The earth electrode shall be UL listed and of minimum 17.0mm diameter and minimum 3 Meter long. – 1 No (In rocky area, a set of 3 electrodes of 1 Meter each of 17.0mm dia in grid form shall be installed in grid form.)

- (ii) The acceptable Earth Resistance at earth MEEB busbar shall not be more than 1 ohm. For achieving this value, more than one earth pits can be installed if necessary depending upon the soil resistivity.
- (iii) The minimum copper bonding thickness shall be of 250 microns of 99.9% electrolyte grade copper. Marking: UL marking as per UL 467 scheme, Manufacturer's name or trade name, length, diameter, catalogue number must be punched on every earth electrode.
- (iv) Earth enhancing compound (minimum approx. 30-35 kg) (It shall be tested and confirm to the requirements of IEC 62561-7 as per RDSO specification)
- (v) Construction of unit earth pit shall be as per RDSO drawing no. SDO/RDSO/E&B/001 and para 8.4.1 of RDSO Spec No. RDSO/SPN/197 Ver.1.0.
- (vi) Construction of loop Earth by providing multiple earth pits shall be as per para 8.4.2 of RDSO Spec No. RDSO/SPN/197 Ver.1.0
- (vii) Location for Earthing: Low lying areas close to the building or equipment are good for locating Earth Electrodes. The location can be close to any existing water bodies or water points but not naturally well-drained. Dry sand, lime stone, granite and any stony ground should be avoided. Earthing electrode should not be installed on high bank or made-up soil.
- (viii) Measurement of Earth resistance and Inspection Chamber shall be done as per para 8.4.2 & 8.4.3 of RDSO Spec No. RDSO/SPN/197 Ver.1.0
- (ix) Equi-potential Earth Busbar and its connection to equipments & Surge protection devices shall be as per para 8.5 of RDSO Spec No. RDSO/SPN/197 Ver.1.0.

## **16. Safety of Existing system of Railway**

- a) The contractor should abide by all the Railway regulations and also ensure that the same are followed by his representatives, agents, servants or workmen. He is therefore bound under these clauses to give notice to them about the provision of this clause and the consequent liability of the contractor under the agreement. The contractor shall conform to all the Railway Rules relating to safety of personnel and operation of signals and points. In the A.C. electrified areas the special precautions as laid down in AC Traction Manual shall be followed.

- b) No petroleum spirit within the meaning of the Indian Petroleum Act shall be stored at site or adjacent land until the approval of the Railway and necessary license under the Act has been obtained by the contractor. The contractor shall also ensure that approval of the Engineer has been obtained for storing any other inflammable material well in advance.
- c) The contractor's employees and workers shall not for any reason operate any appliances or installations of the Railway concerning the safety of train movements, but they should whenever necessarily notify the qualified Railway staff who will then take necessary steps. The contractor shall also be responsible for any damage that may cause due to the carelessness of his workmen and will bear the consequences in this regard.
- d) The work must be carried out most carefully in such a way that they do not hinder the Railway operation except as agreed to by the Railway. The Contractor shall do no work that may interfere with traffic until protection has been provided by the Railway and under supervision of Railway's representative. When the work is required to be carried out on the track itself or as close to the track as may pose a hazard to rail traffic, the work shall be carried out under the supervision of an authorized Railway representative Junior Engineer/Senior Section Engineer (JE/SSE). Whenever trackside work is undertaken by the contractors, areas for unloading of bulk materials should be clearly demarcated and barricades provided, if necessary, with the consent of the (SSE/JE) Signal/Telecom, in-charge of the work. Suitable steps shall also be taken to prevent transport vehicles and such other machinery gaining access so near the track as to threaten the safety of running trains. That, whenever it becomes inescapable to allow transport vehicles or mobile machinery to operate in close proximity to the running lines the maximum moving dimensions for the said lines shall be adequately protected by fencing or such other suitable measures. No vehicle will normally be permitted to ply adjacent to the running lines.
- e) The contractor will be responsible for the safety of hired trucks and men etc. working at the site. He will also be responsible for any damage caused to the Railway property, staff and passengers travelling on the line on account of his truck/vehicles having been allowed to ply on the bank.
- f) The contractor shall take all precautionary measures in order to ensure protection of his own personnel moving about or working on the Railway premises and shall have to conform to the Rules and Regulations of the Railway.
- g) Suitable ladders for climbing the post and slings for supporting men on the post shall be used. Ropes as required shall be used for erection of the poles. The size of the rope shall be adequate. The contractor shall take necessary precaution for working near the power lines.

- h) If at any time the Railway finds the safety arrangements are inadequate or insufficient, the contractor shall take immediate corrective action as directed by the Railway's representative at site. However, it is not obligatory on the part of the Railway's to give such directions. The issue or non-issue of any direction in the matter by the Railway shall in no way absolve the contractor of his sole responsibility to adopt safe working methods. The stone-breakers, if employed shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.
- i) Necessary personal safety equipment as considered adequate by the Engineer-in – Charge should be kept available by the contractor for the use of the persons employed on the site and maintained in condition suitable for immediate use and the contractor should take adequate steps, to ensure proper use of equipment by these concerned. When not in use, electrical apparatus shall be switched off. No paint containing lead or lead products shall be used except in the form of paste or ready mixed paints. Suitable face masks should be supplied by the contractor for use by the workers when paint is applied in the form of spray.
- j) Within the station premises and especially on passenger platforms, the contractor shall ensure sufficient free space for movement of passenger traffic. He must cover and protect the excavations carried out in such areas with a view to avoid any accidents.
- k) In case of an accident of any nature, the contractor will indemnify the Railway for any losses caused by him as a result of the accident.
- l) Contractor has to provide Vehicle for daily movement of Railway Staff for ensuring quality of work and safety at Work Site.
- m) The contractor will not be entitled to any compensation for any damage or loss sustained by him during execution of the work, for any idle labour transport or any loss or deterioration of the material or tools.
- n) During testing and commissioning, signal aspects shall be displayed or changed and slot given to adjoining cabin/ground frame only as authorized by Railway. During testing and commissioning, point setting shall be changed only as authorized by the Railway. The contractor shall do no work that may interfere with traffic until protections has been provided by the Railway and under the supervision of Railway's representative. While testing and commissioning of the TCAS system, the contractor shall not work without authorization from the Railway's Engineer in-charge of the work.
- o) The contractor shall also be responsible for any damage that he may cause due to the carelessness of his workmen and will bear the consequences in this regard.

## **17. Wiring of Relays in Locations**

Relays shall be firmly fixed on suitable relay frames using MS Angles of size 25mmx25mmx6mm and MS Flats of size 25mmx6mm inside respective apparatus cases. The MS relay frame shall be painted before fixing. Laminated Termite Proof Particles board of 25mm thick of requisite size shall be fixed inside the apparatus case for fixing Resistance and Electrolytic condensers. If plug in type relays are used, 16/0.2mm flexible copper wire shall be used for wiring. There shall be no joint in the wire. For soldering the wire to relay clips of Plug-in-type relays in relay racks, best quality rosin core solder shall be used. Wire should be soldered to relay clips and suitable copper eyelets crimped with crimping tools shall be adopted before the termination. The wiring and termination shall be carried out as per the approved circuit diagram.

Functions Description Writing for the installations shall be as per Railway Board Lr. No. 2023/Sig/17-Sig Equip/Maintenance/Part Dt.06.11.2023.

## **18. Concreting & Erection of Cable Termination Rack**

Cable termination racks shall be erected on suitable teak wood base frame of size 50mm x 150mm in the relay room/ Cable Hut at the required location as directed by Railway with suitable foundation bolts and concreted. The cable termination racks shall be painted soon after installation before cable termination work is taken up. Suitable cable ducts wherever required shall be provided to bring all outside cables to the termination rack. All the cables are to be neatly skinned, fixed by wooden clamps, bunched individually and terminated in order. The cable armours and the rack shall be earthed.

The un-used space over the top of the cable termination rack shall be blanked using Hylum sheet of 3mm thick and suitable bolts and nuts.

## **19. Termination of cables**

The terminals and fuse blocks shall be fixed firmly on the cable termination racks and serially numbered for easy identification. Suitable rubber gromite shall be provided on the holes of termination racks. Copper tape of width 20mm x 1.5mm shall be used for providing bus bars. Suitable holes shall be drilled in copper tape for this purpose.

All the cables shall be identified by a punched label, tied on to each cable. Painted cable termination index board using Plywood of thickness 12mm – TW/rough finish as per instructions of site in charge with Aluminium grooved Channel frame of overall size 1200mmx1800mm –1no. shall be fixed in the relay room showing the terminal numbers circuit-wise. In case sufficient space is not available for fixing the board in one piece, it may be provided in parts retaining the overall size as per instructions of site in charge. 'As made' terminal particulars shall be prepared duly signed and handed over to the Railway at the time of commissioning.

Functions Description Writing for the installations shall be as per Railway Board Lr. No. 2023/sig/17-sig equip/maintenance/part dt.06.11.2023.

**20. Erection of relay rack**

Relay rack to accommodate 'Q' series relays shall be anchored using 'J' type foundation bolts and nuts (12mmx100mm) with washers. In places where 'J' type bolts cannot be used, special headed bullet type foundations shall be used. An insulator shall be provided for each foundation bolts and also to the ladders for carrying the cables. A MS wall angle of size 35x35x5mm shall be provided- one end grouted to wall and the other end fixed to the relay rack as tie. The relay rack shall be painted soon after the installation before plugging of the Plug Board.

**21. Wiring of Relays in relay rack**

Based on the circuit diagram, contact analysis chart shall be prepared by the contractor. The required number of 50 way terminal boards, plug boards and plug in type relays shall be fixed on the new/existing rack in the nominated places as instructed by Railway representative. The configuration of plug boards should be checked with the contact analysis chart. The nomenclature both on the rear and the front side of the plug board and on front side of the relays in the relay frame shall be painted.

Suitable arrangements shall be made in the relay rack for fixing condenser and resistance unit, required for slow to pick up or slow to release feature. Letter painting shall be made against each unit to identify the circuit for which it is used. Suitable wire supporting Tray made of PVC shall be provided for each row in relay rack to accommodate the complete bunch wherever the new wiring is carried out.

The wiring shall be carried out as per approved circuit diagram. The wiring shall be done on connectors and terminated on terminal clips by soldering process neatly, using high grade solder. PVC flexible wire 650V grade 16/0.20mm copper conductor shall be used. Potential free contacts of various relays required to be monitored by the Data logger should also be wired on the tag block of the data logger. In case of alteration to existing wiring, the wires and relays not required shall be removed. After completing the alteration work, the new wires have to be bunched neatly and brought to original condition. The relay rack wiring shall be tested initially by the contractor and then jointly with Railway Representative. Any addition/ alteration to wiring in the course of testing shall be carried out free of cost by the contractor. Different colours of wire shall be used for identify the power supply circuit wiring. In case of alteration, a different colour of wire from the existing one shall be used for easy identification.

Before plugging, the relays shall be checked visually and defective ones noticed shall be replaced duly reporting the same to the railways.

The Relay Index board as per instructions of railway representative shall be manufactured and fixed in the relay room giving the details of the relays and their position in the relay rack. In case of alteration/additional relay wiring, the relay particulars shall be incorporated in the existing relay index board available in the relay room. If sufficient space is not available for fixing the board in one piece, it may be provided in parts as per instructions of site in charge.

Hardwood stand shall be provided at room for keeping 'As made' circuit diagram at suitable height as required by Railway Representative. In case of additional/alteration to existing relay wires, the latest 'as made' circuit diagram shall be kept in the relay room on the existing hardwood stand.

The new rooms shall be provided with Double Key Door Lock arrangement. Rubber mat having sufficient width should be placed in front and rear of all the relay rack and FTOT. The mat should not be less than 6mm thick and it should withstand 650V AC.

## **22. Power Supply Equipments**

- a) IPS (Supply & Installation)- IPS is already installed at all the designated places in the scope, hence 110V DC will be provided. The contractor shall arrange to convert the same to suitable voltage for KAVACH operation.
- b) Wherever new IPS systems are required to be procured and installed, they shall follow the latest RDSO guidelines for installation, testing, and commissioning.
- c) DC-DC Converter- Supply of DC-DC converters as per RDSO/SPN/165/2023 Ver. 4.0 Amdt. 1 or latest with RDSO Inspection as per system requirement to be supplied along with the necessary DCDP (DC distribution panel)/ cabinet with SPD arrangement. These may be used for installation and commissioning of power supply required for TCAS in the section and to fulfill the requirement of N+1 system for power supply. Any other requirement apart from this to commission the system is to be done by contractor.
- d) PVC insulated wire multi-strand per conductor 10 Sq.mm flexible -Wiring of power equipments, wherever required for commissioning of TCAS shall be done by PVC insulated wire multi-strand per conductor 10 Sq.mm flexible as per Spec IRS S76/89 Amendment No 2 or latest. Each coil of 100 mts. Length. Wire to be procured from RDSO approved firms with RDSO Inspection.
- e) Fuse block D-type- 2A/6A/10A - D type fuse block and link non indicating type low voltage non- deteriorating fuse base suitable for fuse link of capacity 2A/6A/10A as per specification IRS: S-80/92 or latest shall be used wherever required for commissioning of TCAS.
- f) Lightning and surge arrestors -Lightening and surge arrestors of class B&C suitable for single phase supply in TT network as per amendment 5 of RDSO spec. No. RDSO/SPN/165/2004, shall be used wherever required for commissioning of TCAS. Lightning and surge arrestors shall be inspected by RDSO.
- g) Aluminum ladder of size 25 X 25 X 5mm, 200mm - Fabrication, supply and fixing of Aluminum ladder, size 25 X 25 X 5mm, 200mm width, arrangements for



drawing various wires in the battery, equipment and relay rooms wherever required for commissioning of TCAS.

### **23. Network Monitoring System**

A Network Monitoring System (NMS) for Kavach shall be installed in Salem Division Headquarters at a location approved by the Authority Engineer.

- a) A Centralized Management System with connectivity to all Stationary TCAS units & GSM interface for connectivity with Loco TCAS units shall be provided for Monitoring, Diagnostic and Maintenance Purpose.
- b) E1 channels for NMS at station shall be provided by railway only where the existing hardware supports it. Wherever the existing hardware does not support provision of E1 channels for NMS, additional hardware / cards / STMs shall be supplied, installed and commissioned.
- c) In case of mid-section locations, for communication purpose, NMS shall be commissioned on dark fibre and carried to nearest OFC hut from where it can be networked to Headquarters. Contractor to provide necessary interface equipment like modems, switch and cable from stationary TCAS to OFC hut as per site requirement.
- d) The entire network of Station/ IBS/ Auto huts/ mid-block section interlocked Level Crossing Gates and locomotive TCAS equipments needs to be monitored from divisional control office of the designated TCAS section. Hence all the necessary indoor, outdoor, power supply, power back-up, networking requirements for the completion of this NMS shall be carried out by the contractor.
- e) NMS will be installed at Centralized HQ location which can show the health and generate reports for stationary/Loco TCAS equipment of all OEMs.
- f) Details of different features of NMS are available in RDSO/SPN/196/2020 version 4 or latest, and advisory Note STS/E/TAN/5001, Ver 1.0, dt. 20/02/2019 or latest. Any other NMS feature in addition to those mentioned in the specification as required will be informed by this Railway to the contractor. The contractor is responsible to implement those features to meet the requirement of railways at no additional cost.
- g) The protocol structure for Centralized Network Monitoring System for the purpose of KAVACH System shall be as per Annexure – G of RDSO/SPN/196/2020 Version 4.0.
- h) The minimum hardware requirements of NMS are as follows:
  - i) Dell PowerEdge T40 or better, Intel Xeon E-2224G Processor or better, 32GB RAM or better, 2 TB SATA or better, 800 GB SSD or better, DVD-RW, DOS,

with minimum 3 Years Warranty. This means two such servers shall be installed and the NMS data shall be logged onto each server.

- ii) Windows Professional server of latest available version or better, on both servers.
- iii) Shared Firewall on both servers.
- iv) Microsoft keyboard and mouse.
- v) Minimum 55" 4K/UHD Professional TV of SONY/ LG/ SAMSUNG make or better. One Screen shall display maximum 20 stations. In case the section has more than 20 stations, separate screen shall be provided with seamless integration to enable complete view of KAVACH territory.
- vi) Supply of A3 Printer (03 Numbers) for printing NMS fault and exception reports similar to Epson L 1300 model or better.
- vii) Necessary furniture like Tables, Chairs, etc. shall be provided for NMS facility.

## 24 Works to be Done by Railways:

- a) Approval of design documentation submitted by the contractor
- b) Approval of documentation to be submitted to Independent Safety Assessor (ISA) for Specific Application Safety Case (SASC)
- c) Approval of closing comments to Technical Notes / Queries of ISA with comments of Kavach OEM
- d) Approval of Closure Report of Safety Related Application Conditions (SRACs) of SASC report submitted with comments of Kavach OEM
- e) Processing of statutory sanction documentation submitted by the contractor and Kavach OEM
- f) Arrangement of disconnection, if any required and opening of relay rooms for carrying out Stationary Kavach works
- g) Arrangement of locomotives for fitment of Onboard Kavach.
- h) Arrangement of necessary locomotives / path / crew for testing and trials of Kavach system

## 25. Manuals

Hard copies of manuals along with soft copies shall be supplied for the installations as follows.

S.No.	Equipment	Manual	Location
1	Station Kavach / LC Kavach	1. Installation Manual 2. Troubleshooting Manual 3. Maintenance Manual	All location where Station Kavach / LC Kavach has been installed
2	Remote Interface Unit (RIU)	1. Installation Manual 2. Troubleshooting Manual 3. Maintenance Manual	All locations where RIUs have been installed
3	Onboard Kavach	1. Installation Manual 2. Trouble Shooting Manual 3. Maintenance Manual	All loco sheds whose locomotives have been fitted with Kavach

## **26. Supply of Completion Drawings**

Completion drawings (both CAD files/ Soft copyies and hard copies) shall be supplied for all the installations done for the completion of this Project. A tentative list is given as follows.

1. Cable Route Plan
2. Kavach Deployment Plan with Details of Station Kavach / LC Kavach / Remote Interface Units
3. Kavach Multiple Access Plan
4. Kavach Tag / TIN Allotment Plan
5. RFID Tag / TIN Layout
6. RFID Tag Data
7. Kavach Table of Control (TOC)
8. Interface Circuits
9. Kavach Track Profile
10. Datalogger / Remote Terminal Unit (RTU) Wiring and Validation Report
11. Station Working Rules (SWR)
12. Specific Application Safety Case by Independent Safety Assessor
13. Floor Plans
14. Power Supply Scheme
15. Towers

The list of completion drawings given above is only indicative and any other completion drawings as deemed fit for the installations done in the completion of this Project shall be supplied at the relevant locations. The decision of Authority Engineer shall be final in case of any dispute in this regard.

## **27. WPC & SACFA clearance:**

The frequency of the operation for KAVACH will be defined by RDSO. In order to avoid complications at later stages, the application for obtaining Wireless Operating License (WOL) from the Wireless Planning and Coordination (WPC) Wing and SACFA clearance shall be filed by Railway so that the license remains with Railways. The Contractor shall submit all documents as desired by Railways for obtaining WPC & SACFA clearance for use of radios. The application for WPC license & SACFA clearance will be filed and obtained by Authority at Wireless Planning Commission, Ministry of Telecommunication, New Delhi. Payment for Charges and Fees towards acquiring WPC license & SACFA clearance shall be made by the Railways.

## **28. Inventory / Supply of Kavach Spares**

Spares shall be supplied at the location specified after accountal in the Railway Stores nominated by the Authority Engineer. List of minimum quantity of spares for Kavach to be supplied is as follows.

The “stores depot” mentioned henceforth anywhere in the document means a separate Stores which will be maintained by the contractor at his own cost. Only spares inventory and Schedule C (project facilities) items will be supplied to Railway Stores.

<b>S.No.</b>	<b>Equipment</b>	<b>Spares</b>	<b>Location</b>
1	Station Kavach	10% rounded off to the next highest integer of Station Kavach fully equipped with all types of cards, peripherals and communication equipment as deployed in the working systems of this Project	Stores nominated by Authority Engineer
2	RIU	10% rounded off to the next highest integer of RIU fully equipped with all types of cards, peripherals and communication equipment as deployed in the working systems of this Project	Stores nominated by Authority Engineer
3	RFID Tags	20% rounded off to the next highest integer of RFID Tags as deployed in the working systems of this Project	Stores nominated by Authority Engineer
4	Onboard Kavach	10% rounded off to the next highest integer of Onboard Kavach fully equipped with all types of cards, peripherals and communication equipment as deployed in the working systems of this Project.	Sheds nominated by Authority Engineer

The list of spares given above is only indicative and any other spares as deemed fit for the installations done in the completion of this Project shall be supplied at the relevant locations. The decision of Authority Engineer shall be final in case of any dispute in this regard.

## **29. Maintenance Registers**

Maintenance registers shall be supplied for the installations as follows.

<b>Registers</b>	<b>Location</b>
Kavach SMOCIP SOS Counter Register	All stations and LC Gates provided with Station Kavach / LC Kavach
Kavach Equipment Maintenance Register	All locations provided with Stationary Kavach / RIUs and loco sheds whose locomotives have been fitted with Kavach
Earth Measurement Register	All locations provided with Stationary Kavach / RIUs
Tower Maintenance Register	All locations provided with Towers

The list of registers given above is only indicative and any other registers as deemed fit for the installations done in the completion of this Project shall be supplied at the

relevant locations. The decision of Authority Engineer shall be final in case of any dispute in this regard. The registers shall be supplied in the format specified by Railways for standard registers and OEM for OEM specific equipment registers.

### **30. Documentation**

The contractor shall supply all necessary documents as per Railway's requirement without any additional cost. This shall include following.

All the installation drawings pertaining to a section/station/shed shall be supplied in a good quality folder for each section/ station/shed. During installation, a folder containing all the drawings, testing procedures, commissioning procedure shall be kept at the stations:

#### **A. For On-Board Equipments (For Both Diesel and Electric Locomotives)**

- a) Six sets each of Loco TCAS interface wiring diagram and auto-whistling circuits. Diagrams including tracings shall be handed over to Railways. All drawings in PDF format along with AutoCAD format shall be given on six sets CD/DVDs/pen drive.
- b) Installation details, Equipment layout & Brake interface details duly approved by OEM and Railways.
- c) Manual describing details of equipments, their purpose & specification, principle of operation and details of power supply arrangement. It should also include details of various components of the equipment.
- d) Manual of Installation of Loco TCAS by OEM.
- e) Manual of Maintenance of LTCAS equipment.
- f) Loco TCAS maintenance schedule for various trip maintenance of loco such as Periodic inspection, IA/IC/IB schedule, MOH, IOH etc.
- g) Pre-Commissioning Checklist duly completed and jointly signed by shed staff.
- h) Version control of Loco TCAS application and execution software because of change in design configuration, loco specific changes or on any other account etc. shall be recorded and submitted to Railways during the course of execution of project and even after commissioning i.e. during warranty and AMC period.
- i) Diagnostic Procedure including troubleshooting charts.
- j) User manual with Do's and Don'ts.
- k) Loco TCAS Configuration Manual and user manual for Loco TCAS configuration kit.
- l) User Manual for Application Data generation software.
- m) Loco Pilot Operating Manual.
- n) DMI Display details (configuration details that are entered by Loco Pilots on start of equipment).
- o) Any other documents required by Railways for the normal operation & maintenance.

#### **B. For Stationary Equipments**

- a) Cable route plan in tracing (6 copies) indicating the cable path for all cables laid such as OFC cable, Quad cable, Power cable etc. in station area in block section.
- b) Six sets each of TCAS interface wiring diagram should be supplied in neat bound books. Diagrams including tracings shall be handed over to Railways. All

documents in PDF format and drawings in AutoCAD format shall be given on six sets of CD/ DVD / Pen Drive

- c) Stationary TCAS interface details to existing interlocking along with input pin connection details at Stationary TCAS end. These details should enable tracing of TCAS inputs from stationary TCAS unit end up to relay end.
- d) Six sets each of stationary TCAS Table of Control should be supplied in neat bound books. Tracings of tables shall be handed over to Railways. All documents in PDF format and drawings in AutoCAD format shall be given on six sets of CD/ DVD / Pen Drive
- e) Complete frequency plan identifying the frequency assigned to each station.
- f) Details of assignment of TCAS ID to every stationary TCAS.
- g) TDMA/FDMA based station and loco slot distribution details for every station describing the total number of time slots used at each station, specific slot numbers, frequency assigned to each station etc.
- h) TCAS-TIN/RFID Tag Set Number, Station ID Allotment chart for the entire TCAS section for purpose of communication and TCAS functioning.
- i) Procedure for conducting FAT ,SAT testing of Stationary TCAS
- j) Installation manual and Equipment layout duly approved by OEM and Railways.
- k) Manual describing details of equipments, their purpose & specification, principle of operation and details of power supply arrangement. It should also include details of various components of the equipment.
- l) Stationary TCAS and its sub-systems interconnectivity diagram
- m) User Manual for Application Data generation software
- n) User Manual for Application Data configuration
- o) Version control of stationary TCAS application and execution software because of change in station layout, yard modification / remodeling, alteration in signalling or on any other account etc. shall be recorded and submitted to Railways during the course of execution of project and even after commissioning i.e. during warranty and AMC period.
- p) User manual for Station Master Operation cum Indication Panel (SMOCIP)  
Manual of Maintenance of Stationary TCAS and various sub-systems.
- q) Pre-Commissioning Checklist
- r) Diagnostic Procedure including troubleshooting charts
- s) User manual with Do's and Don'ts
- t) Any other documents required by Railways for the normal operation & maintenance

### **C. For Track Side Equipment**

- a) Six sets each of section and station RFID-TAG-TIN layouts should be supplied in neat bound books. Diagrams including tracings shall be handed over to Railways. All documents in PDF format and drawings in AutoCAD format shall be given on six sets of CD/ DVD / Pen Drive
- b) Six sets each of section and station RFID-TAG data should be supplied in neat bound books. Tracings of data shall be handed over to Railways. All documents in PDF format and drawings in AutoCAD/Excel format shall be given on six sets of CD/ DVD / Pen Drive

- c) Manual describing details of RFID tags, their purpose & specification, principle of operation.
- d) RFID TAG DATA preparation manual along with associated software tools.
- e) RFID TAG DATA configuration manual along with associated software tools.
- f) Manual of Maintenance
- g) Diagnostic Procedure including troubleshooting
- h) Procedure for installation of RFID tags on tracks.
- i) Any other drawings/ documents as required by Railway for the successful operation maintenance of this system.

**D. For Test Benches**

- a) Manual describing installation details of Stationary TCAS test bench and its sub-systems interconnectivity diagram
- b) Manual describing installation details of Loco TCAS test bench and its sub-systems interconnectivity diagram
- c) User manual for operating Stationary TCAS test bench.
- d) User manual for operating Loco TCAS test bench.

**E. For Network Monitoring System(NMS)**

- a) Manual describing details of equipments, their purpose & specification, principle of operation and details of power supply arrangement along with interconnection with different sub-systems.
- b) E1 network diagram
- c) User manual describing different features of Network Management System and process for generating exception reports etc.
- d) NMS installation and maintenance manual.
- e) Any other documents required by Railways for the normal operation & maintenance.

**F. Key Management System**

- a) Manual describing details of equipments, their purpose & specification, principle of operation and details of power supply arrangement along with interconnection with different sub-systems.
- b) KMS installation and maintenance manual.
- c) Any other documents required by Railways for the normal operation & maintenance.

**31. Training of officers / staff**

- a) The Contractor shall provide and complete the training to the personnel of the Authority in diagnostic, trouble shooting, repairing, operation and maintenance of the signalling and telecommunication equipment. The number of (men X Days) to be trained shall be minimum 360 man days . The training shall be completed before the issuance of the Completion Certificate. Training shall be conducted by OEM certified Trainer.

- b) Training to be provided to the Railway officials (Officers & Supervisors) of the various departments such as S&T, Electrical, Engineering, Mechanical, Operating, Running Staff etc. The Training shall be provided at partially at OEM's Premises, Partially at Railway Site, Partially at Training Centers or any other locations as per requirement. The Numbers of Staff from various departments along with training location will be as per the mutual agreement between Railway Authority and OEM.

Hence Contractor shall impart:

- i. Training to Railway officials (Officers & Supervisors) at manufacturer's premises for understanding of manufacturing, and design processes pertaining to hardware & software. This also includes demonstration of interoperability, operation, maintenance, data preparation & configuring of the system at working site as mutually agreed training program. Selected Railway officials of S&T, Mechanical and Electrical departments will be deputed by Southern Railway to the manufacturer's premises.
- ii. Training to Railway personnel/staff at suitable location over Southern Railway / Centralized training Institute/Zonal Training School. Training of Railways staff in software & hardware to enable installation and maintenance of the Stationary TCAS system and test benches.
- iii. Training to the running staff (Loco Pilots, Loco Inspectors etc.) in function of onboard TCAS equipment and handling of TCAS system in different scenarios. The contractor should nominate its representative to accompany the loco pilots during initial trials to provide handling in TCAS functionality.
- iv. Training to staff/Officer/Supervisor of loco shed providing details of installation, programming and maintaining the Loco TCAS system including test benches.
- v. Contractors to indicate the adequacy or otherwise of the duration, place of training, co-ordination required.
- vi. The quality of input should be of such a level that at the end of the training, the Railway Personnel should be able to install/commission the equipment in similar or modified layout, do the necessary software and hardware changes required in future, and also organize, locate and rectify the faults besides maintenance. They shall be trained in all aspects of system design, engineering, inspection, testing, execution, commissioning, fault diagnosis, operation and maintenance of the system as whole and also all constituent equipment.
- vii. The training courses should, apart from formal class room training, include hands on practical experience and visits to working installation.
- viii. Contractor shall prepare E- training modules with the help of latest training aids (including audio and video) to explain functioning of the TCAS system covering the installation practices, maintenance and troubleshooting, testing, commissioning, fault localization etc. Contractor shall also prepare power point presentations for training in various modules. The training material shall also consist of self-explanatory video tutorials explaining.
  - a) The working of TCAS offered by the contractor.
  - b) Trouble shooting of Hardware/Software of TCAS system.



- c) Working of OEM software modules for program up gradation of Stationary application logic, RFID tags corresponding to signalling plan changes.
  - d) These video tutorials shall be provided in electronic form on a CD/DVD as desired by Railways.
- ix. The E-learning module with audio and video support should be prepared separately for Stationary TCAS system and Loco TCAS system. This shall include (but not limited to):
  - a. For Stationary TCAS system:
    - i) Understanding of the architecture of STCAS system.
    - ii) Details of different sub-systems of stationary TCAS such as SMOCIP, Tower, RIU, OFC and radio modems, duly explaining the interconnections between them.
    - iii) Power supply requirements of different sub systems of Stationary TCAS.
    - iv) Maintenance guidelines and the parameters which shall be checked to ensure proper functioning of TCAS along with periodicity.
    - v) Explanation of RFID tag layouts and system for programming and reading the RFID tag data.
    - vi) Any other information as specified by engineer –in-charge.
  - b. For Loco TCAS system:
    - i) Understanding of the architecture of LTCAS system.
    - ii) Details of different sub-systems of stationary TCAS such as LPOCIP, Brake Interface Unit, OFC and radio modems, duly explaining the interconnections between them.
    - iii) Procedure to switch OFF and Switch ON the Loco TCAS and how to isolate the TCAS unit in case of mal-functioning.
    - iv) Power supply requirements of different sub systems of Stationary TCAS.
    - v) Maintenance guidelines and the parameters which shall be checked in loco sheds to ensure proper functioning of TCAS along with periodicity.
    - vi) Action to be taken by Loco Pilots in case of different scenarios such as Limited Supervision, Override of signal, Shunting, Trip, Auto whistling etc.
    - vii) Any other information as specified by engineer –in-charge.

### **32. Provision of CUG SIM for KAVACH (TCAS)**

CUG SIM cards for TCAS shall be provided by the contractor as per the details given below.

- a) Each Stationary TCAS Unit – 2 Nos/ Station
- b) Each Loco TCAS Unit – 2 Nos/Loco.
- c) Each Test Bench Unit – 2 Nos/ Test Bench.
- d) Network Monitoring System Unit– 2 Nos.

As per railway board letter no.2015/Tele/11(2)/1 dated 12.01.2018, the CUG SIMs to be provide for KAVACH usage and as per Railway Board Lr.No.2021/Tele/11(2)/1(3346054) dated 12.04.2023, M/s Reliance Jio Infocomm Ltd. and M/s Bharti Airtel Ltd. have been selected as the two TSPs (Telecom Service Providers) for serving the enlarged CUG scheme. Both SIM cards should not be of same service provider for each location/ Loco.

However, the ownership of CUG SIM cards shall be in the name of Railway Authority.

**33. Lab Model Setup for training: - Nil**

**34. Testing bench setup**

- a) Loco equipment shall be maintained in the Diesel and Electric loco sheds nominated by Railways. The contractor is supposed to provide test benches for maintenance and repair of Loco TCAS equipment at sheds and also test and troubleshoot the Loco TCAS equipment when it is coming out of loco shed. Dedicated service engineers shall be deployed at loco shed for this purpose. The test bench shall meet all the functional requirements as stated in RDSO Letter no STS/E/TCAS/Tender/Part -IX dated 03.02.2016 or later.
- b) Test benches (**01 Numbers for Stationary TCAS and 01 Number for Loco TCAS**) to be installed as mentioned in Schedule-C project facility at location as decided by the Railway Authority at the time of execution.
- c) **Test facilities in Sheds:**  
Successful bidder shall be required to install one test track facility at Loco Shed as nominated by Authority as per RDSO specification and guidelines. No separate payment shall be made for installation of test track set-up. The Contractor shall ensure maintenance and availability of the test track throughout the Contract period so that the locomotives attended in the shed do not ever get detained on account of non-availability of test track.

**35. Data logger Augmentation**

Data logger Augmentation wherever required is to be done by the contractor. All repeater relays of TCAS are to be proved in Data Logger wherever TCAS Repeater Relays are operated. If the capacity of Data Logger/RTU is not sufficient, provision of capacity enhancement by means of replacement/augmentation to be done by the contractor. Necessary connectivity and alteration to the FEP & CMU with updating the exemption logic to be carried out.

**36. Overall Commissioning of KAVACH (TCAS)**

- a) The contractor shall be responsible for Testing & commissioning of Loco TCAS equipment in Electric/Diesel Locos and Trackside equipment (stationary TCAS) along with associated works for Train Collision Avoidance System (TCAS) in the sections. Static Test plan, Dynamic Test plan and related reports shall be prepared and submitted by Contractor.
- b) Pre- commissioning Checklists for all equipments of TCAS to be provided by the contractor before commissioning.

**37. Independent Safety Assessor (ISA) (third party)**

- a) Generic ISA's certification for SIL-4 shall be submitted by the bidder for the product being offered against the tender. Application Safety case certification by

RDSO approved ISA shall be submitted as part of this work, which will be cleared/approved by RDSO.

- b) ISA shall be selected by the Railways from the panel of ISAs for main line signalling Projects/Systems approved by RDSO. The contractor shall submit a list of ISAs from the RDSO panel for the Main line Signalling Projects/Systems that meet the terms and conditions given in the letter. A certificate to this effect shall be submitted by the Contractor. The work experience of listed ISA, in the capacity of ISA, pertaining to Automatic Train Protection System Trackside and On-Board work(s) on Indian/Foreign Railways detailing the exact scope of work, starting and completion date and any other relevant information shall be submitted along with. Railways will select ISA(s) from this list and advise the Contractor accordingly.
- c) Application Safety case of the project shall be developed right from the start and shall be integral part of the project execution. Application Safety case shall be prepared by the contractor. Application safety case needs to be prepared taking reference of generic product assessment report. Before commissioning of the system, ISA shall certify that the entire TCAS is SIL-4 compliant through assessment of application safety case prepared by the contractor. ISA shall be required to verify the safety case as required to ensure that safety case is verified and certification is available before start of commercial operations.
- d) The Accreditation of ISA should be in compliance with the international standard of the series ISO 17000 and EN 45000 the ISA should be authorized to perform product and system certification, audit inspection and other assessments in the field of guided transport, particularly Railway. ISA should have experience of having problem safety certification for Railway signalling system specifically at least one Automatic Train Protection system safety certification. The validation of the site data, various interfaces to Signalling/Loco etc., shall be carried out by the OEM's technical safety personnel & certificate submitted to the Railway before carrying out the work at site.
- e) Application safety case shall be prepared by contractor. An Independent Safety Assessor (ISA) shall be engaged from the RDSO Panel for ISA. RDSO or Railway shall be responsible for giving safety clearance adopting the guidelines pertaining of Safety assessment as the case may be. This will include Application Software for implementing Safety functions, Communication Interface, Input/Output modules, Power supply and other related equipment.
- f) The contractor shall submit an Application Safety case for evaluation of TCAS system. All documents shall be prepared in English language, checked and verified and marked appropriately indicating their version number, number of alterations etc.
- g) Any document required by ISA during the course of Safety Assessment shall be submitted by the contractor to the ISA. A copy of such documents shall also be

submitted to Railways. The panel of Independent Safety Assessor (ISA) for Signaling Projects & Products as issued by RDSO shall be followed.

**38. Alteration in existing KAVACH**

The work is planned to be commissioned in different phases. Phase alterations shall be required to be carried out in the Electronic Interlocking at following stations. Alterations to be carried out in both the phases is part of the work.

Sl. No.	Name of station
1.	Jolarpettai (B cabin)
2.	Tirupattur(TPT)
3.	Doddamapatti (DPI)
4.	Bommidi (BQI)
5.	Tinnapatti (TNT)
6.	Salem (SA)
7.	Erode (ED)

Tentative commissioning phases are as detailed in Schedule-I (Project Milestones) of agreement.

**39. Program Management System Application**

Program Management System Application in cloud service having features of automation of workflow, user mapping, operation handover, task allocation, project dashboard, GIS facility, inventory management, workflow integrated paperless documentation, etc, similar to projectile software or better and its customisations upto 24 months.

**SCHEDULE-C**  
(See Clause 2.1)

**PROJECT FACILITIES**

1. The Contractor shall construct the Project Facilities in accordance with the provisions of this Agreement. Such Project Facilities shall include following items (Item no 1 to 9 ). Also, Before starting the physical execution of the work, the contractor will supply the following items / accessories (Item no 10 to 22) at the Railway Stores.

S.No.	Description of item	Unit	Qty
1	Supply, Installation and Commissioning of Test Bench for Station TCAS equipment as per locations decided by the Authority engineer.	Nos	1
2	Supply, Installation and Commissioning of Test Bench for LOCO TCAS equipment as per locations decided by the Authority engineer.	Nos	1
3	Supply, Installation and Commissioning of Network Monitoring System for Centralized Monitoring of TCAS Station and Loco Equipment as per specification at Salem	Nos	1
4	Supply, Installation and Commissioning of Kit for Configuring, Programming and Downloading Execution and Application Data for Stationary Station TCAS Equipment	Nos	2
5	Supply, Installation and Commissioning of Kit for Configuring, Programming and Downloading and Application Data for RFID	Set	1
6	Preparation and Supply of Training e-learning manuals for On-Board and Trackside System, this needs to meet requirements of Railways (EMU & DEMU each set)	Set	5
7	Supply, Installation, Commissioning of Lab Models for Station/LC and LOCO TCAS Equipment and Trackside Components	Nos	0
8	Provision of Transportation of light materials/men with tools, documents from central location to the workspot and back. For that purpose vehicle (SUV or better) for Railway persons to carry outfield visits, measurements and Inspections of TCAS work till Project Completion date or extended completion date.	Nos	4
9	Supply of Kit for conforming, programming and downloading the execution and application data for LOCO equipment	Nos	1

10	Microsoft Office (family) Tool with 3 years subscription shall be supplied.	Nos	4
11	Supply of A3 Printer similar to Epson L1300 model or latest (Inspection by Consignee)	Nos	3
12	Printer for Office use for printing tag-data, RFID plans etc. Model No Imageclass MF643Cdw or similar (Inspection by Consignee)	Nos	3
13	Supply of Cable Fault locator as per specification Make: Stanlay. Model no. SIDEKICK PLUS 1155- 5001 or similar (Inspection by consignee)	Nos	8
14	Supply of Hand Held 300 KHz Digital Multimeter Similar to Keysight U1252B/ Stanlay/ Stanone/ Extech/ Fluke. Inspection-Consignee	Nos	20
15	Supply of digital insulation tester Voltage range 50V- 1000V DC, Voltage 25V- 600V AC/DC, Continuity, Low ohms and storage memory last 50 reading with fuse blown indicator. Make Rishab/Meco/Fluke or similar (Inspection by Consignee)	Nos	20
16	MECO Electronic Earth Tester make MECO model no 4680B/higher version or similar. Noncontact type without requirement of auxiliary electrodes, 4-digit 9999 LCD ground resistance range from 0.25 ohms to 1500 ohms (Inspection by consignee)	Nos	6
17	Clip on meter Supply of Clip-on Meter MECO 2700 Model or equivalent with similar features. Approval to be obtained from Railway. (Inspection by Consignee).	Nos	6
18	During the course of execution of works, the contractor will make the Supply of thick Kodak photo paper with lamination of various sizes with different lettering and languages in required size as per the instructions of site in-charge. (Inspection by Consignee)	Sq M	88
19	Supply of bis listed semi-automatic stainless steel preventive device with ul Approved clean gas with auto manual reverse stainless steel valve nasa 600 mar having capacity 06 kgs and made of stainless steel 304 grade with indian railways logo each unit and as per specification attached make & model offered: nasa 600 mar cm/l-no. 7200017592 is 15683 :2018 or better.	Nos	100
20	RFID Type Cable Route markers to be provided for marking of Cable Route. (Make- Stanley SM 1500 or similar). Minimum depth to be detected should be 5 feet (to be verified before Authority's Engineer) (Inspection by consignee)	Nos	3000

21	RFID Reader/ Programmer/ Locator also to be provided for programming and reading of laid RFID Markers. (Make- Stanley SML T 1500 or similar) Minimum depth to be detected should be 5 feet (to be verified before Authority's Engineer) and locator should have a built in GPS module to mark the GPS location of each marker. (Inspection by consignee)	Nos	5
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## 2. Project Monitoring and Supervisory Team

The contractor shall employ following minimum Qualified Engineers during the execution of the allotted work as per the Table below.

S.No	Title of Position	Nos.	Total Exp. in Years	Minimum Qualification
A	Design Director	1	10	B.Tech
B	Provision of Project Manager	1	8	B.Tech/MBA
C	Safety Consultant	1	3	B.Tech
D	Proof Consultant	1	3	B.Tech
E	Provision of Site Engineers	2	2	Diploma/B.Tech

Further, in case the contractor(s) fails to employ the Qualified Engineer aforesaid above within 15 days of the Appointed date, he shall be liable to pay an amount given below for the default period:

- 1) Rs. 2,00,000/- per head per month for SN. A
- 2) Rs. 1,00,000/- per head per month for SN. B.
- 3) Rs. 50,000/- per head per month for SN. C&D.
- 4) Rs. 40,000/- per head per month for SN. E.

The contractor shall submit the copy of Bio-data and Degree/ Diploma certificate of the above technical staff employed by him for the scrutiny by Railway and the same will be approved by Authority Engineer and shall be available during the currency of work execution for record purpose. Railway reserve the right to scrutinize the records of the contractor to ascertain as to whether the qualified staff has been actually employed by him and is paid for. The decision of the Authority Engineer as to the period for which the required technical staff was not employed by the Contractor and as the reasonableness of the amount to be deducted on this account shall be final and binding on the contractor.

## 3. Skilled and semi-skilled Assistants for inspections and other activities

Skilled and semi-skilled manpower to assist authority engineer or his representatives to prepare inspection reports, for giving markings of various functions, and to carry out any other activity concerned with the project at office or field.

- i. Skilled manpower: The contractor shall arrange Computer oriented technical manpower, two person/day, on all working days during the currency of the work including extended periods of the contract at Authority Engineer's office to carry out works like Drawing, computation, write up etc., using computer, using software like AUTOCAD, MS Office etc., For 08.00 hrs in a day with all ascents, descents, taxes, octroi, cess, fees, duties, duties with contractors etc., As per special conditions/ specifications/regulations and as directed by Engineering-in-charge. Note: The person engaged for providing the services shall be conversant with computer working knowledge in above software. Skilled manpower to assist the Authority Engineer's representative in preparation of inspection reports, preparation of test formats, preparing documentation, assisting in office work etc. as required by the authority engineer.
- ii. Skilled manpower shall be adequately qualified and experienced to discharge duties assigned to him to the satisfaction of authority engineer. They should have Computer literacy, knowledge of AutoCAD
- iii. The contractor shall arrange unskilled manpower minimum two person/day, on all working days during the entire currency of the work including extended periods of the contract, to assist authority engineer/his representative during inspections or for executing any other work assigned to him at site.in preparing documentation, in office work etc. as required by the authority engineer.

#### **4. Project Monitoring**

The contractor shall deploy latest project monitoring tools such as MS Project / Primavera etc. as approved by Authority Engineer with adequate number of licences for the use of all concerned associated with the project. He shall also engage an experienced Planning Engineer for regular (daily / weekly) updating of progress and generating exception reports as required by Authority Engineer or his representatives.



## SCHEDULE - D

*(See Clause 2.1)*

### **SPECIFICATIONS AND STANDARDS**

#### **1 Construction**

The Contractor shall comply with the Specifications and Standards set forth in Annex-I of this Schedule-D for construction of the Railway Project. The time limit for the review and clearances by the Authority for design and drawings submitted by the Contractor shall be as indicated in Annexure-II.

#### **2 Design Standards**

The Railway Project including Project Facilities shall conform to design requirements set out in the following documents:

1. Indian Railways Permanent Way Manual, Indian Railway Bridge Manual, Indian Railway Schedule of Dimensions and relevant IRS specifications referred in the manuals
2. Indian Railway Signalling Engineering Manual, Indian Railway Telecom Manual and relevant IRS, RDSO specifications referred in the manuals
3. AC Traction Manual
4. Rules for Opening Railways
5. RDSO specifications / guidelines / Technical Advisory Notes (TANs)
6. Principal Chief Signal and Telecommunication Engineer (PCSTE), Southern Railway circulars.

Technical dispute if any between employer and Contractor will be resolved by RDSO. RDSO verdict will be final and binding on both the parties.

#### **3 Latest Version**

Latest version of the Manuals, Specifications and Standards including the amendments notified/published by the Base Month shall be considered applicable.

#### **4 Terms used in Manuals**

The terms Sr.DSTE/Dy.CSTE/DSTE/XSTE/ADSTE/AXSTE/SSE/JE/Supervisor used in the Manuals shall be deemed to be substituted by the term “Authority Engineer”; to the extent it is consistent with the provisions of the Agreement.

#### **5 Absence of specific provision**

In the absence of any specific provision on any particular issue in the aforesaid Manuals, Specifications, or Standards, the following standards shall apply in order of priority

1. Bureau of Indian Standards (BIS)
2. Standards of Telecommunication Engineering Centre (TEC), Department of Telecom, Ministry of Communications, Government of India
3. EULYNX specifications or UNISIG specifications

4. Euro Codes or British Standards or American Standards
5. Any other specifications / standards proposed by the contractor and reviewed by the Authority Engineer. The decision of the Authority shall be final in case of any dispute between the contractor and the Authority Engineer.

## **6 Alternative Specifications and Standards**

- 6.1 The requirements specified in the Manuals are the minimum. The Contractor shall, however, be free to adopt international practices, alternative specifications, materials and standards to bring in innovation in the design and construction provided they are better or comparable with the standards prescribed in the Manuals. The specifications and techniques which are not included in the Indian Railway Manuals/ RDSO specifications shall be supported with authentic specifications and standards specified in paragraph 5 above. Such a proposal shall be submitted by the Contractor to the Authority Engineer. In case, the Authority Engineer is of the opinion that the proposal submitted by the Contractor is not in conformity with any of the international standards or codes, then he shall record his reasons and convey the same to the Contractor for compliance.
- 6.2 In case, the contractor is offering an alternative product which is not as per the designs / specifications stipulated in this Agreement, but the same is already in use with satisfactory performance in one or more major world Railway(s) for more than 5 (five) years for the same or higher design speed / rating (as applicable for project line), such product can be permitted to be used by the Authority Engineer in accordance with the Cross Approval policy of the Railway Board as existing at the time of offering of such product. The products covered for the purpose of this clause shall be as per the list provided in the policy.
- 6.3 In case, the contractor is offering an alternative design which is not as per the designs / specifications stipulated in this Agreement, but the same is already in use with satisfactory performance in one or more Zonal Railways of Indian Railways, such design can be permitted to be used by the Authority Engineer with the concurrence of the Authority. Documentary evidence of satisfactory performance issued by competent railway authority shall be produced for the same.

ANNEX-I  
(Schedule-D)

**SPECIFICATIONS AND STANDARDS FOR CONSTRUCTION**

**1 Specifications and Standards**

All materials, works and construction operations shall conform to the following manuals.

- (i) Indian Railways Signal Engineering Manual
- (ii) Indian Railway Telecom Manual
- (iii) Latest IRS specifications
- (iv) Latest RDSO specifications / guidelines / Technical Advisory Notes (TANs)
- (v) Principal Chief Signal and Telecommunication Engineer (PCSTE), Southern Railway circulars
- (vi) Original Equipment Manufacturer (OEM) specific guidelines
- (vii) In case of any contradiction in the various codal provisions, the order of precedence shall be as follows:
  - (a) Provisions of this Annex-I
  - (b) IRS codal provisions
  - (c) IRC codal provisions
  - (d) IS (BIS) codal provisions

**1.1 Cable Laying**

**1 Requirement:**

- (a) Two sets of 12 core signalling cable for power supply and 12 Fiber OFC for modem shall be laid between Stationary KAVACH and Tower on path redundancy. However the selection of no.of 12 core signalling cables shall be such that the loss shall be tolerable at full load conditions and distance.
- (b) In the JTJ-ED section, as part of the Automatic Block station work currently in progress, 2 x 48-core Optical Fiber Cable will be laid on each side. This cable will be utilized for the Kavach work.

- (c) Signalling cables shall be from Stationary Kavach to signal operator's room (Station Master / Gateman) for carrying functions of push buttons available on Station Master Operation cum Indication Panel (SMOCIP).
  - (d) 12 Fiber OFC shall be laid from Stationary Kavach to OFC hut for connecting Kavach equipment to Network Monitoring System (NMS).
  - (e) Signalling cables of suitable conductors shall be laid between relay rooms of station for picking up repeater relays and extending power supply in the room where Station Kavach is installed.
  - (f) The outdoor signalling relays in auto section which are not centralised, are to be repeated for KAVACH system input duly laying of required signalling cables.
  - (g) Adequate spare conductors to a minimum of 20% of the total conductors used shall be provided for in each main cable up to the farthest point zone, beyond this there should be a minimum of 10% spare conductors of the total conductors used. No spare conductors are required if the total number of conductors used is 3 or less. The spare conductors shall be provided on the outermost layer.
  - (h) Signalling cables shall be terminated in Cable Termination Rack of relay rooms / LC Gate relay rooms / location boxes using PBT Terminals or Disconnect Type Terminals.
2. Cable shall be laid as per approved Cable Route Plan and Cable Corage Plan. These plans shall be submitted along with a reasoned document detailing number of functions with spares indicated in the requirement section above.
  3. Cable laying shall be done as per the practices specified in Indian Railway Telecom Manual, Indian Railway Signal Engineering Manual guidelines issued by RDSO for signal cable laying vide RDSO/SI/G/2010 Version 1.1 or latest and South Railway technical guidelines.
  4. Precautions laid down in RDSO guidelines shall be followed in 25 kV Railway Electrified (RE) area.
  5. Extra cable loop of 6 to 8 m shall be kept at each end of the main cable / tail cable / power cables / 6 quad cable at location boxes, at signal foundations, IBHuts / Relay Rooms, major bridges and culverts.
  6. Work areas such as station area, circulating area involving breaking or cutting of concrete / road / platform / any other surface shall be restored to the original state after the cable laying.

7. In areas where continuous sheet rock is encountered, cable laying shall be done in GI pipes of adequate diameter and complete length of the GI pipe shall be clamped and concreted with 1:3:6 M10 concrete mix of cement, sand and aggregates upto a height / width of 300 mm above / adjacent to the GI pipe.
8. In areas where rock is encountered, cable laying shall be done as per IRSEM Drawing No. 15-D2 Sheets 1, 2 and 3 as applicable.

### **1.1.2 Track Crossing/ Road Crossing**

- (a) Micro-tunnelling / trenchless laying/ Horizontal Direct Drilling/ Horizontal Boring shall be carried out at a depth of not less than 1.5 m from natural ground level.
- (b) Track crossing, road crossing, platform crossing, trenching in circulating area shall be carried out by Micro-tunnelling / trenchless laying/ Horizontal Direct Drilling/ Horizontal Boring to the extent possible.
- (c) Micro-tunnelling / trenchless laying/ Horizontal Direct Drilling/ Horizontal Boring shall also be adopted in difficult terrains / marshy areas / water logged areas if it is found advantageous for quick delivery of this Project. Requirement of such method not envisaged during survey shall be decided by the Authority Engineer.
- (d) Wherever Micro-tunnelling / trenchless laying/ Horizontal Direct Drilling/ Horizontal Boring are not feasible for track crossing, road crossing, platform crossing, manual method shall be carried out with the approval of Authority Engineer.

### **1.1.3 Cable Laying on Bridges:**

- (a) Cable laying on important / major bridges having steel girders shall be either through GI trough as per IRSEM Drawing No. 15-D6 (supporting channels shall be in accordance with Drawing No. S&T/RE/78/2/76 Page 1 galvanised in accordance with IS 2629-1985) or through medium class GI pipe conforming to IS 1239 (Part I) 1990 and galvanised in accordance with IS 4736-1986 of adequate diameter supported by 'C' channels of size not less than 100 mm x 50 mm x 1200 mm, thickness 5 mm galvanised in accordance with IS 2629-1985. GI pipe shall be perforated at regular intervals. Drilling of holes on girders shall not be permitted.
- (b) Cable laying on important / major bridges with concrete girders and having built-in duct shall be done through HDPE pipe of suitable diameter in accordance with specification PE 80 (IS 4984). Blocks of masonry bricks of size 500 mm width x 500 mm height shall be provided at either end of the bridge to cover the exposed HDPE laid for the cable laying.

- (c) Cable laying on important / major bridges with concrete girders not having built-in duct shall be done through GI pipes of adequate diameter. Concrete masonry of size 300 mm x 300 mm x 300 mm shall be provided at an interval of every 2 m above the GI pipes laid for the cable laying. The GI pipes shall be clamped at an interval of every 1 m. The GI pipes and concrete masonry shall not infringe the track as per IRSOD. Both ends of the GI pipes at the end of the bridge shall be closed with brick masonry.
- (d) Cable laying on minor bridges / culverts shall be done as per IRSEM Drawing No. 15-D8. Medium class GI pipes conforming to IS 1239 (Part I) 1990 and galvanised in accordance with IS 4736-1986 of adequate diameter shall be used for cable laying. When cables are to be laid on the bed of the culverts or under the bridges, cable laying shall be done as per IRSEM Drawing No. 15-D7. This procedure shall be adopted for minor bridges / culverts where there is no perennial water flow. The pipes used for cable laying shall be of non-pressure NP2 class (light duty) of suitable diameter RCC pipes with collars jointed with a stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand).

#### **1.1.4 Protection of Cable in open trench method:**

- a) Cables laid in open trench method shall be protected with DWC split pipe of minimum 120/103 mm diameter.
- b) The cable shall be tied with DWC split pipe at an interval of every 1 m.
- c) Cables shall be taken inside Relay Rooms / Dy.SS Room / Level Crossing Gate Hut / IB Huts etc. and bunched over powder coated Mild Steel (MS) ladder of appropriate width made of angle of size 38 mm x 38 mm x 3 mm. The base of the ladder shall be properly concreted with 1:3:6 M10 concrete. The arrangement shall be protected by constructing a block of brick masonry.
- d) Cable entries shall be properly closed using concrete to prevent rodent entry or cable theft.
- e) Cables shall be taken inside location boxes from underneath the location box foundations. The inside of the location box shall be sand filled, plastered after taking the cables inside. The cables shall be taken inside the location boxes / signal posts and terminated in such a way that it is possible to change over without disconnection of working functions or with the barest minimum possible disconnection. Wherever there is a paucity of space in any existing location box / signal post, methodology suggested by representatives of the Authority Engineer, including installation of a new location box / signal and jumpering of existing cables from the existing location box to the new location box / signal, shall be adopted.

#### **1.1.5 OFC Cable Laying**

- (a) Laying of HDPE duct and blowing of OFC shall be done as per guidelines specified in Section VIII, Chapter 13 of Indian Railway Telecom Manual.
- (b) OFC shall be blown through HDPE duct conforming to RDSO specification RDSO/SPN/TC/45/2013. OFC shall be blown through HDPE duct using a

blowing machine and no manual pulling is permitted after conducting Duct Integrity Test (DIT) as per the procedure laid down in Annexure I, Chapter 13 of Indian Railway Telecom Manual duly recording readings.

- (c) OFC shall be jointed as per Section X, Chapter 13 of Indian Railway Telecom Manual.
- (d) OFC shall be tested and readings shall be recorded as per format in para 13.10.23 of Indian Railway Telecom Manual or Southern Railway format.
- (e) All the fibres of OFC shall be terminated in Fibre Distribution Management System (FDMS) with LC connectors at IB Huts / Relay Rooms /Level Crossing Gate Huts / Distributed EI Cabins / Station End Cabin locations etc. The FDMS shall be housed in a U rack of appropriate size and reputed make such as Vero President, Rittal, AEW, Bestnet etc. The U rack shall have adequate number of cooling fans, power managers, cable managers, equipment trays. OFC patch cords of adequate length shall be provided to connect OFC cables to the equipment installed in this Project.
- (f) FRP loop chambers shall be provided at an interval of every one km, both ends of track crossing, major bridges, platform crossing, entry of IB Huts, Relay Rooms, Level Crossing Gate Huts. Each loop chamber shall cater to a minimum OFC length of 30 m.
- (g) FRP joint chambers shall generally be provided at an interval of every three km. Each joint chamber shall cater to a minimum OFC length of 30 m. The enclosures used for jointing shall conform to specification / Drawing No.RAILTEL/SR/OFC/2009/12.

#### **1.1.6 RCC cable route markers shall be provided within two days of trench back filling.**

- a) Details such as cable drum number, total number of cores, to and from location details shall be laser printed, laminated and fixed in location boxes using 2 mm thick Perspex sheet cover.
- b) The trench path shall be straight as far as possible. The trenching shall be carried out without causing damage to working cables. A qualified engineer shall be deployed at the work spot continuously. Telecom Circular No. 09/2023 issued vide Railway Board Letter No. 2021/Tele/5(2)/3-Part(1)(3425647) dated 12.06.2023 for taking up digging activity near S&T cables shall be followed. Necessary bushes/trees/jungle shall be cleared before taking up the trenching.

### **1.2 Location Boxes**

#### **1.2.1 Requirement:** Location boxes shall be installed in accordance to cable laying requirements and equipment housing.

1. Location boxes of full size or half size with 'E' type lock and key fixed on door as per Drawing No. CWM 08097 and CWM 01103 respectively shall be installed.
2. 'E' type lock as per Drawing No. SA 3376/M of ward number 37 shall be used. Key as per Drawing No. S 3377/M shall be used.

3. Location boxes shall be installed by excavation of pit and casting of foundation as per Southern Railway Drawing No. SG/CN/02/6 for Full GRS and SG/CN/02/7 for Half/Quarter GRS.
4. Location boxes shall be installed with the shorter edge (edge without door) parallel to the track without infringements as per IRSOD.
5. Top surface of the foundation of location boxes shall, normally, be matched to rail level in a plain area.
6. Stone pitching of location boxes shall be done wherever the location box foundation depth below the ground level is less than 40 cm and at locations instructed by representatives of the Authority Engineer.
7. Stone pitching of location boxes and tie bar fencing shall be done in miscreant prone locations / locations with improper drainage / locations with chronic garbage dumping problems as instructed by representatives of the Authority Engineer.
8. Foundation of the location box shall be lime washed with two coats after the completion of placement of location box on the foundation.
9. **Painting of Location Box before Placement on Foundation:** Location box shall be painted with one coat of red oxide metal primer after preparing the surfaces smooth by emery paper polishing. Primer shall be of Berger / Asian Paints / British / JSW make
10. **Painting of Location Box after Placement on Foundation:** The location box shall be painted with two coats of aluminium paint on outer surface and two coats of white paint on inner surfaces. Paint shall be of Berger / Asian Paints / British / JSW make.
11. Cables shall be taken inside location boxes from underneath the location box foundations. The inside of the location box shall be sand filled, plastered after taking the cables inside. The cables shall be taken inside the location boxes and terminated in such a way that it is possible to change over without disconnection of working functions or with the barest minimum possible disconnection. Wherever there is a paucity of space in any existing location box, methodology suggested by representatives of the Authority Engineer, including installation of a new location box and jumpering of existing cables from the existing location box to the new location box, shall be adopted.
12. Cable termination shall be done on 1 way / 6 way ARA / WAGO / Phoenix terminals fixed on teak wood reapers / teak wood blocks / 10 mm hylam sheets as per the site requirements as instructed by representatives of the Authority Engineer. Two coats of wood primer shall be applied to teak wood reapers / teak wood blocks. The size of



theteak wood reapers / teak wood blocks / 10 mm hylam sheets shall be as per the site requirements as instructed by representatives of the Authority Engineer.

13. Extra cable loop of 6 to 8 m shall be kept at each end of the main cable / tail cable / power cables / 6 quad cable at location boxes. A cable pit of size not less than 1 m and 1.5 m diameter shall be made near every location box to house the cable loop coil. Individual cable coils shall be tied with released / excess cable bits in the pit. Wherever multiple cables are to be terminated in the same location box, the cables shall be kept on top of one another in the pit. The cable loop pit shall be refilled with the excavated earth and rammed. Wherever, cable pits are not feasible, the cables shall be looped and buried as instructed by representatives of the Authority Engineer.
14. Gland plate shall be fixed as per Southern Railway Drawing No. 5774.
15. Earthing of location box and equipment shall be done.
16. Anti-tilting arrangement for equipment shall be done.
17. Details such as cable drum number, total number of cores, to and from location details, cable termination particulars shall be laser printed, laminated and fixed in location boxes using 2 mm thick Perspex sheet cover.
18. The location boxes in which equipment such as MSDAC, DC-DP, chargers etc are housed shall be provided with teak wood plank of size 940 mm x 470 mm x 20 mm applied with two coats of wood primer fixed with MS angles of size 25 mm x 25 mm x 3 mm applied with two coats of paint.
19. Location boxes shall be painted and numbered as per the extant practice of Southern Railway.
20. Implantation distance and earth resistance shall be painted on the track side of the location boxes instructed by representatives of the Authority Engineer.
21. All associated works shall be done to make the system functional.

### **1.3 Power Supply**

#### **1. Requirement:**

- (a) Power Supply shall to be provided to power on Station Kavach, Remote Interface Units, Kavach communication equipment etc. Power Supply Scheme duly indicating power supply source, cabling, surge protection arrangements etc. shall be submitted for the approval of the Authority Engineer.
- (b) Power supply wiring shall be done as per the approved Power Supply Scheme of Kavach equipment.

- (c) Aviation Lamp of the tower shall be supplied in this project. Also power supply to be extended to the aviation Lamp with suitable surge protection arrangements and not directly from IPS or IPS battery.
2. Power supply arrangements and DC-DC converters as per RDSO/SPN/165/2023 Ver. 4.0 Amdt. 1 or latest with RDSO Inspection as per system requirement to be supplied along with the necessary DCDP (DC distribution panel)/ cabinet with SPD arrangement. These may be used for installation and commissioning of power supply required for TCAS in the section and to fulfill the requirement of N+1 system for power supply. Any other requirement apart from this to commission the system as per the approved Power Supply Scheme is to be done by contractor.
  3. Power supply wiring shall be done as per the approved Power Supply Scheme.
  4. Power supply at the existing stations shall be augmented, if required, to cater for additional power load for powering on equipment for the completion of this Project by way of additional DC-DC converters of suitable rating and upgradation of existing battery bank etc.
  5. Required power supplies for the completion of this Project shall be brought to the Relay Room / Equipment Room from power rack using wires of suitable gauge depending upon the loads. The voltage drop from source to the equipment / fuse block in the Relay Room shall not be more than 1 V.
  6. Pre-Commissioning Checklists of new power supply equipment duly approved by OEM shall be submitted to the authorised representatives of the Authority Engineer for approval. This shall be done as per the extant practice of Southern Railway. OEM installation certificate shall be prepared and submitted.
  7. Wherever IPS is required to be installed at newly constructed huts, installation, testing and commissioning shall be done as per RDSO/SPN/165/2023 Ver 4.0 with latest amendments.

## **1.4 Indoor Wiring**

### **1. Requirement:**

- (a) The contractor shall submit equipment disposition plan / floor plan of the Relay Rooms / IB Huts indicating the position of existing and proposed equipment and racks for the approval of Authority Engineer.
- (b) **Direct Interface between Electronic Interlocking and Kavach:**
  - (i) Direct interfacing between Electronic Interlocking (EI) and Kavach shall be provided at all the locations where EI is available.
  - (ii) Kavach is to be provided as per RDSO specification Version 4.0 with all amendments or latest which includes the direct interfacing with Electronic Interlocking. The bidder shall quote keeping in view all the RDSO approved

technologies for interfacing with Kavach. The Authority shall approve the best technology applicable and feasible during the Project Milestone prior to the Project Milestone targeted for deployment.

- (iii) The Contractor shall adhere to latest guidelines for the implementation of EI-Kavach direct interfacing.
  - (c) For Stationary Kavach at locations where direct interface is not possible, separate repeater relays shall be picked up for Kavach in a separate relay rack for Kavach. The contractor shall submit a list of available spare front contacts for picking up the repeater relays. Non-availability of front contact for picking up repeater relays shall be dealt in the following manner.
    - (i) Wherever no spare front contact is available but front contact has been used for proving the relay in datalogger, the existing relay shall be proved in datalogger using a spare back contact and repeater relay shall be picked up using the spared front contact.
    - (ii) Wherever there is no possibility of switching the datalogger contact to a spare back contact or the relay has already been proved using a back contact, a repeater relay shall be picked up in the existing relay racks as per the instructions of representatives of Authority Engineer. Preferably, the repeater relay shall be picked up sparing a front contact used for panel indication purpose. The function so disturbed shall be restored with proper wiring from the newly picked up repeater relay. Another repeater relay shall be picked up for Kavach.
  - (d) For LC Kavach / RIU at Automatic Block Signalling (ABS) Huts, existing contacts of relays required shall be used for wiring Kavach. If required number of contacts are not available, repeater relays shall be picked up and used for Kavach. Non-availability of front contacts shall be dealt as described above.
  - (e) The repeater relays picked up for Kavach and due to absence of front contacts shall be wired in datalogger.
2. Wiring shall be done as per approved circuits and extant practices of Southern Railway. Wiring shall comply with standards set out by OEMs, latest RDSO Technical Advisory Notes (TANs).
  3. Wiring shall be properly bunched with lacing twine or cable ties.
  4. Outdoor signalling cables laid for the completion of this Project shall be terminated on cable termination racks in Relay Rooms / IB Huts etc.
  5. Indoor wiring shall be done with the following wires / cables.

S.No.	Wires / Cables	Indoor Wiring
1	16/0.2 mm Wire Coils ATC as per RDSO specification IRS: S 76/89 Amendment No. 3 or latest	1. Relay to Relay 2. Relay to Cable Termination Rack 3. Relay to Fuse Block 4. Panel Termination to Panel Indications
2	35 sq. mm (277/0.4 mm) / 10 sq. mm (140/0.3 mm) Wire Coils ATC as per IRS: S76/89 Amendment No.3 or latest as per load calculations / OEM recommendations	Power Supply Wiring
3	Underground Signalling Cable (12 core / 24 core / 30 core only) as per IRS: S 63/2014 Revision 4.0 or latest	Relay Rack to Panel
4	60 Core Indoor Cable as per IRS: S76/89 Amendment No. 3 or latest	1. Tag Block to Datalogger 2. Relay to Tag Block 3. Simulation Panel for Site Acceptance Test (SAT)
5	Multistrand copper conductor of appropriate diameter as per RDSO code of practice for earthing	Earthing
6	OEM recommendations	Kavach

6. Flexible wires shall be terminated using lugs of suitable size. The lugs shall be crimped and soldered. Wire identification sleeves / ferrules of insulation made of insulated material shall be provided at both the ends of wires with termination particulars printed on them. Soldering shall be carried out as per para 19.1.2 of IRSEM.
7. Wiring shall be done in a ring fashion on bus bar at fuses.
8. Cables shall be clamped properly using cable gland plates.
9. Relay wiring shall be done with at least one front and one back contacts spare for each new function picked up for the completion of this Project.
10. Relay bases of correct configuration shall be used. Under no circumstances, configuration of bases shall be disturbed. A penalty of Rs. 10,000/- per relay shall be imposed for use of relay base of wrong configuration.
11. Relays shall be flashed before plugging them. The readings of flashing of relays shall be recorded.

12. Relay name shall be printed / painted on the relay racks as per the standard practice of Southern Railway on both front and rear side of each relay.
13. Cable Termination Rack termination particulars, fuse particulars shall be printed / painted on the Cable Termination Rack / Power Rack in addition to the same details painted on a metal board and fixed on a nearby wall.
14. Cable entries shall be properly closed using concrete / silica gel or any other compound to prevent rodent entry or cable theft.
15. Different types of cables shall be drawn in powder coated aluminium ladder. Power cables and cables for function wiring shall be drawn in different ladders separated by a minimum distance of 50 mm.
16. **Testing of Wiring:**
  - (a) Testing of wiring shall be done in accordance with para 19.8.5 of IRSEM.
  - (b) Testing shall be first carried out by competent engineer of the contractor before offering for testing to railways.
  - (c) First stage of testing (Wire to wire testing with buzzer before soldering) shall be carried out by Railway Engineer nominated by the Authority Engineer.
  - (d) Second stage of testing (Wire to wire testing with buzzer after soldering) shall be carried out separately by Railway Officer nominated by the Authority Engineer.
  - (e) Necessary manpower and equipment required for testing by railways shall be arranged by the contractor.

## **1.5 Outdoor Wiring**

1. **Requirement:** The sections where centralised relay huts are not available suitable arrangements to be made for requisite field inputs for KAVACH equipment and accordingly cable laying to be done. Outdoor wiring as necessitated by cable laying requirements shall be done.
2. The contractor shall submit location box particulars with equipment disposition, fuse, termination details and outdoor wiring diagrams for the approval of the Authority Engineer. Outdoor wiring shall be designed to improve the reliability by paralleling of relay contacts.
3. The installation in location boxes and wiring shall be done as per the approved wiring diagrams.
4. The cables shall be taken inside the location boxes / signal posts and terminated in such a way that it is possible to change over without disconnection of working functions or with the barest minimum possible disconnection. Wherever there is a paucity of space in any existing location box / signal post, methodology suggested by representatives of the Authority Engineer, including installation of a new location

box / signal and jumpering of existing cables from the existing location box to the new location box / signal, shall be adopted.

5. Flexible wires shall be terminated using lugs of suitable size. The lugs shall be crimped and soldered. Wire identification sleeves / ferrules of insulation made of insulated material shall be provided at both the ends of wires with termination particulars printed on them. Soldering shall be carried out as per para 19.1.2 of IRSEM.
6. Wiring shall be done in a ring fashion on bus bar at fuses.
7. Cables shall be clamped properly using cable gland plates.
8. All new cables shall be tested before and after cable laying in the presence of representatives of Authority Engineer. The readings shall be recorded in Cable Testing Summary Register (S&T/R-10).
9. Details such as cable drum number, total number of cores, to and from location details, cable termination particulars shall be laser printed, laminated and fixed in location boxes using 2 mm thick Perspex sheet cover. The same details shall be recorded in the Cable Testing Summary Register.
10. New nomenclature shall be painted on the cable sleeve consequent to the introduction of new circuits / alterations to existing circuits in location boxes etc. New particulars / corrections to existing particulars shall be painted / printed / displayed on the inner side of the location box doors.
11. **Testing of Wiring:**
  - (a) Testing of wiring shall be done in accordance with para 19.8.5 of IRSEM.
  - (b) Testing shall be first carried out by competent engineer of the contractor before offering for testing to railways.
  - (c) Testing (Wire to wire testing with buzzer) shall be carried out by representatives nominated by the Authority Engineer.
  - (d) Necessary manpower and equipment required for testing by railways shall be arranged by the contractor.

## **1.6 Datalogger**

1. Potential free contacts of repeater relays picked up for the completion of this Project shall be proved in the existing dataloggers.
2. Datalogger configuration of the relays whose contact configuration had been changed for Kavach wiring requirements shall be suitably completed.
3. Existing dataloggers shall be upgraded to accommodate the additional analog and digital input requirement for Kavach. The contractor shall supply all necessary materials such as tag blocks, cables, wire coils, digital expansion ribbons, gliders, fixing accessories, interface equipment etc.

4. The contractor shall arrange modifications, upgradation, wiring, validation and updating data base, fault logics of the new inputs related to the completion of this Project in existing dataloggers at stations, LC gates, Divisional HQ, Zonal HQ etc. and any software / hardware upgradation in existing dataloggers required for the functioning of the datalogger network.
5. Installation, wiring, validation, networking of dataloggers at new huts locations shall be carried out by authorised engineers of OEM.
6. FEP / MFEP, additional servers etc., if any required, to augment the datalogger network at Divisional HQ, Zonal HQ etc. shall be provided.

## **1.7 Earthing, Lightning and Surge Protection**

1. All the equipment viz. location boxes, apparatus cases, power supply equipment, power panels, outdoor cables, relay racks, Kavach equipment, communication equipment etc. shall be earthed as per OEM recommendations, extant Southern Railway practice, IRSEM, IR Telecom Manual and ACTM.
2. No indoor earth cables shall be drawn in the ladders. They shall be drawn to the earth bus bar in the shortest path as instructed by the representatives of the Authority Engineer.
3. **Earthing of Location Boxes and Signals:**
  - (a) Earths as per Southern Railway Drawing No. SG/CN/02/13 shall be provided for all gears other than electronic equipment where Earth resistance up to 10 ohm is normally permissible. All nuts / bolts used to connect MS flat to function and earth electrode shall be galvanised.
  - (b) Resistance of earth achieved shall not exceed 10  $\Omega$ . Additional earth electrodes shall be provided and paralleled if required to achieve final earth resistance of less than 10  $\Omega$ .
  - (c) Earth resistance value shall be painted on the earth electrode chamber with date of measurement.
4. **Earthing of Cables:**
  - (a) Armour of signalling and telecom cables shall be earthed. Both sheath and armour of main cables shall be earthed.
  - (b) All cable armours shall be soldered with released cable copper conductors of required length and the other end of the conductors shall be connected to a cable gland plate.
  - (c) Armour of OFC shall be earthed at both the ends.
  - (d) Armour, sheath and screen of 6 quad cable shall be earthed wherever terminated.
5. **Earthing at Stations:**
  - (a) All equipment installed at stations shall be connected to the available earth bus bars in relay room / equipment room.
  - (b) In the locations where perimeter earth is available for lightning protection, the equipment installed shall be connected to the existing perimeter earth.
  - (c) Wherever the available earthing arrangements are found unsuitable as per OEM recommendations, earthing arrangements shall be provided as per OEM recommendations.

- (d) Wherever the available earthing arrangements are found inadequate as per the representatives of Authority Engineer, earthing arrangements shall be provided / augmented as per the instructions of the representatives of Authority Engineer.

**6. Earthing of Telecom Equipment:**

- (a) All telecom equipment shall be earthed as per OEM recommendations.
- (b) Any additional telecom equipment installed adjacent to the existing telecom equipment, shall also be earthed as per OEM recommendations.
- (c) Wherever the available earthing arrangements are found unsuitable as per OEM recommendations, earthing arrangements shall be provided as per OEM recommendations.
- (d) Wherever the available earthing arrangements are found inadequate as per the representatives of Authority Engineer, earthing arrangements shall be provided / augmented as per the instructions of the representatives of Authority Engineer.

**1.8 Stationary Kavach Works**

- 1. Installation of stationary Kavach shall be done as per OEM recommendations conforming to RDSO specification No. RDSO/SPN/196/2012 Version 4.0 with all amendments or latest, Technical Advisory Notes etc.
- 2. Chainage Survey for absolute locations shall be carried out and submitted to the Authority Engineer for approval. The same shall be verified in the presence of the representatives of Authority Engineer.
- 3. Design documentation such as RFID Tag / TIN Layout, RFID Tag Data, Kavach Table of Control (TOC), Kavach Track Profile based on chainage surveys, SIPs, TOCs etc., Interface Circuits shall be submitted to the Authority Engineer for approval.
- 4. Installation of RFID tags, stationary Kavach shall be done as per the approved design documentation.

**1.8.1 Network Monitoring System:**

- i) A new Networking Monitoring System (NMS) shall be installed in Salem Division Headquarters at a location approved by the Authority Engineer.
- ii) The stationary Kavach works installed in this Project shall be integrated with the Kavach NMS installed in Salem Division HQ. All the necessary cable laying, networking requirements for the completion of this Project shall be carried out by the contractor.
- iii) E1 channels for NMS at station shall be provided by railway only where the existing hardware supports it. Wherever the existing hardware does not support provision of E1 channels for NMS, additional hardware / cards / STMs shall be supplied, installed and commissioned. NMS at mid-section locations shall be commissioned on dark fibre and carried to NMS from adjacent station.

**1.8.2 Testing of Kavach:**

- a) Necessary manpower, competent OEM engineers and equipment required for testing by railways shall be arranged by the contractor.
- b) Interface circuits shall be tested as per Sections 1.4 and 1.5 at two levels.
- c) Correspondence test of wiring shall be done by operating individual functions from operating panel / VDU. This shall be carried out as per the extant practice.



- d) Factory Acceptance Test (FAT) shall be carried out at OEM premises as per extant RDSO policies and OEM recommendations.
- e) Site Acceptance Test (SAT) shall be carried out using loco and loco simulator as per extant RDSO policies and OEM recommendations. Loco shall be arranged by Southern Railway while loco simulator of OEM shall be arranged by the contractor.
- f) The contractor shall ensure successful completion of FAT by competent Engineers of OEM before offering it to Railways. Necessary arrangements for FAT such as wiring, interface equipment, simulation panel, manpower needed for testing shall be arranged by the contractor at OEM premises.
- g) SAT reports shall be prepared and offered to railways for approval.
- h) Necessary arrangements for SAT such as wiring, interface equipment, simulation panel, manpower needed for testing shall be arranged by the contractor.
- i) Pre-Commissioning Checklists of Kavach duly approved by OEM shall be submitted to the authorised representatives of the Authority Engineer for approval. This shall be done as per the extant practice of Southern Railway. OEM installation certificate shall be prepared and submitted.
- j) A penalty of Rs. 2,500/- shall be imposed per each design mistake in interface circuits submitted for approval and identified at any stage upto commissioning.
- k) All the design mistakes identified at any stage upto the completion of Defect Liability Period shall be rectified by the contractor at his own cost.

## **1.9 Onboard Kavach Works**

- a) Fitment of Onboard Kavach along with suitable Brake Interface Unit (BIU) shall be done in the 10 locomotives nominated at various loco sheds of Southern Railway as nominated by the Authority Engineer.
- b) Fitment of Onboard Kavach shall be done within the premises of the nominated loco sheds.
- c) Installation of Onboard Kavach shall be done as per OEM recommendations conforming to RDSO specification No. RDSO/SPN/196/2012 Version 4.0 with all amendments or latest, Technical Advisory Notes etc.
- d) Deleted

## **1.10 Independent Safety Assessment and Statutory Sanction**

1. The contractor shall carry out Specific Application Safety Assessment by Independent Safety Assessor (ISA) in association with the Kavach OEM.
2. The contractor shall submit a panel of 3 names from RDSO approved panel of ISA within 30 days of Appointed date to the Authority Engineer. After proposing to the Authority the panel of 3 (three) names of ISA firms, the Authority will select one ISA from the proposed panel within 15 days.
3. The contractor in association with Kavach OEM shall prepare and submit documentation for Specific Application Safety Case (SASC) and assessment by ISA as per the Project Completion Schedule.

4. The contractor in association with Kavach OEM shall submit for the approval of the Authority Engineer documentation to be submitted to ISA including the replies to Technical Notes / Queries of ISA.
5. The contractor in association with Kavach OEM shall prepare and submit documentation for statutory sanction as per RDSO specification for Kavach and the extant practice of Southern Railway.

### **1.11 Tower Works**

1. The Tower Site Plan shall be provided.
2. Soil Safe Bearing Capacity (SBC) test shall be carried out as per the extant civil engineering practices of Southern Railway and the instructions of representatives of Authority Engineer.
3. All the tests including soil test, concrete tests etc. shall be carried out by NABL accredited laboratories.
4. Tower foundations shall be constructed as per RDSO approved tower foundation drawings RDSO/TC/TOWER/L/40/100/F/WT(2Sheets) or RDSO/TC/ TOWER/L/40/100/F/NWT (3 Sheets) for locations with water table and without water table respectively as applicable for all SBC values above 100 kPA.
5. For all SBC values below 100 kPA, foundation designs shall be got prepared by a tower design agency and proof checked by reputed engineering institutes like CPRI, IIT etc. and submitted for approval of Southern Railway. The approved foundation designs shall be used for construction as applicable. Alternatively, soil strengthening to suit 100 kPA foundation drawing shall be done as per the instructions of representatives of Authority Engineer.
6. 40 m Tower super-structures shall be erected as per RDSO approved tower drawings RDSO/TC/TOWER/L/40/180/T/6.5.
7. In case of emergence of requirement of pile foundations for the tower foundations, the Contractor shall submit the reasons for the same to the Authority Engineer in writing. Safety Consultant shall scrutinise and submit the recommendations of the same to the Authority Engineer. Schedule-G1 for pile foundations shall be operated with the approval of the Authority
8. In case of emergence of requirement of tower construction in cyclonic area as per IS 875 (Part 3) : 2015 or latest, the Contractor shall submit the reasons for the same to the Authority Engineer. In cyclonic areas, tower and foundation designs for 6.5 sq.m EPA and wind speed 180 kmph, presently being processed for approval of RDSO shall be used. In the exceptional circumstances of the designs not yet being approved by RDSO, tower and foundation designs 2024-PACS-SPIRE 407RH PLUS-001, 2024-PACS-SPIRE 407RH PLUS-001-40M-100KPA-GBT-NWT\_FDN-001, 2024-PACS-SPIRE 407RH PLUS-001-40M-100KPA-GBT-WT\_FDN-001 or better shall be used depending on site specific requirements. Safety Consultant Shall assess the

site specific requirement and recommend the requirement to the Authority. The Contractor shall commence the tower works with tower designs for cyclonic areas.

9. In case of the emergence of requirement of new foundation designs or tower designs due to site conditions such as non-feasibility of tower erection, soil conditions etc. the towers shall be erected as per the instructions of the Authority. The new designs shall be got prepared by a tower design agency and proof checked by reputed engineering institutes like CPRI, IIT etc. and submitted for the approval of competent authority of Southern Railway as directed by the Authority. Such designs which are approved by the competent authority of Southern Railway shall be used for the sites as directed by the Authority.
10. Aircraft Warning Lights (ACWL) of Low intensity with input voltage 24V or 110V DC (as per Railway requirement) conforming to ICAO standards- IP rating 65 as per IS code 13947 Part-1: 193 shall be provided on the top of tower as per the approved tower drawing.
11. The tower shall have lightning protection arrangements as per the approved tower drawing.
12. Minimum of three maintenance free earth electrodes shall be installed and connected to three different legs of the tower. One maintenance free earth electrode shall be connected to the electronics installed in tower box. All the earth electrodes shall be interconnected with each other so as to obtain an overall earth resistance of less than 1  $\Omega$ . The interconnections between earth electrodes and tower shall be made. All the other interconnections throughout the running length of the GI strip shall be welded together. The GI strip shall be buried at a depth of not less than 40 cm below the ground.
13. Supply and installation of Maintenance free earth shall be as per as per Drg. No. SDO / RDSO/ E&B/001 of RDSO Spec No. RDSO/SPN/197 Ver.1.0 or latest with recent amendments. All materials shall be supplied with RDSO Inspection and the execution/ installation shall be carried out with OEM supervision.
14. Two tower boxes shall be installed on the tower platform. Two different sets of communication equipment shall be accommodated in two separate tower boxes. Communication Equipment will be supplied by railways.
15. The soil inside the tower fencing area shall be consolidated with watering and ramming in layers of 15 cm each. It shall be further covered with 20 mm size hard broken stone metal 100 mm thick. The stone metal surface top shall be 100 mm lower than tower foundation column top.
16. The soil in an area not less than 7 m x 7 m size around the tower shall be consolidated with watering and ramming in layers of 15 cm each. This area shall be levelled to a minimum of 250 mm above the natural ground level so as prevent water logging around the tower.
17. Antenna mounts as required by 4G LTE-R / Kavach OEMs shall be fabricated and provided on the towers.

18. Tower super-structure shall be painted post erection with primer followed by a double coat of paint in alternate bands of white and orange with the bands at the top and bottom of the tower in the darker orange colour. Further, extant civil aviation norms shall be followed for painting of towers as necessitated by site conditions.
19. Fencing of 3m height with doors shall be provided.
20. Procedure for undertaking digging work in the vicinity of Signalling, Electrical and Telecommunication cables should be as per letter No.2021/Tele/5(2)/-3-Part(1) (3425647) dated 12.06.2023. The penalty in case cables are damaged by the contractor during execution of the work as per the above mentioned R.B. Lr. shall be.

Sl.No.	Cable Damaged	Penalty per location
1	Only Quad cable or Signalling cable	Rs. 1.0 Lakh
2	Only OFC	Rs. 1.25 Lakh
3	Both OFC & Quad	Rs. 1.5 Lakh
4	Electrical Cable	Rs. 1.0 Lakh

21. The materials available in the site earmarked for erection of tower shall be cleared by the contractor for construction of towers. **The existing signalling cables, telecom cables, electrical cables, etc. available in the earmarked locations shall be shifted/diverted or protected by the contractor. This shall not form part of the change of scope.**

#### 1.12 Outdoor Cabinets (ODCs)

1. One IP-55 OD fan cooled cabinet with double door Outdoor Cabinets (ODCs) shall be installed with concrete base at each new tower location.
2. The ODC shall be made of GI sheets powder coated with RAL 7035 PP or better and shall be of minimum size 2200 mm (height) x 800 mm (depth) x 1200 mm (width) such as Delta 3923170900 or similar.
3. Concrete base for ODCs shall be as per Drawing No. SK/BOX-FDN/01. Better foundations suitable to the ODC supplied shall be designed and submitted for the approval of the Authority Engineer in case of size variations of ODCs.
4. Concrete base of the ODC shall be lime washed with two coats after the completion of placement of ODC on the foundation.
5. Earthing of ODC and equipment shall be done as per Chapter 19 Section 11 of IR-SEM 2021.
6. Anti-tilting arrangement for equipment shall be done.

7. Earth resistance shall be painted on the track side of the location box as instructed by representatives of the Authority Engineer.
8. All associated works shall be done to make the system functional.

## 2 Deviations from the Specifications and Standards

Notwithstanding anything to the contrary contained in Paragraph 1 above, the following Specifications and Standards shall apply to the Railway Project, and for purposes of this Agreement, the aforesaid Specifications and Standards shall be deemed to be amended to the extent set forth below:

Nil Deviations

## 3 Summary of Specifications and Drawings

A non-exhaustive summary of specifications and drawings is produced below. In case of absence of specification / drawing, specification / drawing proposed by the contractor and reviewed by the Authority Engineer shall be followed. The decision of the Authority shall be final in case of any dispute between the contractor and the Authority Engineer.

S.No.	Description	Specification/ Drawing
1	Cable laying where rock is encountered	IRSEM Drawings No. 15-D2 Sheets 1, 2 and 3 as applicable
2	Cable Laying on major bridges having steel girders	IRSEM Drawing No. 15-D6 or as in Section 1.2.4
3	Cable Laying on minor bridges or culverts	IRSEM Drawing No. 15-D8
4	Cable Laying on bed of culverts or under bridges	IRSEM Drawing No. 15-D7
5	Optic Fibre Cable (OFC)	RDSO Specification No. IRS TC 55/2006 Revision 1 Amendment 1.1 or latest
6	Fibre Distribution Management System	RDSO Specification No. RDSO/SPN/TC/37/2020 Revision 4.0 or latest
7	OFC Joint Closure	RDSO Specification No. RDSO/SPN/TC/68/2014 Revision 1.0 Amendment 1 or latest
8	OFC Patch Cords, Pig Tails	RDSO Specification No. RDSO/SPN/TC/69/2007 Revision 0 or latest
9	Switch Board Cable	TEC Specification No. GR/WIR-06/03 MAR 2002 or latest
10	WAGO / Phoenix Terminals	RDSO Specification No. RDSO/SPN/189/2004 Version 3
11	ARA Terminals and Fuse Blocks	RDSO Specification No. IRS S 75/2006 or latest

S.No.	Description	Specification/ Drawing
12	Fuses	RDSO Specification No. IRS S 78/2006 or latest
13	HDPE Duct	RDSO Specification No. RDSO/SPN/TC/45/2013 or latest or IS 4984-1995 or latest
14	Duct Integrity Test	Procedure in Annexure I, Chapter 13 or Indian Railway Telecom Manual
15	OFC Jointing	Procedure in Section X, Chapter 13 of Indian Railway Telecom Manual
16	Integrated Power Supply	RDSO Specification No. RDSO/SPN/165/2023 Version 4.0 or latest
17	Low Maintenance Lead Acid Secondary Cells	RDSO Specification No. IRS S 88/2004 or latest
18	Non-AC Immune, Plug-in Type, DC Neutral Line, Metal to Carbon Relay, 24 V (Q Style Relay QN1 – 12F/4B or 8F/8B)	BRS 930, RDSO Specifications No. IRS S 34/68 with Amendment 6 or latest, IRS S 23/88 with Amendment 1 or latest (As Applicable)
19	AC Immune, Plug-in Type, DC Neutral Line, Metal to Carbon Relay, 24 V (Q Style Relay QNA1 – 12F/4B or 8F/8B)	BRS 931A, RDSO Specifications No. IRS S 34/68 with Amendment 6 or latest, IRS S 23/88 with Amendment 1 or latest (As Applicable), IRS S 60/78 with Amendment 1 or latest
20	Non-AC Immune, Plug-in Type, DC Neutral Line, Metal to Carbon Relay, 24 V 1000 $\Omega$ (Q Style Relay QN1K – 6F/6B)	BRS 930, RDSO Specifications No. IRS S 34/68 with Amendment 6 or latest, IRS S 23/88 with Amendment 1 or latest (As Applicable), STS/E/Relays/UEA(PI) dated 30.05.1997 Annexure I
21	AC Immune, Plug-in Type, DC Neutral Line, Metal to Carbon Relay, 24 V 1000 $\Omega$ (Q Style Relay QNA1K – 6F/6B)	BRS 931A, RDSO Specifications No. IRS S 34/68 with Amendment 6 or latest, IRS S 23/88 with Amendment 1 or latest (As Applicable), IRS S 60/78 with Amendment 1 or latest, STS/E/Relays/UEA(PI) dated 30.05.1997 Annexure I
22	AC Immune, Plug-in Type, DC Neutral Line, Slow to Pick Up, Metal to Carbon Relay, 24 V (Q Style Relay QSPA1 – 8F/4B)	BRS 933A, RDSO Specifications No. IRS S 34/68 with Amendment 6 or latest, IRS S 23/88 with Amendment 1 or latest (As Applicable), IRS S 60/78 with Amendment 1 or latest
23	16/0.2 mm, 140/0.3 mm (10 sq. mm), 270/0.4 mm (35 sq. mm) Wire Coils ATC	RDSO Specification No. IRS S 76/89 Amendment 3 or latest
24	Underground Signalling Cable	RDSO Specification No. IRS S 63/2014 Revision 4.0 or latest
25	60 Core Indoor Cable	RDSO Specification No. IRS S 76/89 Amendment 3 or latest

S.No.	Description	Specification/ Drawing
26	Datalogger, Remote Terminal Unit	RDSO Specification No. IRS S 99/2006 or latest
27	Electronic Interlocking and Associated Equipment	RDSO Specification No. RDSO/SPN/192/2019 Version 2 or latest
28	Double Walled Corrugated (DWC) Pipes	RDSO Specification No. RDSO/SPN/2014/2011 Version 1.1 Amendment 1 or latest
29	GI Pipe	IS 1239 (Part I) 1990 with galvanisation as per IS 4736-1986 or latest
30	Hylam Sheet	IS 2036-1995 or latest
31	200 Way Tag Block	RDSO Specification No. 71/87 or latest
32	RCC Cable Marker	IRSEM Drawing No. 15-D1
33	Kavach	RDSO Specification No. RDSO/SPN/196/2020 Version 4.0 with all amendments or latest
34	Brake Interface Unit (IRAB) for Kavach	RDSO Specification MP.0.01.00.31 Rev. 05, May 2024 or latest
35	Brake Interface Unit (E70) for Kavach	OEM (Faiveley / WABTEC) Specification
36	Brake Interface Unit (CCB) for Kavach	OEM (Knorr Bremse) Specification
37	Onboard LTE equipment connectivity	RDSO/STT-54/LTE Loco Architecture Ver 1.0p or latest
38	40 m Tower Foundation with Water Table (Non-Cyclonic)	RDSO Drawings No. RDSO/TC/TOWER/L/40/100/F/WT (2 Sheets) SCR Drawings No. GM(W)SC/BR/Tower/22/2022, 23/2002 and 24/2022
39	40 m Tower Foundation without Water Table (Non-Cyclonic)	RDSO Drawings No. RDSO/TC/TOWER/L/40/100/F/NWT (3 Sheets)
40	40 m Tower Super-Structure (Non-Cyclonic)	RDSO Drawings No. RDSO/TC/TOWER/L/40/180/T/6.5 2020-PACS-SPIRE-406LM-STR-DWG-001, 002 (2 Sheets), 003, 004 and 005
41	40 m Tower Foundation with Water Table (Cyclonic)	2024- PACS-SPIRE 407RH PLUS-001-40M-100KPA-GBT-WT_FDN-001
42	40 m Tower Foundation without Water Table (Cyclonic)	2024- PACS-SPIRE 407RH PLUS-001-40M-100KPA-GBT-NWT_FDN-001
43	40 m Tower Super-Structure (Cyclonic)	2024-PACS-SPIRE 407RH PLUS-001

#### 4 Supply of Material

- a) Supply of all materials required for the completion of this Project fall under the scope of the work.
- b) The critical items as per Railway Board Letter No.74/RS(G)/379/2Pt. dated 04.03.1991 and 18.06.1991 shall be supplied duly inspected by RDSO. The inspection clause mentioned in this section for each item shall be strictly adhered to irrespective of amount.
- c) All inspection charges shall be borne by the contractor.
- d) The inspection charges for material to be inspected by RITES shall be as per Railway Board Letter No.2022/RS(G)/779/9 dated 01.12.2022 or latest Railway Board guidelines.
- e) A non-exhaustive summary of specifications and drawings is produced below. In case of absence of inspection agency, inspection agency proposed by the contractor and reviewed by the Authority Engineer shall be followed. The decision of the Authority shall be final in case of any dispute between the contractor and the Authority Engineer.
- f) Normally, the inspecting agency shall not be changed. However, in case the nominated inspecting agency is not in a position to carry out inspection due to policy changes / or any other reason, the inspection shall be carried out as per Authority's decision. In such a case, cost of inspection charges as applicable for RDSO/RITES shall be deducted from the contractor's bills.
- g) Material with RDSO specifications shall be procured from RDSO approved vendors only. If no RDSO approved vendor is available, material shall be procured from other sources as approved by Authority.
- h) Notwithstanding any approval which the inspecting officer may have given in respect of the stores or any materials or the work or workmanship involved in the performance of the contract (Whether with or without any test carried out by the contractor or the Inspecting officer or under the direction of the Inspecting officer) and notwithstanding delivery of the stores where so provided to the interim consignee, it shall be lawful for the consignee, on behalf of the purchaser, to reject the stores or any part, portion of consignment thereof within a reasonable time after actual delivery thereof to him at the place or destination specified in the contract if such stores or part, portion of consignment thereof is not in all respects in conformity with the terms and conditions of the contract whether on account of any loss, deterioration or damage before dispatch or delivery or during transit or otherwise whatsoever.
- i) Once materials with value more than Rs.10 Lakh is received at designated store depot, the contractor has to inform the Authority Engineer in writing within Seven days of receipt of such material along with copies of inspection certificates and other documents. Within Fifteen days of receipt of information, Authority engineer shall depute his representative to inspect the material. In order to facilitate Authority engineer's representative inspection, Contractor shall produce all certificates, e-way bills and invoices in original during inspection. Contractor will also facilitate the Authority Engineer's representative with tools, measuring instruments, labour and skilled staff for sample testing of the material. Material, irrespective of value, which is not in conformity with the specifications, loss, defective or damaged will be rejected summarily.

S.No.	Description	Inspecting Agency
1	Optic Fibre Cable (OFC)	RDSO



S.No.	Description	Inspecting Agency
2	Fibre Distribution Management System	Consignee
3	OFC Joint Closure	RITES
4	OFC Joint Chamber (FRP Type)	RITES
5	OFC Patch Cords, Pig Tails	Consignee
6	Switch Board Cable	Consignee
7	WAGO / Phoenix Terminals	RDSO
8	ARA Terminals and Fuse Blocks	RDSO
9	Fuses	RDSO
10	HDPE Duct	RITES
11	Full Location Boxes	RITES
12	'E' Type Lock and Key	RITES
13	Integrated Power Supply	RDSO
14	Low Maintenance Lead Acid Secondary Cells	RDSO
15	Cable Termination Rack	RITES
16	Relay Rack	RITES
17	Non-AC Immune, Plug-in Type, DC Neutral Line, Metal to Carbon Relay, 24 V (Q Style Relay QN1 – 12F/4B or 8F/8B)	RDSO
18	AC Immune, Plug-in Type, DC Neutral Line, Metal to Carbon Relay, 24 V (Q Style Relay QNA1 – 12F/4B or 8F/8B)	RDSO
19	Non-AC Immune, Plug-in Type, DC Neutral Line, Metal to Carbon Relay, 24 V 1000 $\Omega$ (Q Style Relay QN1K – 6F/6B)	RDSO
20	AC Immune, Plug-in Type, DC Neutral Line, Metal to Carbon Relay, 24 V 1000 $\Omega$ (Q Style Relay QNA1K – 6F/6B)	RDSO
21	AC Immune, Plug-in Type, DC Neutral Line, Slow to Pick Up, Metal to Carbon Relay, 24 V (Q Style Relay QSPA1 – 8F/4B)	RDSO
22	16/0.2 mm, 140/0.3 mm (10 sq. mm), 270/0.4 mm (35 sq. mm) Wire Coils ATC	RDSO
23	Underground Signalling Cable	RDSO
24	60 Core Indoor Cable	RDSO
25	Datalogger, Remote Terminal Unit	RDSO
26	Electronic Interlocking and Associated Equipment	RDSO
27	Double Walled Corrugated (DWC) Pipes	RITES
28	GI Pipe	RITES
29	Hylam Sheet	Consignee
30	Conventional Earth	Consignee
31	Ladder for Indoor Wiring	Consignee
32	200 Way Tag Block	Consignee
33	RCC Cable Marker	RITES
34	Kavach	RDSO
35	Kavach Tower Aviation Lamp	RDSO

S.No.	Description	Inspecting Agency
36	Brake Interface Unit (IRAB) for Kavach	RDSO
37	Brake Interface Unit (E70) for Kavach	RITES
38	Brake Interface Unit (CCB) for Kavach	RITES
39	Media Converters	Consignee
40	LAN Extenders	Consignee
41	Switches	Consignee
42	Maintenance Free Earth	RDSO
43	40 m Tower Super-Structure	RITES
44	F40 m Tower Aviation Lamp	RITES

Note: Third Party Inspection (TPI) to be carried out in case of RDSO/RITES is not inspecting as per the latest policy guidelines.

## 5 Released Material

All the material released from the site shall be property of Southern Railway. The released material shall be transported after railway accountal to the nominated location as per railway requirement.

## 6 Engineering, Electrification and TRD

Survey the actual space availability in the existing huts and construct building as per the actual requirement of total of 910 sq.mtr. including all electrical provisions with approval of the authority engineer.

### 6.1 Engineering Works:

- i) Design of Signalling huts as per the layout plan CE/612 or SK/02/2019 or TY/05/2014 or DM/AJJ/569 as per the site requirement with the approval of Authority Engineer and construction as per the approved drawings at the specified location along with supply of all electrical fittings & carrying out necessary electrical wiring with all the related works as per approved designs and drawing.
- ii) Initially, site survey to be carried out to identify the locations at above mentioned block sections by the contractor along with site engineer. This survey also includes huts adjacent to the existing relay rooms. Soil tests, in accordance with the site conditions, to be conducted during the execution of the work. Contractor has to submit the site and structural drawings for the approval of Railways as per SR practice (Typical structural drawings are attached for reference).
- iii) The hut shall consist of one floor only. The floor height shall preferably be maintained at track level or be at a height not less than 1000 mm from the surrounding ground level and above HFL of that area. The floor height shall be decided after site survey as per site conditions and approved by the site engineer. Height of the roof inside the hut from flooring top to roof bottom shall not be less than 3000 mm. Foundation & Super structure shall be designed based on Safe

Bearing Capacities of soil (SBC) value as per the soil test. Appropriate foundation & Superstructure design shall be adopted at a particular location by carrying out Soil testing from NABL approved laboratories. Detailed QAP for foundation and super structure shall be submitted for approval.

- iv) All the engineering materials for huts used for construction shall be as per IS specifications.
- v) Brick wall partitions and Aluminium partitions to be provided for hut as per site requirement.
- vi) Windows shall be made of UPVC with glazed glass doors, MS grill of approved type and integrated wire mesh. Door frames shall be made of solid wood. Doors shall be made of solid wood and single door type. Metal grill to be provided for doors including staircase. Ventilator with mesh and sliding door etc shall be provided as per drawing attached.
- vii) All doors and windows shall be painted with two coats of approved colour. Indoor and outdoor shall be painted with weather proof emulsion paints of minimum two coats of approved colours. The Paint shall be of approved brands such as Asian, Berger, Indigo, British, Dulux etc.
- viii) The flooring shall be provided with double vitrified tiles of size not less than 600 mm x 600 mm. The battery room shall be provided with Acid proof tiles.
- ix) Cable duct of size 300 mm x 300 mm shall be provided as per the site requirement. Arrangements shall be made inside the hut to fix cable trays, supporting angles of cable termination racks, relay racks and supports for various equipment. After completion of cable laying, cable duct shall be provided with matching tiles.
- x) Supervision of building and electrical construction activities, quality control shall be done by a qualified Civil Engineer having minimum five years of working experience in a reputed construction company/organization as approved by Authority Engineer. The above-mentioned Civil Engineer shall be available at site during the entire period of Hut construction
- xi) Proper approach such as steps shall be provided from track formation to hut as per the site condition. The width of the approach shall not be less than One meter.
- xii) Arrangements shall be made on the roof of the huts to erect Class A protection system. Base plate for installation of the mast for Class A protector shall be embedded in the roof while casting Slab. Hooks for connecting stay wires of class A protection mast shall be provided in the slab as per extant instructions.
- xiii) Provision for Cable entries shall be provided at appropriate places and the same to be properly closed after work as per the instruction of site engineer.
- xiv) Steps to be provided to enter into the hut along with required soil filling and necessary concreting to approach all doors.
- xv) Contractor is responsible for loading, unloading and transportation of all construction material of hut to site.
- xvi) All the materials used for construction of huts shall be as per the approved list issued by PCE and USSOR issued by Engineering department of SR.
- xvii) The contractor is responsible for completing any additional requirements that are not explicitly specified for the fulfilment of the hut work.

### 6.1.1 Specification For Building Works

i) **Setting out works:-**

The contractor shall be responsible for the true and proper setting out of the works for correctness of the position, levels, dimensions and alignment of all parts of work and for provision of all necessary pegs, reference pillars, instrument, equipment and appliances and labour in connection therewith. If at any time during the progress of the work any error shall appear or arise in the position of levels, dimensions or alignments at any part of the works, the contractor shall at his own expense rectify such errors to the satisfaction of the Engineer incharge and he shall carefully protect, preserve secure all benchmarks, site rails, pegs, reference pillars and other things used in setting out of the works.

The contractor shall have sufficient number of survey instruments such as theodolites, leveling instruments, leveling staff etc and arrange to set out the alignment at his own cost and also establish necessary reference pillars as required and directed by the Engineer

ii) **Earth work:**

The classifications of soils in excavation shall be decided by the Engineer in charge and his decision shall be final and binding on the contractor. Merely the use of explosives in an excavation will not be considered as a reason for higher classification unless blasting is clearly necessary in the opinion of the Engineer in charge.

Excavation for foundation/foundation works etc shall include any wet excavation including springs that may be met, or bailing out water with or without mechanical means or for any other precautions of work which may be found necessary during the course of execution.

Whenever excavation for catch water is ordered, the excavated soils should be spread, consolidated and sectioned to the required profile to form a bund on the downhill side of the catch water drain.

Earthwork sinkage below ground level due to soil conditions as per site conditions shall be done by the contractor as per SR practice. The contractor should study the site conditions before tendering.

Site clearance or jungle clearance or shrubs clearance, brush wood, grass or other obstructions including small trees of girth shall be done as per site.

Samples of all fittings and fastenings including locking arrangements of approved quality required for doors, windows, ventilators as well as all sanitary and water supply fittings etc should be submitted to Engineer in charge and used in the work only after his specific approval. Approved samples should be deposited with the Engineer in charge.

The Railway will have the right to check the quality of any material required for construction like cement, steel, sand, coarse aggregate, admixtures, bricks, timber and

concrete cubes etc for its conformity with specification. The testing charges will have to be borne by the contractor. Sufficient cube moulds will have to be supplied by the contractor at his own cost

iii) **Cement:**

The cement used shall be any of the following, with the prior approval of the Engineer:

- a) 43 Grade Ordinary Portland cement conforming to IS:8112;
- b) 53 Grade Ordinary Portland cement conforming to IS: 12269;
- c) Rapid hardening Ordinary Portland cement conforming to IS: 8041;
- d) High strength Portland Cement conforming to IRS: T:40;
- e) Portland slag cement conforming to IS: 455 (See Note 1 & 4 below)
- f) Portland pozzolana cement conforming to IS:1489 (See Note 2 & 4 below)
- g) Sulphate resistance cement conforming to IS: 12330 (See Note 3 below)

Note 1:

Portland slag cement conforming to IS: 455 may be used for pre-stressed concrete work, provided slag content in cement is not more than 50%.

Note 2:

Portland Pozzolana cement shall not be used for RCC & PSC works. Portland pozzalana cement can be used only for foundation concrete and concrete works in bridge substructures where reinforcement is not provided for structural strength or reinforcement provided is only nominal for temperature stresses etc. When Portland pozzolana cement is used, supporting form work shall not be removed till concrete attains at least 75% of the design strength.

Note 3:

The sulphate resisting cement conforming to IS: 12330 shall be used only in such conditions where the concrete is exposed to the risk of excessive sulphate attack e.g. concrete in contact with soil or ground water containing excessive amount of sulphate. It shall not be used under such conditions where concrete is exposed to risk of excessive chlorides and sulphate attack both.

Note 4:

The rate of development of strength is slow in case of blended cement i.e. Portland pozzolana cement and Portland slag cement, as compared to ordinary Portland cement. This aspect should be taken care while planning to use blended cement. Accordingly stage of pre- stressing period of removal of form work and period of curing etc should be suitably increased.

Cement to be used on the works should be procured from the main cement plants or from their authorized dealers and each consignment shall be covered with manufacturer's test certificate.

Cement bags in packings should bear the following information in legible markings:

Manufacturer's name, registered trade mark of manufacturer, if any.

- 1) Type of cement.
- 2) Weight of each bag in kgs or number of bags/tonne.
- 3) Date of manufacture, generally marked as week of the year/year of manufacture. Example: 15/03 which means 15th week of 2003.

- 4) Tests on cement will be conducted as per IS 4031. Some of the tests which may be carried out are:

Tests on cement will be conducted as per IS 4031. Some of the tests which may be carried out are:

- 1) Compressive strength
- 2) Initial & final setting time
- 3) Consistency

The cement shall be used within 3 months of manufacture. The decision of the Engineer incharge as to whether the cement is fit for use in the work shall be final and binding on the contractor. For M 20 and higher mix of cement concrete, quantity of cement will be based on the design mix. For concreting under water 10% extra quantity shall be added and allowed towards extra consumption.

The cement consumption of the works which are not based on design mix shall be as per the 'Cement Schedule' and as per the 'Specifications for materials and works 1969' of Southern Railway.

iv) **Steel:-**

The reinforcement shall be any of the following with the prior approval of Engineer:

- a) Grade I mild steel and medium tensile steel bars conforming to IS: 432 (Part I);
- b) High strength deformed steel bars conforming to IS: 1786;
- c) Thermo mechanically treated (TMT) bars satisfying requirements of IS:1786;
- d) Rolled steel made from structural steel conforming to IS: 2062 Gr A and Gr B.

Steel shall be procured from the main producer such as SAIL, TISCO, IISO, TINL-VSP or authorized stock yards. Re-rolled steel will not be accepted. Each batch of steel shall be covered with manufacturer's test certificate.

The weight of the steel (reinforcement) will be calculated from the nominal or actual unit weight whichever is less.

Binding wires used for binding/fixing reinforcement shall be galvanized iron wires. The contractor should make his own arrangements for the required binding wire for all RCC works including the works under USSOR 2011 items though it is mentioned otherwise in the USSOR 2011 rates.

In addition to test certificate produced by the tenderer/contractor, Railway may draw samples and send for testing independently at Railway's own laboratory or through outside agencies, cost of which shall be borne by the contractor. The decision of the Engineer as to the necessity of such test shall be final and binding on the contractor.

v) **Aggregate:-**

The aggregate shall conform to IS: 383 and shall before use be tested through one of the approved testing institutions and the result submitted in accordance with Appendix A of IS 383.

Coarse aggregate shall be crushed stone, angular in shape and gravel shall not be used.

Fine aggregates shall be resulting from natural disintegration of rock which has been deposited by streams or glacial agencies.

vi) **Water:-**

Water to be used in making and for curing concrete shall conform to IS: 456.

The contractor shall arrange for water supply necessary for the work. Ordinarily no water will be supplied by Railways to the Contractor either for drinking purpose or for execution of the work and the rate quoted shall include the cost of arranging water supply.

However if surplus water is available from near by Railway source, contractor may be allowed to draw water for his work on payment of necessary water charges as fixed by railway administration. Necessary arrangement of drawl of water by pumping, laying of pipe line and storage arrangement etc shall be done by contractor at his cost.

vii) **Form Work:-**

Form work shall conform to the shapes, lines and dimensions shown in the drawings and shall be so constructed and supported as to remain sufficiently rigid and water tight to prevent loss of mortar and water from the concrete and shall be able to carry all the loads and forces during the casting as well as later.

For important works steel shuttering with tubular steel centering shall be used in accordance with the manufacturer's/designer's instructions.

All panel joints, corners and seams should be made water tight by using approved sealing materials. Also the steel form should be thoroughly cleaned before use.

Form faces should be treated with releasing agent to prevent concrete sticking to the forms and thereby aid in stripping. Only approved type of releasing agent with prior permission of the Engineer incharge shall be used. Use of black oil or grease is totally prohibited.

Ample access should be provided within the form work for proper cleaning up, placement, consolidation and inspection of concrete.

viii) **Construction joints:**

The surface of the construction joints should be cleaned properly and prepared so as to ensure adequate bond with the concrete placed below or adjacent to it and to obtain the required water tightness. Any approved method of cleaning for removal of laitance, bleed water and fines by using wire brush, water jetting, green cutting, sand blasting may be used with the prior approval of the Engineer incharge.

ix) **Concrete:**

The concrete shall be produced and laid in the manner as given in IRS Concrete Bridge Code 1997 (Second Revision) for General Bridge construction corrected upto date and IS 486.

The concrete shall be of controlled quality with nominal maximum size of coarse aggregate limited to 20 mm unless specified otherwise in the schedule.

Batching of different ingredients for production of concrete shall be done by weight only. A modern, mechanized or automatic weigh batcher shall be used for the weighing aggregates and cement. The weigh batch shall have accuracy of + 3%. Modern high speed mixer or any other mixer approved by the Engineer shall be used for mixing concrete. The concrete shall be consolidated by means of vibration with approved type needle/form/surface vibrators.

The contractor should submit concrete mix design before starting the work and obtain the approval by Engineer incharge before the execution of work. In case source of cement/type change a new mix design shall be submitted for approval.

The minimum grade of plain cement concrete shall be M 20 and that of Reinforcement and cement concrete shall be M25 unless specified otherwise in the tender schedule. Only approved design mix shall be used for the concrete.

The minimum grade of concrete shall be M-40 for pre tensioned pre-stressed concrete structure.

The minimum quantity of cement to be used for various grades of concrete shall be as under:

M 20 350 kgs/cum ]

M 25 400 kgs/cum ] with 43 grade cement

M 30 420 kgs/cum ]

x) **Maximum water cement ratio:**

The limits for maximum water cement ratio for design mix shall be based on environmental conditions as per extant Railway Board's instructions. The limits for maximum water cement ratio for different environmental conditions shall be as under:

Environment	Maximum water -cement ratio		
	Plain concrete (PCC)	Reinforced concrete (RCC)	Prestressed concrete (PSC)
Mild	0.55	0.45	0.40
Moderate	0.50	0.40	0.40
Severe	0.45	0.40	0.40
Very severe	0.45	0.38	0.35
Extreme	0.40	0.35	0.35

Samples from fresh concrete shall be drawn as required in IRS Concrete Bridge Code 1997. The test cubes should be cast at regular intervals and tested to assess the strength of concrete. The contractor should establish cube testing equipment at or near



the site of work. The cost of casting of cubes and their testing will have to be borne by the contractor. In case the contractor desires to use a curing membrane instead of water curing, he may do so after submitting the necessary data and after the same is approved by the Engineer incharge. For curing/vibrating the concrete at different heights and the contractor should make his own arrangements for the provision of necessary staging/scaffolding etc and carry out curing/vibrating at all levels as directed by the Engineer incharge.

If curing is not being done to satisfactory standard, the Engineer may get it done at the contractor's cost without any notice to him as the curing cannot wait for any such notice time, etc. The Engineer's decision shall be final and binding as to whether satisfactory curing is being done or not.

**xi) Ready Mixed Concrete (RMC):**

**(To be mandatorily used if the concrete volume is more than 6 cum)**

Concrete produced by completely mixing cement, aggregates, admixtures, if any, and water at a Central Batching and Mixing ac and delivered in fresh condition at site of construction.

Ready Mixed concrete may be used, wherever required. It shall conform to the specifications of concrete, as laid down in IRS Bridge Code, IS: 4926 (Specification for Ready Mixed Concrete) may be referred.

Re-tempering with concrete: Under any circumstances, re-tempering i.e. addition of water after initial mixing, shall not be allowed, as it may affect the strength and other properties of concrete.

**xii) Time period for delivery of concrete:**

The concrete shall be delivered completely to the site of work within 1 ½ Hr (when the atmospheric temperature is above 20 degree C) and within 2 Hrs (when the atmospheric temperature is at or below 20 degree C) of adding the mixing water to the dry mix of cement and aggregate or adding the cement to the aggregate, whichever is earlier. In case, location of site of construction is such that this period is concerned inadequate, increased time period may be specified provided that properties of concrete have been tested after lapse of the proposed delivery period at the time of finalizing mix design.

**xiii) Transportation of ready mixed concrete:**

The ready mixed concrete shall be transported in concrete transit agitators conforming to IS: 5892 (Specification for concrete transit mixers and agitators). Agitating speed of the agitators during transit shall not be less than 2 revolution per minute nor more than 6 revolution per minute.

Any excess quantity of cement and steel left over after completion of the work will have to be disposed of by the contractor and cannot be taken over by the Railway.

- i. Supplying and filling m-sand in plinth and under floors including watering, ramming, consolidating and dressing complete.
- ii. Inside 12 mm cement plaster of mix -1:6 (1 cement : 6 m-sand) to be provided.

- iii. Cement plaster to ceiling of mix - 6mm thick 1:3 (1 cement : 3 m-sand) to be provided.
- iv. Outside 18mm cement plaster in two coats under layer 12mm thick cement plaster 1:5 (1 cement : 5 coarse sand) finished with a top layer 6mm thick cement plaster 1:6 (1 cement : 6 fine sand) to be provided.
- v. For outside, Finishing walls shall be provided with water proofing cement paint of required shade two or more coats @ 3.84 kg/10 sqm.
- vi. For inside, Distempering with oil bound washable distemper of approved brand and manufacture to give an even shade - New work (two or more coats of distemper) over and including priming coat with distemper primer. Distemper or better.
- vii. Providing and laying in position cement concrete of specified proportion upto plinth level : 1:3:6 (1 cement : 3 sand : 6 graded stone aggregate 40mm nominal size)

## **6.2 Electrical/General works:**

**Scope:** Concealed Electrical wiring at the huts as directed by the Railway Engineer, Provision of All Electrical Fittings (Lights, Fans, Exhaust Fans, AC etc.), and any other connected works which are necessary.

### **6.2.1 Requirement Details:**

- a) Provision of electrical fitting as per approved design but not limited to ceiling fans (1400 mm sweep), exhaust fan and required number of Lights inside & outside (LUX shall be not less than 500) with MCB protection arrangements as Electrical layout plan for Double Line section. Electrical wiring shall be concealed. All materials used shall be energy efficient and of reputed make such as Havells, Phillips, Surya etc. and as per extant practice of SR.
- b) Compliance to statutory regulations: - The work shall conform to the following Acts, Rules and Codes as applicable:-
  - i) Indian Electricity Rules.
  - ii) National Building Code.
  - iii) National Electrical Code 1985.
- c) The work shall be carried out generally in conformity with ISS latest edition amended/ modified wherever specified and also in conformity with the Regulations for tender and contract conditions or tender, Tender agreement form.
- d) Workmanship: - Good workmanship is an essential requirement of this Contract. No substandard work or incomplete work will be accepted. The work shall be carried out under the direct supervision of persons holding certificates of competency issued by the State Government.
- e) Power Supply: No electric power will be supplied by the Railways for the Contractor to carry out his work. The Contractor if so desires to have temporary power supply

for his work, he may apply for the same to the Sr. Divisional Electrical Engineer/Southern Railway/ Chennai Division and if feasible supply may be made available on terms applicable as for outsiders. The Contractor has to bear all the incidental charges.

- f) The contractor shall have to submit a laid route diagram for conduit/wiring/switch board layout in original tracing, preferably made in “CAD”. The tenderer shall also make available a soft copy of the same in a External HDD/Pen drive as directed by Section Engineer.
- g) The contractor shall submit general arrangement Drawing for LT switchboard if any while execution, for the approval from competent authority.
- h) The Contractor should submit Insulation Resistance value and Earth Resistance value after completion of the work.
- i) Disaster Management over Indian Railways: - Please note that in case of any accidents/ natural calamities involving human lives, the vehicles and equipment of Contractors shall be drafted by the Railway administration on payment basis. Hence the Contractor shall also furnish the details of vehicles and equipments available with them to enable the Railway administration to utilize the same during any accidents/natural calamities involving human lives (Reference: - Railway Board Letter No. 2003/Elect (G)/113/4 Dated 08.08.2003 issued vide CEE/MAS Letter No. E.252/P/Vol. XII Dated 18/20.08.2003 – (M/E.61/II/P/Vol. III).
- j) Guarantee/Warranty Clause:-The Contractor should guarantee that the said goods/stores/articles would continue to conform to the description and quality as aforesaid, for a period of 60 months for LED fixtures & BLDC fan and 12 months for all remaining items from the date of taking over as above by the Railways and this warranty shall survive notwithstanding the fact that the goods/stores/articles may have been inspected, accepted and payment therefore made by the purchaser (Reference: CEE/MAS letter no.E.252/P/Vol.XIV dated 17/20.02.2006-(M/E.61/II/P/Vol.IV)).
- k) Inspection: All equipment/materials to be supplied by the Contractor may at the discretion of the Engineer-in-charge be subject to inspection by the Engineer or his representatives at the manufacturers factory before dispatch and the Railways shall have free access for such an inspection being carried out. All expenditure in connection with the inspection by the Railways shall be borne by the tenderer/Contractor. However, the inspection carried out and the certificate issued thereof on delivery at site will be final.
- l) For materials of purchase value Rs.5 lakhs and above, inspection shall be done by third party i.e. M/s.RITES and all expenditure in connection with the inspection shall be borne by the tenderer/Contractor.

- m) For ISI marked products, if the order is placed on ISI certified manufacturers, the materials can be accepted on firm's WTC. (Ref: Railway Board Letter No.2017/Trans/01/Policy/Pt-S dated 16.08.2018)
- n) Tests:- Necessary tests either at manufacturing end or elsewhere, during any stage of manufacture as is required to be carried out in conformance with, applicable latest revision of Indian Standard or equivalent standards so as to satisfy itself with meeting the requirements, shall be done if demanded by Railway administration, in presence of the Authority Engineer of Railway administration or his nominated representative, and all costs towards the same shall be borne by the contractor. The right of acceptance of the rightness of the test condition, facilities, parameters, results etc., shall rest with Railway administration. Railways shall also reserve the right to insist carrying out the tests, though already carried out earlier, in presence of its Engineers. In addition to the above tests, all tests which are considered necessary for ensuring quality of Transformers/ACB switch gears/LT Switch Gears/ Measuring Instruments and/or associated components shall also be done by the contractor and or shall be supplemented with test certificates issued at source. The contractor shall along with the equipment supply copies of test certificates in original for reference and record. The contractor shall bear all the expenses incidental to inspection
- o) CLEARANCE FROM ELECTRICAL INSPECTOR:- The Contractor shall provide all as laid/as erected Drawings general arrangement Drawing (in original tracing preferably made in 'CAD') and other details such data obtained during type and routine tests, authenticated copy of type certificate and original certificate of routine test clearly indicating the Serial Number of equipment/accessories. Any modification/alteration/ corrections pointed out by the Electrical Inspector shall be carried out both at site as well as in Drawing. A soft copy of the Drawings in a CD/DVD/Pen drive shall also be supplied.
- p) List of approved make of materials
- (i) MCCB: SCHNEIDER/ ABB/SIEMENS/ Legrand/L&T
  - (ii) LT XLPE Cables/ wires: CCI/NICCO/Finolex/Havells/KEI/Polycab
  - (iii) Multi-function meter: L & T/AE/ENERON/TRINITY/Schneider
  - (iv) Ammeter (Digital): L&T/AE/ENERON/TRINITY/Cozerv/Schneider/ Secure/ Rishab
  - (v) Current Transformer: AE/KAPPA/INDCOIL/Crompton
  - (vi) Indication lamps: L&T/TEKNIC/Schneider/ Siemens/ ABB/L&T
  - (vii) MCB: Schneider/Siemens/ Legrand/L&T
  - (viii) Wires: KEI/Finolex / Polycab / CCI/ Havells/ L&T
  - (ix) Selector switches: Kaycee / Siemens / L & T
- i. Note:
  - ii. Apart from the makes/brands indicated above, Railway also reserves the right to accept any other reputed makes based on technical suitability. All materials/ fittings/ appliances etc used in electrical installations shall confirm to BIS Specifications

### **6.2.2 Earthing Arrangement**

- (a) The earthing arrangement shall be done as per Drawing EL/P/TYPE-1022
- (b) The earthing arrangement shall be generally as per IS: 3043 latest
- (c) The earthing arrangements proposed is meant for LT earthing at huts.
- (d) All the earthing installations shall be tested as per IE Rules updated for compliance to the following value:-
  - (i) Individual Resistance: not more than 8 ohms.
  - (ii) Combined Resistance: less than 2 ohms
- (e) The above values shall be obtained irrespective of the nature of soil. However if the soil requires treatment the same shall be done by the contractor at no extra cost.
- (f) The scope includes provision of new earthing installations, leading of earth wire and terminating at distribution boards or elsewhere as to be indicated by site engineer.
  - (i) Note: - When the earthing arrangements are proposed under the work of rewiring and (or) work involving provision of earthing arrangements in lieu of existing / damaged/ corroded / ineffective earthing, then the scope of work shall also include releasing existing / damaged / corroded / ineffective earth electrodes, at least up to the portion protruding above ground level. Similarly, the existing GI earth continuity wires shall also be removed to the maximum length visible to the naked eye.

#### **6.2.2.1 Special conditions for wiring/rewiring**

- (a) Wiring shall be carried out with single core, PVC insulated cables with Copper conductors. The cables proposed to be used are of the flexible type unless otherwise as specifically indicated in the Schedule of Work of appropriate voltage grade and other specifications as indicated in this specification.
- (b) The attention of the contractor is invited with regard to spurious makes of cable sold in the market. If at any time the cable used were found to be spurious, the work has to be redone by the contractor at his own cost duly removing the spurious materials.

#### **System of wiring:**

- i. The system of wiring shall be that separate phase and neutral wire shall be taken for each circuit from the main control board/distribution fuse board. Similarly, from the control board to each and every light point/fan point/plug point, separate phase and neutral wires shall be taken.
- ii. Where more than one control board is to be connected in any one circuit the supply can be taken from one control board to the other by taking separate

phase and neutral wires (and earth continuity connections) or from the main control board/distribution fuse board through separate phase and neutral wires for each control board. Looping of neutral and earth wires are not permitted.

- iii. Suitable Porcelain/Bakelite connector shall be used for this purpose in the main control board for termination of phase and neutral wires controlling the light points, fan points and other control boards. No jointing or twisting of wires is permitted either inside the control boards or anywhere else outside.
- iv. **Layout of the wiring:** Power circuits, if any shall be kept separate and distinct from the light and fan circuits. The wiring shall be done in such a way to facilitate easy inspection. The wiring shall be carried out in an approved manner satisfying the relevant IS specifications, code of practice available and the additional specifications, applicable for conduit wiring system included
- v. No joints shall be permitted in the wiring. If any jointing of cables is found to have been carried out in the PVC pipe wiring subsequently a penalty of Rs.500/- per joint will be levied and deducted. In addition, the contractor has to redo the portion of the wiring found to have been carried out with jointing at his own cost to an acceptable standard.
- vi. No power will be supplied by the Railways for the contractor to carry out his work. If he desires to have temporary supply for his works, he may apply for the same to the Sr. Divisional Electrical Engineer/ Chennai Division and if feasible, supply may be made available on terms applicable as for outsiders. The contractor has to bear all the costs.
- vii. Necessary earth continuity connection shall be provided keeping in mind the maintenance requirements, safety etc. In addition to the above earth connection the contractor is required to have a separate earth pit and earth connection as detailed in the schedule of work. Power supply and the suppliers earth connections on the MDB will be terminated by the Railways as per site feasibility.
- viii. Type and size of PVC pipes, all PVC pipes shall be in conformity to IS: 9537 Part 3. No PVC pipes not less than 20 mm dia shall be used in wiring PVC pipes, heavy duty with wall thickness not less than 2.0 mm, suitable for taking electrical cables, electrical wiring smooth inside and outside shall only be used. PVC pipe of appropriate sizes should be used for wiring. Provision should be available for taking additional cables of similar type for future use. The route of the piping should be properly planned to have minimum number of bends, change of direction etc. in addition to achieving neatness of wiring. The number of insulated cables that can be drawn into PVC pipe should be as per Table III of ISS: 732-1963 amended suitably for the size and type of

cable proposed to be used. The main consideration is the easiness in putting the cables through at the time of rewiring. PVC pipe shall be joined by means of PVC coupling. In long distance straight runs, inspection type couplers shall be provided at reasonable intervals. IVORY coloured conduit shall only be used. The paint/distemper of the wall shall also be applied to the conduit and clamps so that they do not appear conspicuous. All the conduit accessories such as bends, couplings, inspection boxes etc., shall be of the same colour as that of the conduit.

- ix. Fixing conduits for concealed wiring: -
  - a. As far as practicable, the PVC pipes shall be laid on the ceiling direct from the control point to the actual location of point so that minimum number of bends, tees, junction boxes etc. only are provided since junction boxes/Tee bends cause problems at a later date for rewiring.
  - b. The PVC pipes shall be laid over the reinforced and tied on to them by means of GI binding wire. This shall be carried out in such a way to avoid disturbance to the reinforcement work.
  - c. Suitable concealing type PVC junction boxes shall be used for junction boxes etc. so that the exposed surface of the deep boxes is in alignment with the surface of the ceiling.
  - d. Please note that as per the specification mentioned vide para no. 4.1 the wiring shall be with a pair of cable for each point taken from the switch board to the point for phase and neutral. Then the size of PVC conduits shall be appropriately designed for this purpose. (Please note that "Looping in" system shall not be adopted for this).
- x. Recessed PVC conduits wiring system shall comply with all the requirements for surface PVC wiring system specified above. The chase made in the wall shall be neatly made and be amply dimensioned to permit the PVC pipe to be fixed in the manner desired.
- xi. In the case of buildings under construction, chase shall be provided in the wall- ceiling etc. at the time of the construction and shall be fitted up neatly after erection of conduits and brought to the original finish of the wall. The pipe shall be fixed by means of saddle not more than 60 cm apart. Fixing of standard bends of elbows shall be avoided as far as practicable and all curves maintained by bending the pipe itself with a long radius, which will permit easy drawing of conductors. Suitable inspection boxes shall be provided to permit periodical inspection and to facilitate removal of wires, if necessary. These shall be mounted flush with the wall suitable ventilating holes shall be provided in the inspection box covers.

All the outlets such as switches and wall sockets shall be of surface mounting type only. Heat may be used to soften the pipe for bending and forming joints in case of plain conduits. The PVC pipe is to be bent to shape by the heating

projects for leading in and out from the sheet steel and TW boards and shall be fixed rigidly by a saddle clamp inside the boxes.

- xii. Fixing of ceiling rose for fans: - At the fan point, ceiling rose shall be provided as near to the fan hook as practicable. Wiring to the fan terminals from the ceiling rose shall be done by three-core flexible pendant chord of size 23/0.0076 (Minimum).
  - xiii. Fixing of Exhaust fan: - The exhaust fan shall be fixed on the walls with sufficiently long MS bolts of 3/8" / 1/2" as required embedded inside the wall for 3" with gripping MS flats welded with bolt head.
  - xiv. On completion of the wiring work, necessary tests will be conducted to certify the correctness of the work carried out by the contractor, which shall cover broadly the following: -
    - i) Insulation strength from conductor to earth.
    - ii) Earth resistance of earth pits and effectiveness of the earthing provided.
- The reading should be recorded jointly and submitted to this office.
- xv. Fans shall be installed such that the bottom of the fan body is generally at a height of 9' (maximum) from floor level. The length of down rods required should be assessed.
  - xvi. The contractor should indicate the makers/manufacturers name etc. in respect of the materials proposed to be supplied and used by him, and for all fabricated items to be supplied by the contractor, he may take prior approval before erection of the same.
  - xvii. Layout of Electrical installations showing the control boards, distribution boards, light, fan and plugs to be provided are to be decided at site by Section in charge to suit site conditions.
  - xviii. The wiring to be done under this contract will be in close proximity to the wiring already existing. Hence, special case shall be exercised while rewiring is done not only to avoid damage to the existing wiring but also to ensure continuity of power supply. The old wiring shall be dismantled only after completion of the new wiring and energising. The tenderer shall ensure shutting down the supply before commencing the work at site.
  - xix. The walls/ceilings opened or damaged in the course of this work shall be plastered neatly. This shall include the wall surface from where wooden plugs are removed consequent to the removal of the wiring to the satisfaction of the site engineer. The portions of wall replastered shall also be white or colour washed to bring these portions in good condition as had been before rewiring.



- xx. Two numbers of 1-Ton 5-star high-wall split inverter AC units with mounting stand (Make - Voltas/O-General/Mitsubishi/Hitachi or better) with minimum 1 year warranty on product, 5 years for PCB and Compressor shall be provided at each Hut..
- xxi. Necessary openings required on the wooden board shall be made suitably to terminate the existing PVC pipe inside the wooden boards and properly rewired by clamps/saddles indicated in the specification. The PVC cable and earth continuity wire for the fan point wiring shall be terminated inside the new seasoned wooden board and properly connected up.

Note:-

1. All MCB DBs, Switch fuse units shall be sheet steel enclosed duly painted or phosphated or powder coated.
2. This specification is general in nature. The applicability of the various Para will depend on the nature & scope of work. However, the decision on the applicability shall rest with Railway.
3. Important: - The tenderer shall note that all the conduits/capping and casing shall be given adequate number of coats of white/colour wash after completion of all the works so as to blend the same with the colour of interiors of the respective rooms.
4. All switches / Switch boards / Metering boards shall be paint marked / stencilled with controlled circuits / loads. Alternatively, aesthetically designed stickers shall also be used.
5. All the terminations in the switches / MCBs including the internal wiring in the MCB DBs shall only be with suitable type and size of crimping sockets. The material of the shoe namely copper or aluminium shall be based on the material of wire / cable. A rough sketch indicating the method of cable termination at MCB is enclosed for general guidelines. In addition, proper connection must be made using good quality spring and flat washers of appropriate size. The sockets / shoes for termination into MCBs shall be of insulated / sleeve type.

### **6.3 Technical Details**

#### **6.3.1 LED Luminaire**

##### **a) Technical Requirements of LEDs**

100 Lumens/watt for luminaire wattage up to 45 Watts 120lumens/watt >45 watt @ 350mA drive current. In respect of LEDs of higher power rating. Drive current greater than 350mA can be accepted if the LED's LM-80/IS:16105 test report supports them. LEDs shall be SMD type only. Proof of procurement of LED to be submitted and it should not be more than 6 months old.

##### **b) LED Make**

NICHIA/OSRAM/SEOUL/PHILIPS/LUMILEDS/CREE and LEDNIUM

##### **c) Life Span**

L-70 reported life span of LEDs used in the luminaire shall be greater than 50,000 hrs. at the soldering point temperature of 85°C at the

- luminaire driving current (TM-21 extrapolation of the LED manufacturer shall be submitted in support of life
- d) View angle
  - 120 degrees (Data sheet to be supported)
- e) Colour Temperature
  - White colour LED shall be 5700K as per ANSI standard C78.377A
- f) Colour Rendering Index
  - $\geq 65$  (Data sheet to be supported)
- g) Safety norms
  - LED shall comply with photo biological safety norms as per IEC 62471/EN 62471/ IS:16108. Test certificate of accredited international / national laboratory shall be submitted
- h) Test report
  - LM80/IS:16105 test report of specific LED at the soldering point temperature of 85°C for the drive current at which the LEDs shall be driven shall be submitted.

### 6.3.2 Technical Requirements of Driver

- a) Efficiency
  - 85% minimum for power output  $\leq 100$  Watts, and 90% for power output  $> 100$  Watts
- b) Total Harmonic distortion
  - Less than 20% at full load
- c) Power Factor of complete fitting
  - Greater than 0.9
- d) Input Operating Voltage with in- built high & low voltage cut off
  - 140V — 277V AC ( Cut Off in built - 140v for Low & cutoff inbuilt 277v for High)
- e) Protection
  - Short Circuit & Over Load Protection.
- f) Surge protection standard
  - Minimum 3kV maximum 4 kV. The surge protection device (SPD) should be fail safe ( ie, without leading to fire hazard ) SPD failed status should be clearly visible through a flag/ indication
- g) Potting of LED Driver
  - Mandatory for driver output  $> 50$  Watts
- h) EMI/ EMC compliance
  - Test certificate of NABL accredited laboratory is to be submitted in support of compliance to the following EMI/ EMC standards: (a) CISPR 15/ IS: 6573, (b) IEC: 61547  
(reference standards are listed as follows) -IEC 61000-4-2/ IS:14700 Part 3: Sec 2 - IEC 61000-4-3 - IEC 61000-4-4/ IS:14700 Part 3: Sec 4 - IEC 61000-4-5 3 kV {or 4 kV if so offered by the contractor} - IEC 61000-4-6 - IEC 61000-4-11/ IS:14700 Part 3: Sec 11, (c) IEC: 61000-3-2 (Class C)/ IS:1534 Part 1, (d) IEC: 61000-3-3/ IS 14700: Part 3: Sec.2.
- i) Safety requirement

- Driver shall comply the safety requirements laid down in IEC: 61347-2-13/ EN: 61347-2-13/ IS: 15885-2-13. Test certificate of NABL accredited laboratory shall be submitted in respect of the offered model/ rating.
- j) Performance requirement  
Driver shall also comply the performance requirements as per IEC: 62384/ IS: 16104. Test certificate of NABL accredited laboratory shall be submitted in respect of the offered model/rating
  - k) Lumen efficacy (min)  
80 lumens / watt for  $\leq 45W$ , 90 lumens /watt for  $> 45 W$
  - l) Secondary Lens/Optics  
The luminaire must have secondary lens /optics. The material of lens. should preferably be PMMA ( Poly Methyl Methacrylate)
  - m) Cover type  
Toughened Glass or UV stabilized Polycarbonate
  - n) Life of the LED product as per LM79  
Maintenance of Lumen output — 50,000 hours
  - o) Insulation class  
CLASS — 1
  - p) Temperature rise test  
Soldering point temperature of LED must be  $\leq 85$  Deg C. (Test certificate from NABL accredited labs to be supported)
  - q) Housing protection  
IP-65. Test certificate of NABL accredited laboratory to be submitted for the luminaire model / rating offered
  - r) Safety requirement  
The luminaire shall comply IEC 60598-1 /IS;10322 Part-1. IEC60598-2-3 /IS;10322 Part-5 Sec.3. Test certificate of NABL accredited laboratory shall be submitted for the luminarie model / rating offered
  - s) Housing of Luminarie  
Pressure die cast LM/ADC12/LM24 housing
  - t) Impact resistance  
IK 05
  - u) Tests report  
Manufacturer shall submit the LM-79/IS:16106 test report from NABL accredited laboratory. The manufacturer shall submit a declaration that the luminarie submitted for LM79 testing was equipped with the LED driver now being offered.
  - v) Acceptance test  
Acceptance testing shall be carried out by the purchaser or his representative or by any agency deputed by the purchaser on his behalf. Following will be the list of acceptance tests: as per RDSO Doc. No. RDSO/EM/ LED Norm/ 01 Ver: 1.0 Date: 18.09.2014 Prev. Ver: None. (i) visual check (ii) Checking of luminaire model/ rating from the LM79/IS;16106 test clearance report (iii) 10% of the luminaires should be randomly picked and opened up to check if the LED Driver model/rating is the same as was cleared during LM-79/ IS;16106 test report. (iv) Checking of documents of purchase of LED; (v) Insulation resistance test of luminarie (vi) Electric strength test of luminaire (vii) Verification of Luminaire nominal system wattage (LED + Driver); (viii) Power factor of drive (ix) Driver Efficiency (x) Driver THD (xi) Low/High voltage cut off of driver (xii) Power supply to the LED PCB is to be through proper connector.

w) **Guarantee/ Warranty**

The Supplier shall guarantee satisfactory performance and manufacturing defects of the LED light fittings for a period of 60 months from the date of commissioning or 72 months from the date of supply whichever is earlier.

**6.3.3 BLDC Ceiling fan:-**

**Parameter & Values**

- (a) Item: BEE 5 Star rated energy efficient ceiling fan
- (b) Type of Motor: BLDC (Brushless DC)
- (c) Sweep: 1200MM
- (d) IS Rating: As per IS 374/2019
- (e) Air Delivery: Minimum 220 CMM
- (f) Power Consumption: Maximum 27W to 35W
- (g) Total Harmonic Distortion: <5% (THD)
- (h) Power Factor: >0.98
- (i) Minimum Speed: 350 RPM
- (j) Input Voltage: 140V to 285V
- (k) Body: Powder coated Aluminum body
- (l) No of Blades: 3
- (m) Accessories: Down rod, Shackles, Canopies
- (n) Speed Control: Remote Control
- (o) Colour: White/Ivory/Matt Brown
- (p) Warranty: 60 Months
- (q) Acceptable Makes: Superfan, Bajaj, Usha, Orient, Crompton, Havells, Atomberg.

**6.3.4 LED tube light 18/20 W :-**

- (a) Self-ballasted LED tube light, having system wattage between 18W to 20W with available lumen output of minimum 120 lumens per watt(lm/W).
- (b) System wattage: 18W to 20W
- (c) Operating voltage Range: 150-270V Frequency(Hz): 50Hz  $\pm$  5%
- (d) Power Factor: >0.9
- (e) Beam Angle: Minimum 120 deg.
- (f) LED lamp efficacy(lm/W): Minimum 120 lumen/watt
- (g) Lumen: 80% up to 35000 burning hours
- (h) Lumen Maintenance factor: Initial lumens specified at Ta 25° in the Data of LED mfg. should not drop more than 10% at Tj 85°
- (i) Colour Temperature(K): 5600-6500°K
- (j) Operating temperature (deg C): 0°C to 45° C CRI: >80
- (k) THD(%):  $\leq$ 10
- (l) Protection: Surge Protection upto 2.5kV
- (m) Efficiency(%): >90
- (n) Ingres Protection: IP 20 or above
- (o) Life expectancy: Minimum 25000Hrs
- (p) Warranty: 60 months from the date of commissioning or 72 months from the date of supply whichever is earlier.

- (q) Type Testing: Valid type test certificates from Government (NABL) accredited labs for total lumens measurement, Electrical parameters measurement as per IS-16106-2012& IES LM-79-80
- (r) BEE Star Rating: 5 star rating
- (s) Conformity to ISS: Availability of test report to IS 16102 part 1 and IS 16102-part II latest
- (t) Registration CRS: Standard mark for CRS to be marked on the LED lighting.

### **6.3 TRD Works**

AT provision in connection with provision of KAVACH work in JTJ-ED section in salem division.

#### **6.3.1 Requirement Details**

- i) Materials shall be procured from RDSO/CORE approved suppliers only as advised by the purchase engineer
- ii) All the materials need to be supplied by the contractor to complete the work. The materials to be supplied by the contractor against various items should be conforming to RDSO's latest specifications and drawing.
- iii) The contractor has to carry out works under power block as per site engineer instruction.
- iv) All the materials supplied by the purchaser (if any) will be made available at their depot and the same are to be transported by the contractor. Necessary tools, welding machine, pulling and lifting machines Etc. required for erection and adjustment shall be arranged by the contractor
- v) This work involves.
  - a. Supply and erection of fabricated steel works (SPS), 9 tonne cut insulator and 25 KV post insulator.
  - b. Supply and erection of copper jumper, structure bond, longitudinal bond, transverse and special bond, Earth electrode, 25 KV drop out fuse switch, Anti climbing device etc.
  - c. Supply and laying of 70 sq.mm XLPE insulated PVC sheathed Aluminium cable.
  - d. Supply and erection of 10 KVA, 25 KV/240V single phase 50 HZ, oil filled Auxillary transformer.
  - e. Supply and erection of LT control board for AT location
  - f. Supply and erection portion of provision of SMC type fuse box with 63A rewirable type porcelain fuse unit complete on the AT Masts.
  - g. Supply and erection portion of provision of sheet iron cable link box.
  - h. AT supply to be provided with Up and Down TRD supplies as main and standby with EB from state EB supply

#### **6.3.2 Technical Details**

##### **i) Concrete For Foundation And Plinth In Hard Soil and Rocky Soil:-**

The erection rate shall cover excavation, supply and handling of all materials and accessories, temporary arrangements for excavation in hard soil and in concrete/

masonry drains/ walls requiring use of chisel and hammer in Hard soil or requiring blasting under in rocky soil shoring wherever necessary, casting concrete including frame work wherever necessary, casting concrete grouting of masts and finishing the top of concrete foundation or anchor blocks. Wherever underground cables or pipes are met with, the contractor should arrange to excavate with due care so as not to damage the U.G. cables/ Pipes and arrange for slight deviation of the U.G. cable to the extent necessary to cast foundation and protect the cables using PVC / RCC pipes of adequate thickness and length as approved by the Authority Engineer. The work also includes dismantling of all connected temporary arrangements, back filling with earth and compacting the same to the required height and width as per drawing to ensure safety of foundation, confining the exposed height of foundation block to within 10 cm and removal of spoil. The contractor shall arrange for filling up of earth around foundation where the embankment is low and enough shoulder width is not available as directed by Authority Engineer. The work shall also include diverting the tracks side drains, if any, on account of OHE mast foundation works. The Authority engineer shall certify where use of chisel and hammer or blasting has been necessary. The contractor shall arrange for supply of explosives and all tools and plants for blasting operations at his own cost.

Dowel bars in special foundations and nominal reinforcement in black cotton soil foundations will be necessary.

For all foundation works in OHE/Feeder/PSI works – M-15 concrete shall be used and for core – M – 20 concretes shall be used.

Concrete for foundation and plinth in other than hard soil and rock shall done as per Southern Railways practice

**ii) Fabricated And Galvanized Small Parts Steel Work (Sps) :-**

The work covers the of supply and erection of the above steel works including fasteners which are to be supplied by the contractor as per latest approved RDSO approved designs and drawings.

For standard fabricated steel work for which RDSO's approved drawings are available, the weight of steel work as specified in RDSO's drawing shall be considered. However, in case the unit sectional weight of any member indicated in RDSO's drawing is not in conformity with the unit sectional weight as per the latest IS specification the weight of the fabricated steel work, shall be calculated on the basis of latest IS specification. For the nonstandard fabricated steel work as per relevant drawing based on latest IS sectional weight at the time of submitting the designs for approval of the Authority Engineer. All type of Drop arm with accessories, Pedestal Insulator outrigger (with mast/structure) and feeder super (individual or on portal) mast, 3121 will only be paid under this schedule.

**iii) Structure Bond: -**

The work shall cover the supply and erection of all materials including the erection of mild steel flat required to be provided in a structure bond connecting a traction mast or structures to the nearest non-track circuited rail, or (locations other than earth wire) earth electrode, including all fasteners at both ends. Bonding should have suitable insulation sleeve in an approved manner. The work shall include shaping and drilling and painting of all materials including the bond. The work shall also include provision of heat shrinkable PVC sleeve of minimum length of 40 cm for structure bond under track circuited rail. This would also cover connections to earthing terminals of equipments, L.T. transformers with structures

and then to Rails as per relevant drawing. The rate will be per bond

**iv) 10 Kva, 25 Kv / 240 V Single Phase 50 Hz, Oil Filled Auxiliary Transformer For Railway Ac Traction System As Per Rdso's Specification No. Eti/Psi/15/(08/2003) :-**

The work shall cover erection of 10 kVA, 25 kv / 240 v Single Phase 50 Hz, oil filled Auxiliary Transformer for Railway AC Traction system as per RDSO's Specification no. ETI/PSI/15/(08/2003) LT supply transformer complete with terminal connectors on a mast or gantry. The work includes transformers mounted on steel pedestals at switching stations also. The work shall also cover supply and erection of an enameled number plate of approved design. The work shall also cover oil filtration and pre-commissioning tests as approved by the Railways if required. The contractor shall make his own arrangement for oil filtration equipments as well as power supply required for the same if required. All necessary tools, equipments instruments required for carrying out oil filtration/checks/tests for commissioning shall be arranged by the contractor

**v) 25 Kv Fuse Switch: -**

The work shall cover supply and erection of 25 kV drop out fuse switch complete with all mounting accessories and terminals connectors as required including the supply and erection of 25 kV solid core insulator. The work shall include supply and erection of small parts steel work, fuse element and mounting base channel. The D.O fuse switch of 5amps shall be provided for 100Kva/50Kva auxiliary transformers and 1 amp for 10Kva auxiliary transformers.

**vi) Anti-Climbing Device For Lt Supply Transformer Stations: -**

The work shall cover the supply and erection of ant-climbing device consisting of galvanized steel fixtures mounted on each mast below the transformer. The work shall be for each mast provided with the anti-climbing device.

**vii) SMC Type Fuse Box With 63 Amps Rewireable Type Porcelain Fuse Unit Complete On The At Masts: -**

The work shall cover supply at site, fixing, testing and commissioning of weather proof, SMC Type, 'Sintex – model' fuse box with 63 Amps re-wireable porcelain fuse unit complete with connecting the incoming PVC Insulated, multi stranded cable from A.T. to fuse terminal and similarly XLPE LTUG Cable leads duly soldered / crimped with cable shoes are also to be connected to fuse terminals. The fuse board to be fixed on the traction mast by-means of suitable M.S.Clamp of 3mm thick with required bolt, nut and washers. The clamp is to be painted with two coats of red-oxide paint and one coat of aluminium paint

**viii) Sheet Iron Cable Link Box With (1) Hylam Sheet Base, Fixing Bolts, Nuts And Washer Etc, (2) Cable Terminals With Screws (3) Flexible Copper Cable Of Size 35 Sq.Mm From Link Box To At Terminals (4) Including Removing The Existing Cable Connection Complete :-**

The work shall cover supply at site, fixing, testing and commissioning of sheet iron box for linking the existing Colour light Signal Panel terminal and the proposed 2

core 70 Sq.mm LTUG Cable complete with (1) Hylam sheet base for fixing terminals with fixing bolt, nut and washers etc, (2) Flexible, multi-stranded copper conductor PVC cable suitable for the existing MCB terminals in the CLS Panel (3) Internal wiring duly removing the existing PVC Cable connection, (4) The board shall be painted with 2 coat of paint red oxide & one coat of paint admiralty grey inside & outside. The board shall be made with supporting M.S. Channel / angles / flats etc complete. The board shall be provided in flush with the bottom end of the CLS Panel. (5) The board shall be fabricated with sheet steel of not less than 16 SWG. (6) The in-coming 70sq mm Cable leads are to be connected to the terminals with suitable cable shoes duly soldering / crimping. (7) Separate terminals for the in-coming cable and outgoing flexible cable to be provided. (8) The internal connection between the in-coming and outgoing terminals shall be by means of copper plate. (9) The fixing arrangements of the copper plate and the in- coming & outgoing connections shall be such that, the copper plate will be fixed in a permanent manner and the in-coming and the outgoing connections shall be provided on top of the copper plate with separate fixing bolt, nuts and washers on the through bolt to facilitate removal of connections without disturbing the copper plate

**ix) CLS Panel (Lt Control Board For At Location As Per Latest Rdso Specification): -**

The work shall cover supply and erection, testing, commissioning of LT control and distribution panel for colour light signaling suitable for 10KVA with automatic change over supply facility as per latest RDSO specification. The work also shall include provision of suitable cable termination box 63Amps for terminating the LT cable of AT & local EB supply and outgoing cable to signal equipment at cabin / station building. The work shall also cover provision of 16 sq.mm copper leads for connecting terminals board to the Lt Control and distribution panel. The work shall also include supply and erection of necessary cable glands, fasteners grouting bolts and clamps required for fixing / grouting of panel board

**x) 2 Core, 70 Sq.mm XLPE, PVC Sheathed ALU.Cable :-**

The work shall cover Supply and Laying of XLPE insulated PVC sheathed Aluminium conductor armored power cable of size 2 core, 70 Sq.mm as per ISS 7098 heavy duty, 1100V with IS marking for signal purpose as per latest RDSO directives. The cable shall be laid from LT signaling AT to the station building AT control panel or part thereof. The cable should be of RDSO approved make. The cable should be properly clamped on walls and GI pipe of required size and length is to be provided wherever cable is taken out from the earth to surface level. The work shall include testing connecting /jointing and commissioning of cable and it will be paid /metre length. Suitable cable indicators are to be supplied and placed at 50 metre interval in an approved manner. No intermediate joint is permitted, whatever be the length of cable used. The work shall also cover supply and erection of suitable cable glands and connectors at both ends

**xi) Cable Trench Cutting: -**

For laying of 2 cores, 70Sq.mm XLPE cable, trench to be excavated to a depth of 3 feet and suitable width. The work shall cover cable trench cutting with suitable dimensions in all kinds of soil, including rocks, concrete surface, platform etc. The work shall include re-plastering, dismantling the masonry structure if any and



reconstructing the same duly clearing the rocks, rectification of damaged platform surface etc. The cable to be laid in the RCC spun pipe of inner diameter 150mm dia 2.5 mm thickness with suitable collar confirming to NP2 class, at a depth of 3 feet for crossing culvert, drainage, roads, and track area etc. and to be covered with excavated mud. The RCC pipe joint to be covered with gunny bags and cement grouting. The mud should be kept with a heap for future settlement. The work shall inclusive of concreting of platform area to its original shape. The work shall also cover supply and spreading of coarse sand throughout the pit for a depth of 100mm above and 100 mm below the loose cable, covering with one layer of standard brick (breadth wise) above the coarse sand and refilling the pit with excavated screened soil back complete including ramming and consolidating

**xii) Single Earth Electrode: -**

The work shall cover supply and erection of an earthing station with a single pipe embedded into the ground complete with protective concrete box and lugs suitable for directly connecting two mild steel flats of minimum size 40 mm x 6 mm. The earth resistance shall be measured and stenciled in the concrete box. The concrete Box shall be, as per RDSO's Design and may not be possible to remove unless otherwise bond fasteners are removed. The work includes provision of Charcoal and Salt to a minimum size of 0.3 x 0.3 x 2.0 mts. in alternative layers irrespective of Soil Condition at Site.

**xiii) 8 SWG GI Wire for Earthing: -**

The work shall cover supply and erection of 25 mm x 6 mm copper strip to connect the earth terminals of equipments like potential transformer, lightning arrestors, LT supply transformer and booster transformers to the main mast of the gantries on which they are mounted. The work shall cover all fastenings required for fixing the copper strip along any structure member of the gantry.

Annex - II

(Schedule-D)

(See Clause 10.2.7(c))

**Time Schedule for Review of Drawings by the Authority**

S.No.	Item	Preparation	Authority's Review with Time Limit	Review by Open Line / RDSO
1	Kavach RFID Tag / TIN Layout	Contractor	Authority (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
2	Kavach Table of Control (TOC)	Contractor	Authority (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
3	Kavach Track Profile	Contractor	Authority (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
4	Kavach Interface Circuits	Contractor	Authority (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
5	Kavach RFID Tag Data	Contractor	Authority (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
6	Kavach Multiple Access Plan	Contractor	Authority (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
7	Kavach Deployment Plan	Contractor	Authority (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
8	Kavach RFID Tag / TIN Allotment Plan	Contractor	Authority (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.

S.No.	Item	Preparation	Authority's Review with Time Limit	Review by Open Line / RDSO
9	KAVACH NMS Connectivity Scheme	Contractor	Authority (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
10	Cable Route Plan	Contractor	Authority Engineer (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
11	Cable Corage Plan	Contractor	Authority Engineer (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
12	Interface and Logic Circuits for Electronic Interlocking (EI)	OEM through Contractor	Authority (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
13	Outdoor Circuits	Contractor	Authority (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
14	Equipment Disposition Plan / Floor Plan	Contractor	Authority Engineer (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
15	Datalogger / Remote Terminal Unit (RTU) Wiring and Validation Plan	Contractor	Authority Engineer (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
16	Station Working Rules (SWR)	Contractor	Authority (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
17	Kavach ISA documentation	Contractor	Authority (Days)	Remarks to be given within one month of submission and approval by Railways / RDSO to be furnished to the contractor within one month of submission of compliance of remarks by contractor.

S.No.	Item	Preparation	Authority's Review with Time Limit	Review by Open Line / RDSO
18	Statutory Sanction Documentation	Contractor	Authority (Days)	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
19	Site Plan of tower	Contractor	Authority Engineer	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.
20	Design & drawing of tower if not available	Contractor	CBE/ RDSO	Remarks to be given within one month of submission and approval by Railways to be furnished to the contractor within one month of submission of compliance of remarks by contractor.

Note: The drawings / designs which are not mentioned herein will fall under the review of Authority Engineer and the time limit thereof will be as per the terms and conditions mentioned in the Contract Document.

SCHEDULE - E  
(See Clause 3.1.6(a))

**APPLICABLE PERMITS**

**1 Applicable Permits**

1.1 The Contractor shall obtain, as required under Applicable Laws, the following Applicable Permits:

- (a) Permission of the State Government for extraction of boulders from quarry;
- (b) Permission of Village Panchayats and Pollution Control Board for installation of crushers;
- (c) Licence for use of explosives;
- (d) Permission of the State Government for drawing water from river/reservoir;
- (e) Licence from inspector of factories or other competent Authority for setting up batching plant;
- (f) Clearance of Pollution Control Board for setting up batching plant;
- (g) Clearance of Village Panchayats and Pollution Control Board for setting up asphalt plant;
- (h) Permission of Village Panchayats and State Government for borrow earth; and
- (i) Any other permits or clearances required under Applicable Laws.
- (j) WPC & SACFA clearance: The frequency of the operation for TCAS will be defined by RDSO. In order to avoid complications at later stages, the application for WPC & SACFA shall be filed by Railway so that the license remains with Railways. The Contractor shall submit all documents as desired by Railways for obtaining WPC & SACFA clearance for use of radios. The application for WPC license & SACFA Clearance will be filed and obtained by Authority at Wireless Planning Commission, Ministry of Telecommunication, New Delhi. Payment for Charges and Fees towards acquiring WPC licensee & SACFA clearance shall be made by the Railways directly. The payments made by the contractor shall be reimbursed by Railways to the contractor after obtaining license

1.2 Applicable Permits, as required, relating to environmental protection and conservation shall have been or shall be procured by the Authority in accordance with the provisions of this Agreement.

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## SCHEDULE - F

(See Clauses 7.1.1, 7.5.3 and 17.2)

### FORM OF BANK GUARANTEE

Annex-I

(See Clause 7.1.1)

#### Performance Security/ Maintenance Security

FA & CAO/CN/MS

Southern Railway,

.....

#### WHEREAS:

- (A) .....(insert name and address of the contractor) (hereinafter called the “**Contractor**”) and (insert name and address of the project authority), (hereinafter called the “**Authority**”) have entered into an agreement (hereinafter called the “**Agreement**”) for the project Provision of KAVACH (Train Collision Avoidance System) including tower in Jolarpettai to Erode Junction Section (179.29 Rkm) of Salem Division in Southern Railway on Engineering, Procurement and Construction (the “**EPC**”) basis, subject to and in accordance with the provisions of the Agreement .
- (B) The Agreement requires the Contractor to furnish a Performance Security/ Maintenance Security for due and faithful performance of its obligations, under and in accordance with the Agreement, during the {Construction Period/ Defects Liability Period/ Maintenance Period } (as defined in the Agreement) in a sum of Rs..... cr. (Rupees ..... crore) (the “**Guarantee Amount**”).
- (C) We, ..... through our branch at ..... (the “**Bank**”) have agreed to furnish this bank guarantee (*hereinafter called the “**Guarantee**”*) by way of Performance Security.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful performance of the Contractor’s obligations during the {Construction Period/ Defects Liability Period/ Maintenance Period} under and in accordance with the Agreement, and agrees and undertakes to pay to the FA&CAO/CN/MS, Southern Railway, Egmore, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of Junior Administrative Grade in Southern Railway, that the Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Agreement shall be conclusive, final and binding on the

Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfilment and/ or performance of all or any of the obligations of the Contractor contained in the Agreement or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Agreement or for the fulfilment, compliance and/or performance of all or any of the obligations of the Contractor under the Agreement.
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Guarantee shall cease to be in force and effect on \*\*\*\*<sup>s</sup>. Unless a demand or claim under this Guarantee is made in writing before expiry of the Guarantee, the Bank shall be discharged from its liabilities hereunder.

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<sup>s</sup> Insert date being 2 (two) years from the date of issuance of this Guarantee (in accordance with Clause 7.2 or clause no 7.6.4 of the Agreement).

9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

Signed and sealed this ..... day of ....., 20..... at .....

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.
- (ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.



Annex – II  
(Schedule - F)  
(See Clause 7.5.3)

**Form of Guarantee for Withdrawal of Retention Money**

FA & CAO/CN/MS

Southern Railway,

.....]

WHEREAS:

- (A) [insert name and address of the contractor] (hereinafter called the “**Contractor**”) has executed an agreement (hereinafter called the “**Agreement**”) with the [name and address of the project authority], (hereinafter called the “**Authority**”) for the project Provision of KAVACH (Train Collision Avoidance System) including tower in Jolarpettai to Erode Junction Section (179.29 Rkm) of Salem Division in Southern Railway on Engineering, Procurement and Construction (the “**EPC**”) basis, subject to and in accordance with the provisions of the Agreement.
- (B) In accordance with Clause 7.5.3 of the Agreement, the Contractor may withdraw the retention money (hereinafter called the “**Retention Money**”) after furnishing to the Authority a bank guarantee for an amount equal to the proposed withdrawal.
- (C) We, ..... through our branch at ..... (the “**Bank**”) have agreed to furnish this bank guarantee (hereinafter called the “**Guarantee**”) for the amount of Rs. .... cr. (Rupees.....crore) (the “**Guarantee Amount**”).

NOW, THEREFORE, the Bank hereby unconditionally and irrevocably guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of **Junior Administrative Grade** in Southern Railway, that the Contractor has committed default in the due and faithful performance of all or any of its obligations for under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final, and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.
3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor

and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.

4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Retention Money and any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Retention Money.
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Guarantee shall cease to be in force and effect 15 (fifteen) days after the date of the Completion Certificate specified in Clause 12.4 of the Agreement.
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

Signed and sealed this ..... day of ....., 20..... at .....

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

(i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.

(ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.

Annex – III  
(Schedule - F)  
(See Clause 17.2)

**Form of Guarantee for Advance Payment**

FA & CAO/CN/MS

Southern Railway,  
Chennai-600003

**WHEREAS:**

- (A) [name and address of the contractor] (hereinafter called the “**Contractor**”) has executed an agreement (hereinafter called the “**Agreement**”) with the [name and address of the project authority], (hereinafter called the “**Authority**”) for the project Provision of KAVACH (Train Collision Avoidance System) including tower in Jolarpettai to Erode Junction Section (179.29 Rkm) of Salem Division in Southern Railway on Engineering, Procurement and Construction (the “**EPC**”) basis, subject to and in accordance with the provisions of the Agreement.
- (B) In accordance with Clause 17.2 of the Agreement, the Authority shall make to the Contractor advance payment (herein after called “**Advance Payment**”) equal to 10% (ten per cent) of the Contract Price; and that the Advance Payment shall be made in two instalments subject to the Contractor furnishing an irrevocable and unconditional guarantee by a Bank for an amount equivalent to 110% (one hundred and ten percent) of such instalments to remain effective till the complete and full repayment of the instalment of the Advance Payment as security for compliance with its obligations in accordance with the Agreement. The amount of {first/second} instalment of the Advance Payment is Rs. ....cr. (Rupees .....crore) and the amount of this Guarantee is Rs. .... cr. (Rupees ..... crore)(the “**Guarantee Amount**”)§.
- (C) We, ..... through our branch at ..... (the “**Bank**”) have agreed to furnish this bank guarantee (hereinafter called the “**Guarantee**”) for the Guarantee Amount.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful repayment on time of the aforesaid instalment of the Advance Payment under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of *Junior Administrative Grade* in Southern Railway, that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the

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§The Guarantee Amount should be equivalent to 110% of the value of the applicable installment.

instalment of the Advance Payment under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Advance Payment or to extend the time or period of its repayment or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Advance Payment.
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Guarantee shall cease to be in force and effect on \*\*\*\*.<sup>s</sup> Unless a demand or claim under this Guarantee is made in writing on or before the aforesaid date, the Bank shall be discharged from its liabilities hereunder.
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it

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<sup>s</sup> Insert a date being 90 (ninety) days after the end of one year from the date of payment of the Advance payment to the Contractor (in accordance with Clause 17.2 of the Agreement).

has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

Signed and sealed this ..... day of ..... 20..... at .....

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.
- (ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.

**SCHEDULE-G**  
(See Clauses 10.1.4 and 17.3)  
**CONTRACT PRICE WEIGHTAGES**

- 1.1** The estimated project cost is Rs. 1,12,79,46,554/- say Rs 112.79 Cr (It includes estimated cost of schedule G1)

1	Signalling and Telecom works of Provision of KAVACH.	71.58% of the Contract Price
2	Tower Erection and Commissioning	25.49 % of the Contract Price
3	Building construction, Electrification works and TRD works	2.93 % of the Contract Price

**NOTE: Contract price does not include the cost of maintenance during the maintenance period including DLP.**

**KAVACH system consisting of Wayside Station and Locomotive works#**

#Wayside Station, Trackside KAVACH and LOCO Equipments £ (For Defect Liability Period) per annum (1.5% of (A+B))	0.57 % of the Contract Price
# Wayside Station ,Trackside KAVACH and LOCO Equipments (After Defect Liability Period) per annum (3% of (A+B))	1.14 % of the Contract Price
#Stationary KAVACH and NMS Equipments (A)	33 % of the Contract Price say “A”
# Loco KAVACH Equipments (B)	5.1 % of the Contract Price say “B”

# The percentage given above is for the purpose of **Maintenance Obligation** only as per utilized in Article 15A.

£ This does not include Towers, OFC System and Signalling System other than KAVACH System. It includes Loco Equipments, Wayside Station/LC KAVACH Equipments, NMS and other equipments related to KAVACH system.

The maintenance will be executed under the supervision of Division and Authority for Stationary TCAS will be Sr. DSTE/SA and Sr. DEE/Loco of concerned loco shed. Payment for maintenance will be done quarterly based on

Monthly Maintenance Payment statement on pro rata basis in accordance with relevant schedules and Clauses.

**1.2 Proportions of the Contract Price for different stages of Construction of the Railway Project (Kavach Work) shall be as specified below:**

**1.2.1 Signalling and Telecom works of Provision of KAVACH .**

<b>Item</b>	<b>Weightage in Percentage to the Kavach Works</b>	<b>Stage for Payment</b>	<b>Percentage Weightage</b>	<b>Payment Procedure</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1.2.1.1 Survey, design and documentation (Unit: Station with adjoining Block Section)	0.94 %	1.2.11.1. Survey, design and documentation	100%	70% Payment on approval of documents.  30% Payment on submission of completion drawings and documents  Payments on pro-rata basis



Item	Weightage in Percentage to the Kavach Works	Stage for Payment	Percentage Weightage	Payment Procedure
1	2	3	4	5
1.2.1.2. Stationary Kavach Works at Stations/Huts (Unit: Station with adjoining Block Section)	63.36 %	1.2.1.2.1. Supply, installation, testing and deployment of Kavach equipment which includes complete Stationary KAVACH, Remote Interface Units (if any) within the section and station limits, RFID Tags for station and the concerned block section, communication equipment such as radio modems, antennae, ring modems etc.	73.30%	<p>70% Payment on supply of complete Stationary KAVACH and associated equipment and acceptance of material at store depot</p> <p>10% Payment on installation, energisation, testing and deployment</p> <p>5% Payment on submission of ISA documentation and positive safety assessment</p> <p>5% Payment on submission of statutory sanction documentation</p> <p>Payments on pro-rata basis pro rata basis for each station and concerned automatic block section. 1 automatic block section includes installation of Station TCAS at 1 station with ,mid section TCAS (if any in midsection),RIU(if any),RFIDs at station and the concerned auto section.</p>
		1.2.1.2.2 System integration and commissioning of Kavach	26.70%	<p>95% Payment on pro-rata basis on system integration and commissioning of Kavach</p> <p>Balance 5% payment on commissioning of Kavach in entire project section</p>

Item	Weightage in Percentage to the Kavach Works	Stage for Payment	Percentage Weightage	Payment Procedure
1	2	3	4	5
				<p>5% Payment under 1.2.1.2.1 pro-rata basis on system integration and commissioning of Kavach</p> <p>5% Payment under 1.2.1.2.1 on commissioning of Kavach in entire project section</p>
1.2.1.3. Onboard Kavach Works (Unit: Loco)	4.45 %	1.2.1.3.1. Supply, installation, testing, deployment of Kavach equipment which includes complete Onboard Kavach, communication equipment such as radio modems, antennae etc.	68.49%	<p>70% Payment on supply of complete onboard Kavach and associated equipment and acceptance of material at store depot</p> <p>10% Payment on installation, energisation, testing and deployment</p> <p>5% Payment on submission of ISA documentation and positive safety assessment</p> <p>5% Payment on submission of statutory sanction documentation</p> <p>Payments on pro-rata basis. Total no of LOCO Kavach is 10.</p>

Item	Weightage in Percentage to the Kavach Works	Stage for Payment	Percentage Weightage	Payment Procedure
1	2	3	4	5
		1.2.1.3.2 System integration and commissioning of Kavach	31.51%	<p>95% Payment on pro-rata basis on system integration and commissioning of Kavach</p> <p>Balance 5% payment on commissioning of Kavach in entire project section</p> <p>5% Payment under 1.2.1.3.1 pro-rata basis on system integration and commissioning of Kavach</p> <p>5% Payment under 1.2.1.3.1 on commissioning of Kavach in entire project section</p>
1.2.1.4 Tower Works (Unit: Tower Location)	24.55 %	1.2.1.4.1 Completion of tower foundation including activity completion certificate for each activity and completion of installation of ODCs at each new tower location	20%	<p>90% Payment on completion</p> <p>Payments on pro-rata basis for completed Tower Location</p>
		1.2.1.4.2 Supply of fabricated tower super-structure material with inspection	50%	<p>90% Payment on supply</p> <p>Payments on pro-rata basis for supplied towers</p>

Item	Weightage in Percentage to the Kavach Works	Stage for Payment	Percentage Weightage	Payment Procedure
1	2	3	4	5
		1.2.1.4.3 Completion of erection and painting of tower-superstructure including activity completion certificate for each activity	20%	90% Payment on completion  Payments on pro-rata basis for completed Tower Location
		1.2.1.4.4 Completion in all respects including submission of completion drawings	10%	90% Payment on completion  Payments on pro-rata basis for completed tower locations
				Balance payment under 1.2.1.4.1, 1.2.1.4.2, 1.2.1.4.3 and 1.2.1.4.4 shall be paid after issue of Part Completion Certificate / Completion Certificate (Provisional or Final) for completed tower locations
1.2.1.5. Network Monitoring System (NMS)	0.65 %	1.2.1.5.1. NMS	100%	70% Payment on supply of NMS hardware and acceptance at store depot  20% Payment on installation, energisation, testing and deployment of NMS in entire project section  10% Payment on commissioning of Kavach in entire project section

Item	Weightage in Percentage to the Kavach Works	Stage for Payment	Percentage Weightage	Payment Procedure
1	2	3	4	5
1.2.1.6. Test Benches	0.50 %	1.2.1.6.1. Supply and installation of test benches-1 for Station KAVACH and 1 for Loco KAVACH.	100%	70% Payment on supply of Test Benches hardware and acceptance at store depot 30% Payment on installation, energisation, testing and deployment Test Benches.
1.2.1.7. Inventory: Supply of spares	2.59 %	1.2.1.7.1. Inventory for Kavach	100%	100% Payment for inventory shall be made on supply of entire quantity of spares for the project. There shall be no payment for part supply of inventory.
1.2.1.8. Construction of Miniature huts, Electrification and TRD arrangements at huts	2.97 %	1.2.1.8.1. Survey, design and construction of hut	70.486 %	Payment shall be made on completion of Survey and Design works and approval of these drawings by authority for service building / Relay Hut and construction of service building on pro rata basis with respect total area. of Service building & Relay Hut in the Section.

Item	Weightage in Percentage to the Kavach Works	Stage for Payment	Percentage Weightage	Payment Procedure
1	2	3	4	5
		1.2.1.8.2. Electrical arrangements at Huts	19.514 %	Payment shall be made on completion of Survey and Design works and approval of these drawings by authority for service building / Relay Hut and construction of service building on pro rata basis with respect total no. of Service building & Relay Hut in the Section.
		1.2.1.8.3. Completion of the Service building in all respect and commissioning of the entire work included in the whole project.	10%	Completion of the Service building in all respect and commissioning of the entire work included in the whole project.

**Note:**

1. Payment for the supply of fabricated tower super-structure material under 1.2.1.4 shall be done only for those towers targeted for supply in current Milestone.
2. The “stores depot” mentioned above means a separate Stores which will be maintained by the contractor at his own cost. Only spares inventory and Schedule C (project facilities) items will be supplied to Railway Stores.

**SCHEDULE-G1***(See Clauses 10.1.4, 17.3 and 17.4)***SEPARATE BOQ FOR ITEMISED WORK****CONTRACT PRICE WEIGHTAGES (FOR BOQ ITEMS)**

1. The Contract Price for this schedule (G1) of Agreement is Rs. 1,40,88, 600/- .
2. Schedule-G1 may be used as per the requirement.
3. Rate should be quoted (% Above / Below / At Par) for Schedule-G1.

Item	Quantity	Rate(Rs.)	Total Amount of Schedule G1(Rs)	Rate Quoted (% Above / Below / At Par)
Pile Foundation for Tower (Per Tower Site)	10	Rs.14,08,860/-	Rs. 1,40,88, 600/-	

**4. Schedule-G1**

Description	Item	Value of Schedule	Payment Procedure	Applicable Rates
For Tower	NS Items	Rs.	Payment shall be made on actual work done as per work done measured while submitting stage payment certificate.	As detailed in Para 3 above.

Note: Before start of any sub-work(s) under Schedule-G1, drawing, method statement, BOQ etc. shall be finalised and approved from Authority.

## SCHEDULE - H

*(See Clause 10.2.7)*

### **DRAWINGS**

#### **1 Drawings**

In compliance of the obligations set forth in Clause 10.2 of this agreement, the Contractor shall furnish to the Authority Engineer, free of cost, all Drawings listed in Annex-I of this Schedule-H

#### **2 Additional Drawings**

If the Authority Engineer determines that for discharging its duties and functions under this Agreement, it requires any drawings other than those listed in Annex-I, it may by notice require the Contractor to prepare and furnish such drawings forthwith. Upon receiving a requisition to this effect, the Contractor shall promptly prepare and furnish such drawings to the Authority Engineer, as if such drawings formed part of Annex-I of this Schedule-H.



Annexure-I

*(Schedule-H)*

**List of Drawings**

**List of drawings and documents to be furnished by the contractor shall include but not be limited to:**

1. General and Civil Engineering: As per SR Practice.
2. Signal Engineering
  - (a) Cable Route Plan (Integrated cable route plan with the existing cable route plans. Submitted separately for station and block sections)
  - (b) Cable Corage Plan
  - (c) Power Supply Diagram (Station / IB Hut / LC Gate Huts)
  - (d) Equipment sizing (Station / IB Hut / LC Gate Huts)
  - (e) Equipment layout and details including cable troughs required (Station / IB Hut / LC Gate Huts)
  - (f) Circuit Diagrams, Contact Analysis
  - (g) Station / Gate Working Rule / Rule Diagrams
  - (h) Equipment Rack Details
  - (i) Cable Termination Rack Details
  - (j) Fuse Details
  - (k) Location / Junction boxes layout and wiring details
  - (l) Lightning, surge protection and earthing plan
  - (m) Interface and Logic Circuits for Electronic Interlocking (EI)
  - (n) Equipment Disposition Plan / Floor Plan
  - (o) Datalogger / Remote Terminal Unit (RTU) Wiring and Validation Plan
  - (p) Station Working Rule Diagram (SWRD)
  - (q) Station Working Rules (SWR)
  - (r) Power Supply Scheme along with Wiring Plan
3. Telecommunication Engineering
  - (a) Location and connectivity of all equipment and cables
  - (b) Schematic and wiring diagrams
  - (c) Cable core plan and numbering scheme
  - (d) Equipment mounting details
  - (e) Cable route drawings
  - (f) Layouts in equipment racks, in equipment rooms, trackside, and all other equipment locations
  - (g) Channelling plan
4. Electrical Engineering (Traction): Not applicable
5. Electrical Engineering (General Power Supply): As per SR Practice.

SCHEDULE - I  
(See Clause 10.3.2)

**PROJECT COMPLETION SCHEDULE**

**1 Project Completion Schedule**

During Construction period, the Contractor shall comply with the requirements set forth in this Schedule-I for each of the Project Milestones and the **Scheduled Completion Date**. Within 15 (fifteen) days of the date of each Project Milestone, the Contractor shall notify the Authority of such compliance along with necessary particulars thereof.

**2 Project Milestone-I**

2.1 Project Milestone-I shall occur on the date falling on the 90<sup>th</sup> (ninetieth) day from the Appointed Date (the “**Project Milestone-I**”).

2.2 **Kavach Work**

(a) Prior to the occurrence of Project Milestone-I, the Contractor shall have completed and submitted to the Authority the following drawings and documentation for the entire Project.

- (1) Kavach Deployment Plan with Details of Stationary KAVACH / Remote Interface Units
- (2) Kavach Multiple Access Plan
- (3) Kavach Tag / TIN Allotment Plan
- (4) Network Monitoring System (NMS) Connectivity Scheme
- (5) Feasibility of tower erection including soil test reports and proposed tower foundation designs at 32 (Thirty Two) tower locations.

(b) The Contractor shall have completed and submitted to the Authority the following drawings and documentation required for completion of Project Milestone-II.

- (1) Absolute Location Survey including OHE mast to mast distances
- (2) Radio Signal Strength Survey
- (3) Cable Route Plan
- (4) RFID Tag / TIN Layout
- (5) RFID Tag Data
- (6) Kavach Table of Control (TOC)
- (7) Kavach Track Profile
- (8) Interface Circuits
- (9) Datalogger / Remote Terminal Unit (RTU) Wiring and Validation Plan
- (10) Station Working Rules (SWR)
- (11) Power Supply Scheme
- (12) Floor Plans

### 2.3 **Civil Engineering works**

The Contractor shall have completed and submitted to the Authority the following drawings and documentation required for completion of Project Milestone-II

- a) Layout plans and Site location plans of Miniature Huts of 13 (Thirteen) Nos.
- b) Soil Test Reports of 13 (Thirteen) Nos Miniature Huts Locations for sections in all locations.
- c) Foundation Designs based on location SBC for 13 (Thirteen) Nos Miniature Huts.
- d) Super Structure Design Drawings for 13 (Thirteen) Nos Miniature huts.
- e) Commencement of 13 (Thirteen) Nos Miniature Huts construction activity at locations.

## 3 **Project Milestone-II**

- 3.1 Project Milestone-II shall occur on the date falling on the 390<sup>th</sup> (Three hundred and Ninety) day from the Appointed Date (the “**Project Milestone-II**”).
- 3.2 Completed construction of 13 (Thirteen) Nos Miniature Huts construction activity at locations as mentioned in the **Project Milestone-I**.
- 3.3 Completed Electrification of 13 (Thirteen) Nos Miniature Huts construction activity at locations as mentioned in the **Project Milestone-I**.
- 3.4 Completed AT Erection (if required), Installation and Commissioning of 13 (Thirteen) Nos Miniature Huts construction activity at locations as mentioned in the **Project Milestone-I**.
- 3.5 Feasibility of tower erection including soil test reports and proposed tower foundation designs at remaining 32 (Thirty Two) tower locations.
- 3.6 Installation of towers of 32 Nos as mentioned in the **Project Milestone-I** shall be completed.
- 3.7 Prior to the occurrence of Project Milestone-II, the Contractor shall have completed deployment of Kavach in Five (05) locomotives.
- 3.8 Prior to the occurrence of Project Milestone-II, the Contractor shall have completed deployment of Kavach in **JTJ-TPT-KEY-SLY-DST-DPI** Automatic block sections including stations.
- 3.9 Prior to the occurrence of Project Milestone-II, the Contractor shall have completed installation of Network Monitoring System (NMS) in Salem Division HQ and made ready for monitoring of Kavach train running and stations.
- 3.10 Contractor shall have completed and submit floor plan and design documentation for Test Bench setup for STCAS (1 Nos) & LTCAS (1Nos).
- 3.11 The Contractor shall have completed and submitted to the Authority the following drawings and documentation required for completion of **Project Milestone-III**
  - a) Layout plans and Site location plans of remaining 13 (Thirteen) Nos of Miniature Huts.
  - b) Soil Test Reports of remaining 13 (Thirteen) Nos Miniature Huts.
  - c) Foundation Designs based on location SBC of remaining 13 (Thirteen) Nos Miniature Huts.
  - d) Super Structure Design Drawings of remaining 13 (Thirteen) Nos Miniature huts.
  - e) Commencement of remaining 13 (Thirteen) Nos Miniature Huts.

- 3.12 Prior to the occurrence of Project Milestone-II, the Contractor shall have commenced construction of the Railway Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 15 % (Fifteen per cent) of the Contract Price.

#### **4 Project Milestone-III**

- 4.1 Project Milestone-III shall occur on the date falling on the 480<sup>th</sup> (Four hundred and Eighty) day from the Appointed Date (the “**Project Milestone-III**”).
- 4.2 Completed construction remaining 13 (Thirteen) Nos Miniature Huts construction activity at locations as mentioned in the **Project Milestone-II**.
- 4.3 Completed Electrification of remaining 13 (Thirteen) Nos Miniature Huts construction activity at locations as mentioned in the **Project Milestone-II**.
- 4.4 Completed AT Erection (if required), Installation and Commissioning of 13 (Thirteen) Nos .
- 4.5 Installation of remaining 32 Nos of towers as mentioned in **Project Milestone-II**.
- 4.6 Prior to the occurrence of **Project Milestone-III**, the Contractor shall have completed deployment of Kavach in **DPI-MAP-BDY-BQI** Automatic block sections including stations.
- 4.7 Prior to the occurrence of **Project Milestone-III**, the Contractor shall have completed deployment of Loco TCAS another 5 (Five) Nos of locomotives.
- 4.8 Prior to the occurrence of Project Milestone-III, the Contractor shall have completed Installation of remaining 32 Nos (Thirty Two) Towers.
- 4.9 Installation and commissioning of Test Bench for LTCAS (1Nos) & STCAS (1Nos) as mentioned in **Project Milestone-II**.
- 4.10 Prior to the occurrence of Project Milestone-III, the Contractor shall have completed positive assessment by ISA and submitted the Specific Application Safety Case (SASC) Report and documentation required for statutory sanction for Kavach deployed in Project Milestone-II.
- 4.11 Prior to the occurrence of Project Milestone-III, the Contractor shall have continued with construction of the Railway Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 30% (Thirty percent) of the Contract Price.

#### **5 Project Milestone-IV**

- 5.1 Project Milestone-IV shall occur on the date falling on the 570<sup>th</sup> (Five hundred and seventy) day from the Appointed Date (the “**Project Milestone-IV**”).
- 5.2 Prior to the occurrence of **Project Milestone-IV**, the Contractor shall have completed deployment of Kavach in **BQI-LCR-DSPT-TNT** Automatic block sections including stations.
- 5.3 Prior to the occurrence of Project Milestone-IV, the Contractor shall have completed positive assessment by ISA and submitted the Specific Application Safety Case (SASC) Report and documentation required for statutory sanction for Kavach deployed in **Project Milestone-III**.

- 5.4 Prior to the occurrence of Project Milestone-IV, the Contractor shall have continued with construction of the Railway Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 45% (Forty five percent) of the Contract Price.

## **6 Project Milestone-V**

- 6.1 Project Milestone-V shall occur on the date falling on the 690<sup>th</sup> (six hundred and Nintey) day from the Appointed Date (the “**Project Milestone-V**”).
- 6.2 PPrior to the occurrence of **Project Milestone-V**, the Contractor shall have completed deployment of Kavach in **TNT-KPPR-MGSJ-SA** Automatic block sections including stations
- 6.3 Prior to the occurrence of Project Milestone-V, the Contractor shall have completed positive assessment by ISA and submitted the Specific Application Safety Case (SASC) Report and documentation required for statutory sanction for Kavach deployed in Project Milestone-IV.
- 6.4 Prior to the occurrence of Project Milestone-V, the Contractor shall have continued with construction of the Railway Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 65% (Sixty five percent) of the Contract Price.

## **7 Project Milestone-VI**

- 7.1 Project Milestone-VI shall occur on the date falling on the 840<sup>th</sup> (Eight hundred and Forty) day from the Appointed Date (the “**Project Milestone-VI**”).
- 7.2 Prior to the occurrence of **Project Milestone-VI**, the Contractor shall have completed deployment of Kavach in **SA-VRPD-DC-MVPM-SGE-ANU-CV-ED** Automatic block sections including stations
- 7.3 Prior to the occurrence of Project Milestone-VI, the Contractor shall have completed positive assessment by ISA and submitted the Specific Application Safety Case (SASC) Report and documentation required for statutory sanction for Kavach deployed in Project Milestone-V.
- 7.4 Prior to the occurrence of Project Milestone-VI, the Contractor shall have continued with construction of the Railway Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 85% (eighty five percent) of the Contract Price.

## **8 Scheduled Completion Date**

- 8.1 The Scheduled Completion Date shall be the 900<sup>th</sup> (Nine hundred) day from the Appointed Date.
- 8.2 On or before the Scheduled Completion Date, the Contractor shall have completed positive assessment by ISA and submitted the Specific Application Safety Case (SASC) Report and documentation required for statutory sanction for Kavach deployed in Project Milestone-VI.
- 8.3 On or before the Scheduled Completion Date, the Contractor shall have completed the commissioning of Kavach in the entire Site of the Project.
- 8.4 On or before the Scheduled Completion Date, the Contractor shall have completed all construction in accordance with this Agreement.

## **9 Extension of Time**

Upon extension of any or all of the aforesaid Project Milestones or the Scheduled Completion Date, as the case may be, under and in accordance with the provisions of this Agreement, the Project Completion Schedule shall be deemed to have been amended accordingly.

## SCHEDULE - J

*(See Clause 12.1.2)*

### **Tests on Completion**

#### **1 Schedule for Tests**

- 1.1 The Contractor shall, no later than 30 (thirty) days prior to the likely completion of construction, notify the Authority Engineer and the Authority of its intent to subject the Railway Project to Tests, and no later than 10 (ten) days prior to the actual date of Tests, furnish to the Authority Engineer and the Authority detailed inventory and particulars of all works and equipment forming part of Works.
- 1.2 The Contractor shall notify the Authority Engineer of its readiness to subject the Railway Project to Tests at any time after 10 (ten) days from the date of such notice, and upon receipt of such notice, the Authority Engineer shall, in consultation with the Contractor, determine the date and time for each Test and notify the same to the Authority who may designate its representative to witness the Tests. The Authority Engineer shall thereupon conduct the Tests itself or cause any of the Tests to be conducted in accordance with Article 12 and this Schedule-J.

#### **2 Tests**

- 2.1 Visual and physical test: The Authority Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include all the test as prescribed by RDSO/Railways.
- 2.2 Integrated Testing of system followed by a period of trial running. The test sequence may be as shown below:-
  - a) Tests on Equipment
  - b) Installation Test and sub-system individually
  - c) System Integrated Test
  - d) Final Acceptance Test
  - e) Trial Running
  - f) Demonstration of compatibility with LTE.
  - g) Interoperability test with other OEMs.
- 2.3 Obtaining ISA certification of Safety case of the project followed by acceptance and clearance thereof by RDSO.
- 2.4 Sanction of Commissioner of Railway Safety (CRS) is required before opening of track in terms of Chapter XIII of Indian Railway Permanent Way Manual. Similarly, sanction of Competent Railway Authority in accordance with Applicable Laws is required before the commissioning of IBS and associated Kavach works.
- 2.5 The documents for Sanction of Commissioner of Railway Safety (CRS), (if required) before commissioning of signalling system in terms of Chapter XIII of Indian Railway Permanent Way Manual shall be prepared and submitted by the

contractor.

- 2.6 Other tests: The Authority Engineer may require the Contractor to carry out or cause to be carried additional tests, in accordance with Good Industry Practice, for determining the compliance of the Railway Project with Specifications and Standards.
- 2.7 Environmental audit: The Authority Engineer shall carry out a check to determine conformity of the Railway Project with the environmental requirements set forth in Applicable Laws and Applicable Permits.
- 2.8 Safety Audit: The Authority Engineer shall carry out, or cause to be carried out, a safety audit to determine conformity of the Railway Project with the safety requirements and Good Industry Practice.

### **3. Agency for conducting Tests**

All Tests set forth in this Schedule-J shall be conducted by the Authority Engineer or such other agency or person as it may specify in consultation with the Authority.

### **4. Completion Certificate**

- i. Upon successful completion of Tests, the Authority Engineer shall issue the Provisional Certificate in accordance with the provisions of Article 12. For the avoidance of doubt, the Completion Certificate shall not be issued by the Authority Engineer unless authorisation of the Commissioner for Railway Safety or the authorisation of Competent Railway Authority in accordance with Applicable Laws has been obtained.
- ii. The quality and integrity of the installation remains complete responsibility of the OEM. The firm must provide an OEM certificate regarding this before commissioning of any installation, any deficiency pointed out later, shall be done free of cost by OEM. This shall be confirmed by OEM before commissioning.



SCHEDULE - K  
(See Clause 12.2 and 12.4)

**1. PROVISIONAL CERTIFICATE**

- 1 I/We, ..... (Name of the Authority Engineer), acting as the Authority Engineer, under and in accordance with the Agreement dated ..... (the “**Agreement**”), for the project Provision of KAVACH (Train Collision Avoidance System) including tower in Jolarpettai to Erode Junction Section (179.29 Rkm) of Salem Division in Southern Railway on Engineering, Procurement and Construction (EPC) basis through ..... (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been undertaken to determine compliance of the Railway Project with the provisions of the Agreement.
- 2 Certain minor works are incomplete and these are not likely to cause material inconvenience to the Users of the Railway Project or affect their safety or the movement of rail traffic in any manner. These works have been specified in the Punch List appended hereto, and the Contractor has agreed and accepted that it shall complete all such works in the time and manner set forth in the Agreement.
- 3 In view of the foregoing, I/We am/are satisfied that the Railway Project for the project Provision of KAVACH (Train Collision Avoidance System) including tower in Jolarpettai to Erode Junction Section (179.29 Rkm) of Salem Division in Southern Railway can be safely and reliably placed in service of the Authority for railway freight and passenger traffic, subject to authorisation by the Commissioner of Railway Safety in accordance with Applicable Laws. In terms of the Agreement, the Railway Project is hereby provisionally declared fit for entry into operation on this the ..... day of ..... 20.....

ACCEPTED, SIGNED, SEALED  
AND DELIVERED  
For and on behalf of  
CONTRACTOR by:

(Signature)

SIGNED, SEALED AND  
DELIVERED  
For and on behalf of  
AUTHORITY ENGINEER by:

(Signature)

## 2. COMPLETION CERTIFICATE

1 I/We, ..... (Name of the Authority Engineer), acting as the Authority Engineer, under and in accordance with the Agreement dated ..... (the “**Agreement**”), for construction for the project Provision of KAVACH (Train Collision Avoidance System) including tower in Jolarpettai to Erode Junction Section (179.29 Rkm) of Salem Division in Southern Railway on Engineering, Procurement and Construction (EPC) basis through ..... (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been successfully undertaken to determine compliance of the Railway Project with the provisions of the Agreement, and the authorisation by the Commissioner for Railway Safety or the authorisation of Competent Railway Authority under Applicable Laws has been obtained.

2 It is certified that, in terms of the aforesaid Agreement, all works forming part of Railway Project have been completed, and the Railway Project is hereby declared fit for entry into operation on this the ..... day of ..... 20.....

SIGNED, SEALED AND DELIVERED

For and on behalf of

the Authority Engineer by:

(Signature)

(Name)

(Designation)

(Address)

SCHEDULE - L  
(See Clause 16.1.1)

**SELECTION OF AUTHORITY ENGINEER**

**1. Selection of Authority Engineer**

Authority shall appoint a railway engineer /Project Management Services (PMS) agency, to be the engineer as set forth in Article 16, to be the engineer under this Agreement (the "Authority Engineer").

Generally, a railway officer of Selection Grade (SG)/ Junior Administrative Grade (JAG)/ Project Management Services (PMS) Agency shall be appointed as Authority Engineer. Authority shall notify the Contractor in writing of the appointment and identity of the Authority Engineer and of any replacement thereof from time to time.

**2 Terms of Reference**

The Terms of Reference for the Authority Engineer (the “**TOR**”) shall substantially conform with Annex 1 to this Schedule L.

## **DUTIES & RESPONSIBILITIES FOR AUTHORITY ENGINEER**

### **1 Scope**

- 1.1 These Duties & Responsibilities (DR) shall apply to construction and maintenance (wherever applicable) of the Railway Project.

### **2 Definitions and interpretation**

- 2.1 The words and expressions beginning with or in capital letters and not defined herein but defined in the Agreement shall have, unless repugnant to the context, the meaning respectively assigned to them in the Agreement.
- 2.2 References to Articles, Clauses and Schedules in this DR shall, except where the context otherwise requires, be deemed to be references to the Articles, Clauses and Schedules of the Agreement, and references to Paragraphs shall be deemed to be references to Paragraphs of this DR.
- 2.3 The rules of interpretation contained in Clauses 1.2, 1.3 and 1.4 of the Agreement shall apply, *mutatis mutandis*, to this DR.

### **3. General**

- 3.1 The Authority Engineer shall discharge its duties in a fair, impartial and efficient manner, consistent with the highest standards of professional integrity and Good Industry Practice.
- 3.2 The Authority Engineer shall perform the duties and exercise the authority in accordance with the provisions of this Agreement, but subject to obtaining prior written approval of the Authority (where Authority Engineer is designated as the Authority, the compliance of these conditions have to be ensured by him/her) before determining:
- (a) any Time Extension;
  - (b) any additional cost to be paid by the Authority to the Contractor;
  - (c) the Termination Payment;
  - (d) providing Power Block or Traffic Block to the Contractor;
  - (e) approval of signalling plan and signalling plan and Kavach control chart;
  - (f) approval of disconnections for modification of signalling and telecom works;
  - (g) any other matter which is not specified in (a) to (f) above and which creates an obligation or liability on either Party for a sum exceeding Rs.5,000,000/- (Rupees fifty lakh).
- 3.3 The Authority Engineer shall submit regular periodic reports, at least once every month, to the Authority in respect of its duties and functions assigned to him for

the project. Such reports shall be submitted by the Authority Engineer within 10 (ten) days of the beginning of every month.

- 3.4 The Authority Engineer shall aid and advise the Authority on any proposal for Change of Scope under Article 13.
- 3.5 In the event of any disagreement regarding the meaning, scope and nature of Good Industry Practice, as set forth in any provision of the Agreement, the Authority Engineer shall specify such meaning, scope and nature by issuing a reasoned written statement relying on Good Industry Practice and authentic literature.
- 3.6 The Authority Engineer shall verify the as built drawings submitted by the Contractor after completion of the works. These drawings will be signed by the Authority Engineer after due verification.

#### **4. Construction Period**

- 4.1 During the Construction Period, the Authority Engineer shall review the Drawings furnished by the Contractor along with supporting data, including the geo-technical and hydrological investigations, characteristics of materials from borrow areas and quarry sites and topographical surveys. The Authority Engineer shall complete such review and send its observations to the Authority and the Contractor within 21 (Twenty One) days of receipt of such Drawings; provided, however that in case of an Important Bridge, a Major Bridge or Structure, and interlocking and telecom switching equipment the aforesaid period of 21 (Twenty One) days may be extended up to 30 (thirty) days (Refer Schedule- D, Annex-II). In particular, such comments shall specify the conformity or otherwise of such Drawings with the Scope of the Project and Specifications and Standards.
- 4.2 The Authority Engineer shall review any revised Drawings sent to it by the Contractor and furnish its comments within 10 (ten) days of receiving such Drawings.
- 4.3 The Authority Engineer shall review the Quality Assurance Plan submitted by the Contractor and shall convey its comments to the Contractor within a period of 21 (twenty-one) days stating the modifications, if any, required thereto.
- 4.4 The Authority Engineer shall complete the review of the methodology proposed to be adopted by the Contractor for executing the Works, and convey its comments to the Contractor within a period of 10 (ten) days from the date of receipt of the proposed methodology from the Contractor. The Authority Engineer shall draw the non-interlocking programme for works involving existing yards and issue a jointly agreed NI programme for each such yard.
- 4.5 The Authority Engineer shall grant written approval to the Contractor, where necessary, for interruption and diversion of the flow of traffic in the existing lane(s) of the Railway Project for purposes of maintenance during the Construction Period in.
- 4.6 The Authority Engineer shall review the monthly progress report furnished by the Contractor and send its comments thereon to the Authority and the Contractor within 7 (seven) days of receipt of such report.

- 4.7 The Authority Engineer shall inspect the Construction Works and the Railway Project and shall submit a monthly Inspection Report bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies.
- 4.8 The Authority Engineer shall conduct the pre-construction review of manufacturer's test reports and standard samples of manufactured Materials, and such other Materials as the Authority Engineer may require.
- 4.9 For determining that the Works conform to Specifications and Standards, the Authority Engineer shall require the Contractor to carry out, or cause to be carried out, tests at such time and frequency and in such manner as specified in the Agreement and in accordance with Good Industry Practice for quality assurance. For purposes of this Paragraph 4.9, the tests specified in Manuals or any modification/substitution thereof shall be deemed to be tests conforming to Good Industry Practice for quality assurance.
- 4.10 The Authority Engineer shall test check prescribed in this agreement for each category or type of test for quality control by the Contractor.
- 4.11 The timing of tests referred to in Paragraph 4.9, and the criteria for acceptance/rejection of their results shall be determined by the Authority Engineer in accordance with the Quality Control Manuals. The tests shall be undertaken on a random sample basis and shall be in addition to, and independent of, the tests that may be carried out by the Contractor for its own quality assurance in accordance with Good Industry Practice.
- 4.12 In the event that results of any tests conducted under Clause 11.10 establish any Defects or deficiencies in the Works, the Authority Engineer shall require the Contractor to carry out remedial measures.
- 4.13 The Authority Engineer may instruct the Contractor to execute any work which is urgently required for the safety of the Railway Project, whether because of an accident, unforeseeable event or otherwise; provided that in case of any work required on account of a Force Majeure Event, the provisions of Clause 19.6 shall apply.
- 4.14 In the event that the Contractor fails to achieve any of the Project Milestones, the Authority Engineer shall undertake a review of the progress of construction and identify potential delays, if any. If the Authority Engineer shall determine that completion of the Railway Project is not feasible within the time specified in the Agreement, it shall require the Contractor to indicate within 15 (fifteen) days the steps proposed to be taken to expedite progress, and the period within which the Project Completion Date shall be achieved. Upon receipt of a report from the Contractor, the Authority Engineer shall review the same and send its comments to the Authority and the Contractor forthwith.
- 4.15 The Authority Engineer shall obtain from the Contractor a copy of all the Contractor's quality control records and documents before the Completion Certificate is issued pursuant to Clause 12.4.
- 4.16 Authority Engineer may recommend to the Authority suspension of the whole or part of the Works if the work threatens the safety of the public and pedestrians.

After the Contractor has carried out remedial measure, the Authority Engineer shall inspect such remedial measures forthwith and make a report to the Authority recommending whether or not the suspension hereunder may be revoked.

- 4.17 In the event that the Contractor carries out any remedial measures to secure the safety of suspended works and the public, and requires the Authority Engineer to inspect such works, the Authority Engineer shall inspect the suspended works within 3 (three) days of receiving such notice, and make a report to the Authority forthwith, recommending whether or not such suspension may be revoked by the Authority.
- 4.18 The Authority Engineer shall carry out, or cause to be carried out, all the Tests specified in Schedule-J and issue a Completion Certificate or Provisional Certificate, as the case may be. For carrying out its functions under this Paragraph 4.18 and all matters incidental thereto, the Authority Engineer shall act under and in accordance with the provisions of Article 12 and Schedule-J.

#### **4A. Maintenance Period**

- (i) The Authority's Engineer shall aid and advise the Contractor in the preparation of its monthly Maintenance Programme and for this purpose carry out a joint monthly inspection with the Contractor.
- (ii) The Authority's Engineer shall undertake regular inspections, at least once every month, to evaluate compliance with the Maintenance Requirements and submit a Maintenance Inspection Report to the Authority and the Contractor.
- (iii) The Authority's Engineer shall specify the tests, if any, that the Contractor shall carry out, or cause to be carried out, for the purpose of determining that the Project "Provision of KAVACH (Train Collision Avoidance System) including tower in Jolarpettai to Erode Junction Section (179.29 Rkm) of Salem Division in Southern Railway" is in conformity with the Maintenance Requirements. It shall monitor and review the results of such tests and the remedial measures, if any, taken by the Contractor in this behalf.
- (iv) In respect of any defect or deficiency referred to in Paragraph 3 of Schedule- Q, the Authority's Engineer shall, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and Standards and shall also specify the time limit for repair or rectification of any deviation or deterioration beyond the permissible limit.
- (v) The Authority's Engineer shall examine the request of the Contractor for closure of working or operational equipment/systems of the Project "Provision of KAVACH (Train Collision Avoidance System) including tower in Jolarpettai to Erode Junction Section (179.29 Rkm) of Salem Division in Southern Railway" for undertaking maintenance/repair thereof, and shall grant permission with such modifications, as it may deem necessary, within 3 (three) days of receiving a request from the Contractor. Upon expiry of the permitted period of closure, the Authority's Engineer shall monitor the reopening of such equipment/system, and in case of delay, determine the Damages payable by the Contractor to the Authority under Clause 15A.4.

## **5. Determination of costs and time**

- 5.1 The Authority Engineer shall determine the costs, and/or their reasonableness, that are required to be determined by it under the Agreement.
- 5.2 The Authority Engineer shall determine the period of Time Extension that is required to be determined by it under the Agreement.
- 5.3 The Authority Engineer shall consult each Party in every case of determination in accordance with the provisions of Clause 16.5.

## **6. Payments**

- 6.1 The Authority Engineer shall withhold payments for the affected works for which the Contractor fails to revise and resubmit the Drawings to the Authority Engineer in accordance with the provisions of Clause 10.2.7 (d).
- 6.2 Authority Engineer shall -
  - (a) within 10 (ten) days of receipt of the Stage Payment Statement from the Contractor pursuant to Clause 17.4, determine the amount due to the Contractor and recommend the release of 80 (eighty) percent of the amount so determined as part payment, pending issue of the Interim Payment Certificate; and
  - (b) within 20 (twenty) days of the receipt of the Stage Payment Statement referred to in Clause 17.4, deliver to the Authority and the Contractor an Interim Payment Certificate certifying the amount due and payable to the Contractor.

## **7. Other duties and functions**

The Authority Engineer shall perform all other duties and functions as specified in the Agreement.



**8. Miscellaneous**

- 8.1 A copy of all communications, comments, instructions, Drawings or Documents sent by the Authority Engineer to the Contractor pursuant to this TOR, and a copy of all the test results with comments of the Authority's Engineer thereon, shall be furnished by the Authority's Engineer to the Authority forthwith.
- 8.2 The Authority Engineer shall retain at least one copy each of all Drawings and Documents received by it, including 'as-built' Drawings, and keep them in its safe custody.
- 8.3 Within 90 (ninety) days of the Project Completion Date, the Authority Engineer shall obtain a complete set of as-built Drawings, in 2 (two) hard copies and in micro film form or in such other medium as may be acceptable to the Authority, reflecting the Railway Project as actually designed, engineered and constructed, including an as-built survey illustrating the layout of the Railway Project and setback lines, if any, of the buildings and structures forming part of Project Facilities; and shall hand them over to the Authority against receipt thereof.
- 8.4 The Authority Engineer shall inform the Authority and the Contractor of any event of Contractor's Default within one week of its occurrence.

## SCHEDULE - M

*(See Clauses 17.4.1, and 17.6.1)*

### **Forms of Payment Statements**

#### **1. Stage Payment Statement for Works**

The Stage Payment Statement for Works shall state:

- (a) the estimated amount for the Works executed in accordance with Clause 17.3.1 subsequent to the last claim;
- (b) amounts reflecting adjustments in price for the aforesaid claim;
- (c) the estimated amount of each Change of Scope Order executed subsequent to the last claim;
- (d) amounts reflecting adjustment in price, if any, for (c) above in accordance with the provisions of Clause 13.2.3 (a);
- (e) total of (a), (b), (c) and (d) above;
- (f) Deductions:
  - (i) Any amount to be deducted in accordance with the provisions of the Agreement except taxes;
  - (ii) Any amount payable by the Contractor to the Authority under the provisions of the Agreement; and
  - (iv) Any amount towards deduction of taxes at source under Applicable Laws.
  - (v) Total of (i) to (iii) above.
- (g) Net claim: (e) – (f) (iv);
- (h) The amounts received by the Contractor up to the last claim:
  - (i) For the Works executed (excluding Change of Scope orders);
  - (ii) For Change of Scope Orders, and
  - (iii) Taxes deducted at source under Applicable Laws

#### **1A. Monthly Maintenance Payment Statement**

The monthly Statement for Maintenance Payment shall state:

- (a) the monthly payment admissible in accordance with the provisions of the Agreement;
- (b) the deductions for maintenance work not done;
- (c) net payment for maintenance due, (a) minus (b);
- (d) amounts reflecting adjustments in price under Clause 17.9a; and
- (e) amount towards deduction of taxes.

#### **2. Contractor's claim for Damages**

**Note:** The Contractor shall submit its claims in a form acceptable to the Authority.

—

SCHEDULE - N  
(See Clause 18.1)

**INSURANCE**

**1. Insurance during Construction Period**

- 1.1 The Contractor shall effect and maintain at its own cost, from the Appointed Date till the date of issue of the Completion Certificate, the following insurances for any loss or damage occurring on account of Non Political Event of Force Majeure, malicious act, accidental damage, explosion, fire and terrorism:
- (a) insurance of Works, Plant and Materials and an additional sum of [15% (fifteen per cent)] of such replacement cost to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature; and
  - (b) insurance for the Contractor's equipment and Documents brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.
- 1.2 The insurance under paragraph 1.1 (a) and (b) above shall cover the Authority and the Contractor against all loss or damage from any cause arising under paragraph 1.1 other than risks which are not insurable at commercial terms.

**2. Insurance for Contractor's Defects Liability**

The Contractor shall effect and maintain insurance cover for the Works from the date of issue of the Completion Certificate until the end of the Defects Liability Period for any loss or damage for which the Contractor is liable and which arises from a cause occurring prior to the issue of the Completion Certificate. The Contractor shall also maintain other insurances for maximum sums as may be required under Applicable Laws and in accordance with Good Industry Practice.

**3. Insurance against injury to persons and damage to property**

- 3.1 The Contractor shall insure against its liability for any loss, damage, death or bodily injury, or damage to any property (except things insured under Paragraphs 1 and 2 of this Schedule) or to any person (except persons insured under Clause 18.9), which may arise out of the Contractor's performance of this Agreement. This insurance shall be for a limit per occurrence of not less than the amount specified below with no limit on the number of occurrences.

The insurance cover shall be not less than Rs. 2,500,000/- (Twenty-Five Lakhs).

- 3.2 The insurance shall be extended to cover liability for all loss and damage to the Authority's property arising out of the Contractor's performance of this Agreement excluding:
- (a) the Authority's right to have the construction works executed on, over, under, in or through any land, and to occupy this land for the Works; and
  - (b) damage which is an unavoidable result of the Contractor's obligations to execute the Works.

**4. Insurance to be in joint names**

The insurance under paragraphs 1 to 3 above shall be in the joint names of the Contractor and the Authority.

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## SCHEDULE - O

*(See Clauses 4.6 & 4.7)*

### **Provision of Traffic Blocks and Power Blocks**

#### **1. Provision of Traffic Blocks Power Blocks and Disconnections**

- 1.1 The authority shall provide Traffic Blocks during day or night, as the case may be to enable the Contractor to execute the construction works. No power blocks are envisaged in this project. The maximum aggregate duration of blocks for the Railway Project shall be 320 hours.
- 1.2 The Contractor is entitled to execute the construction work within the block period specified in this Schedule-O. The total duration of Power Block or Traffic Block or both, as the case may be, shall not exceed 20% of the period specified in this Agreement. In case such total duration exceeds 20% the Contractor shall pay Damages at the rate of Rs.10000 per hour or part thereof for the exceeded Block periods.
- 1.3 The Authority shall arrange for disconnections of S&T system as determined by Authority Engineer, to enable the Contractor to execute the construction work which affects existing Singalling and Telecommunication installations.

—

SCHEDULE - P  
*(See Clauses 4.4)*  
**Machinery and equipment**

No Machinery & Plant to be provided to the contractor by The Authority.

—

## SCHEDULE-Q

*(See Clauses 2.1 (d), 15A.1 (iii), 15A.2.1, 15A.5 (I, 15A.9, 15B.1 (ii) and 17.5b (ii))*

### **Maintenance Requirements**

#### **1. Maintenance Requirements**

- (i) The Contractor shall, at all times maintain the Project KAVACH in accordance with the provisions of this Agreement, Applicable Laws and Applicable Permits.
- (ii) The Contractor shall repair or rectify any Defect or deficiency within the time limit as specified by Authority's Engineer and any failure in this behalf shall constitute non-fulfillment of the Maintenance obligations by the Contractor. Upon occurrence of any breach hereunder, the Authority shall be entitled to effect reduction in monthly lump sum payment as set forth in Clause 15A.5 of this Agreement, without prejudice to the rights of the Authority under this Agreement, including Termination thereof.
- (iii) All Materials used /provided during the maintenance period, shall be in conformity with RDSO Specifications/Guidelines/Technical Advisory Notes (TANs) as applicable and will be compatible to the installed system in operation. Standard drawings / Good Industry Practice shall be adopted for these materials/works for which RDSO specification/TAN/guidelines are not available.
- (iv) Any updation, upgradation, modification in software (executive/application or other) arising due to requirement of latest version of RDSO specifications/Guidelines/TANs issued time to time during maintenance period, shall be done by the contractor at his own cost with prior confirmation from Authority's Engineer. This does not include migration/change of technology.

#### **2. Prompt Response Teams**

- (i) The Contractor shall engage trained personnel and constitute teams comprising of at least 2 (two) such personnel each to provide a prompt response for Unscheduled Maintenance and for carrying out the Consumables Replenishment Schedule outside the Maintenance Depots and for confirming with the Maintenance Requirements (the "Prompt Response Teams" or "PR Teams"). The Contractor shall ensure that one PR Team is available for approximately every 100 (hundred) Kms. Such that PR Teams are able reach their destination, along with suitable maintenance kit, within 90 (ninety) minutes of being notified of an event requiring Unscheduled Maintenance hereunder. For the avoidance of doubt, the Parties expressly agree that the Contractor may, with the consent of the Authority, employee other forms of prompt response which can be demonstrated as equivalent to or better than the prompt response specified herein.
- (ii) The PR Team shall, to the extent possible, repair and rectify the defects and deficiencies, including those specified in the Maintenance Requirements, and notify the Authority of further repairs, if any, required to be taken for safe and reliable operation of the KAVACH system. Upon receiving such report,

the Parties agree to take action as may be necessary to procure safe and reliable operation of the KAVACH system.

- (iii) The Parties agree that the obligation of the Contractor to provide PR Teams shall be restricted to Project.
- (iv) The helpline stated in 15A.2.2(i) will also be used to monitor and maintain NMS of KAVACH

### **3. Tests**

For determining that the Project KAVACH conforms to the Maintenance Requirements, the Authority's Engineer shall require the Contractor to carry out, or cause to be carried out, Tests specified by him or in accordance with Good Industry Practice. The Contractor shall, with due diligence, carry out or cause to be carried out all such Tests in accordance with the instructions of the Authority's Engineer and furnish the results of such Tests forthwith to the Authority's Engineer.

### **4. Other Defects and Deficiencies**

In respect of any Defect or deficiency not specified in Annex - I of this Schedule Q, the Authority's Engineer may, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and Standards, and any deviation or deterioration beyond the permissible limit shall be repaired or rectified by the Contractor within the time limit specified by the Authority's Engineer.

### **5. Extension of Time Limit for Rectification**

Notwithstanding anything to the contrary specified in this Schedule-Q, if the nature and extent of any Defect or deficiency justifies more time for its repair or rectification than the time specified herein, the Contractor shall be entitled to additional time in conformity with Good Industry Practice. Such additional time shall be determined by the Authority's Engineer and conveyed to the Contractor and the Authority with reasons thereof.

### **6. Emergency Repairs/Restoration**

Notwithstanding anything to the contrary contained in this Schedule-Q, if any Defect, deficiency or deterioration in the Project KAVACH poses a hazard to safety or risk of damage to property, the Contractor shall promptly take all reasonable measures for eliminating or minimizing such danger.

### **7. Maintenance record by the Contractor**

The Contractor shall, through its engineer, shall maintain a record of inspections undertaken on a day to day basis in a register to be kept in such form and manner as the Authority's Engineer may specify. Such record shall be kept in safe custody of the Contractor and shall be open to inspection by the Authority and the Authority's Engineer at any time during office hours.



## **8. Repairs on Account of Natural Calamities**

All damages occurring to the Project KAVACH on account of a Force Majeure Event or wilful default or neglect of the Authority shall be undertaken by the Authority at its own cost. The Authority may instruct the Contractor to undertake the repairs at the rates agreed between the Parties.

## **9. Epidemic Defect Warranty**

- (i) The Contractor agrees that if any identical defect or deficiency occurs on more than 20% (twenty percent) of KAVACH equipments installed in Project, in any rolling period of 36 (thirty six) months commencing from the date of supply, such defect or deficiency shall be deemed to be an epidemic defect (the “Epidemic Defect”) and Contractor shall cover such epidemic defect under epidemic defect warranty to be maintained by Contractor for the Maintenance Period (The “Epidemic Defect Warranty”). In addition, any manufacturing defect observed in KAVACH equipment will be rectified/replaced free of cost by the contractor.
- (ii) If during the Agreement Period, the Authority notifies the Contractor that an Epidemic Defect has occurred, the Contractor shall remedy such Epidemic Defect on all KAVACH equipments, and shall undertake such other work and measures as may be necessary for enabling the KAVACH System to continue in operation in conformity with the Maintenance Obligations until such defects are rectified. Within 30 (thirty) days having been notified of such Epidemic Defects by the Authority, the Contractor shall submit to the Authority a programme for rectification of the Epidemic Defects as soon as practicable and the Contractor and the Authority shall negotiate and agree to such programme in good faith, within a period of 30 (thirty) days after receipt of such programme.
- (iii) If Contractor and the Authority are unable to agree to a programme within 30 (thirty) days of its receipt, the Authority may rectify the defect, or cause rectification of the defect, at the Contractor’s cost and expense, and recover the same from the Contractor in accordance with Clause 15A.6, along with the Damages specified therein.

## **10. Distribution of Roles and Responsibility for KAVACH equipments**

### **10(a) Authority**

- (i) Maintenance of earthing of equipments.
- (ii) Maintenance of KAVACH E1 network for NMS connectivity
- (iii) Tracking for any changes in yard.
- (iv) Maintenance of RFID tags (excluding programming)
- (v) Checking PSR resulting in KAVACH Application Logic alterations
- (vi) OFC and Signalling systems other than KAVACH.

**10(b) Contractor**

- i) Maintenance of complete way side KAVACH equipment including modems, sub assembly cards, GPS and GSM modules and other items excluding items covered in 10(a) above supplied by the contractor.
- ii) Maintenance of on board KAVACH equipment including BIU, DMI, RFID reader, pulse generator, modems, sub assembly cards, GPS and GSM modules and other items supplied by the contractor.
- iii) Maintenance of test benches for way side and on board KAVACH systems installed in stations and loco sheds.
- iv) Maintenance of lab models installed in training institutes.
- v) Maintenance of NMS server (hardware and software) and connected modems and other sub systems.
- vi) Maintenance of radio modems and radio antenna.
- vii) Maintenance of power supply items associated with KAVACH system supplied by the contractor.
- viii) Carrying out RSSI survey on quarterly basis and submission of report.
- ix) In case of any damage, theft of RFID tags, the same shall be programmed and reinstalled by Contractor. RFID tag for this purpose may be supplied by Railway (from procured spares).
- x) Notwithstanding above, the contractor shall maintain the KAVACH system during maintenance period ensuring fitness of the purpose.

## Annex-I, Schedule-Q

### Maintenance Schedule

Item No.	Location	Maintenance Task Description	Frequency	Responsibility of Maintenance (Railway)	Responsibility of Maintenance (Contractor)
To be filled by Zonal Railway					

- Note: 1. Maintenance Schedule (Stationery & Onboard KAVACH) may be based on schedule issued by RDSO vide letter no. RDSO-SIG0MISC(Gen)/1/2021 dated 27.12.2021 or latest.
2. Zonal Railway may further modify Maintenance Schedule of RDSO with approval of PCSTE as per field requirement.

## **SCHEDULE-R**

*(See Clauses 15A.5 (i), 15B.2 (iv) and 17.5b (ii))*

### **Payment Reduction for Non-Compliance**

#### **1. Payment reduction for breach of Maintenance Obligations.**

- (i) Monthly lump sum payments for maintenance shall be reduced in the case of non-compliance with the Maintenance Requirements set forth in Schedule-Q.
- (ii) Any deduction made on account of non-compliance with the Maintenance Requirements shall not be paid even after compliance subsequently. The deductions shall continue to be made every month until compliance is done.
- (iii) The Authority's Engineer shall calculate the amount of payment reduction in the event that the contractor fails to carry out Maintenance Requirements set forth in Schedule-Q, it shall be deemed to be breach of this Agreement and the Authority shall be entitled to recover Damages, to be calculated and paid for each day of delay at the rate of 0.5% (zero point five percent) of the Maintenance fee of that month for respective Wayside Station/Locomotive. Recovery of such Damages shall be without prejudice to the rights of the Authority under this Agreement, including the right of Termination thereof.
- (iv) For delay in repairing or rectification of any defect or deficiency in respective Wayside Station/ locomotive beyond a reasonable time as decided by Authority's Engineer, a lumpsum penalty may be imposed on contractor by Authority Engineer.

## **SCHEDULE-S**

*(See Clause 15A.9)*

### **Tests on Completion of Maintenance Period**

**1. Visual and Physical Test:**

The Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement.

**2. Quality Test:**

Quality test: Quality parameters of each equipment of the system shall be checked. The quality tests shall include measurement of parameters be as per the requirement of maintenance mentioned in Schedule-Q.

## **SCHEDULE-T**

### **Taking Over Certificate**

I, ..... (Name and designation of the Authority's Representative) under and in accordance with the Agreement dated ..... (the "Agreement"), for Provision of KAVACH (Train Collision Avoidance System) including tower in Jolarpettai to Erode Junction Section (179.29 Rkm) of Salem Division in Southern Railway on Engineering, Procurement and Construction (EPC) basis through (Name of Contractor), hereby certify that the Tests on completion of Maintenance Period in accordance with Article 15A of the Agreement have been successfully undertaken to determine compliance of the Project KAVACH with the provisions of the Agreement and I hereby certify that the Authority has taken over the Project KAVACH from the Contractor on this day.....

SIGNED, SEALED AND DELIVERED

(Signature)

(Name and designation of Authority's Representative)

(Address)

## **The End of Schedules.**

## **Appendices**



## APPENDIX-I

### LIST OF BID-SPECIFIC CLAUSES<sup>s</sup>

#### **A. Clauses with non-numerical (\$) footnotes:**

1. Clause 3.2.1 : Obligation relating to sub-contracts and any other agreements
2. Clause 13.5.1 : Power of the Authority to undertake works
3. Article 26 : Definition of Consortium/Joint Venture
4. Schedule-F, Annexure-I : Item (C)-8
5. Schedule-F, Annexure-III : Item (B) and Item (C)-8

#### **B. Clauses with curly { } brackets:**

1. Recital : Para 2
2. Clause 1.5 : Joint and several liability
3. Clause 3.2.1 : Obligations relating sub-contracts and any other agreements
4. Clause 5.1 (l) : Representations and warranties of the Contractor
5. Article 26 : Definition of “Affiliate”, “Consortium/Joint Venture” and “Lead Member”
6. Contract Agreement : ‘Signature’ page
7. Schedule-F, Annexure-I : Item (B) and Item (C) 1
8. Schedule-F, Annexure-III : Item (B)

#### **C. Clauses with Blank Spaces (.....), (\*\*\*)**

1. First line of the Concession Agreement
2. Recital : Para 2
3. Recital : Item A, B, C and D
4. Clause 3.9 : Training of Authority’s Personnel
5. Clause 17.1.1 : Contract Price
6. Schedule-F, Annexure-I : Item A, B and C
7. Schedule-F, Annexure-I : Signing Date
8. Schedule-F, Annexure-II : Item A and C

9. Schedule-F, Annexure-II : Signing Date
10. Schedule-F, Annexure-III : Item A, B and C
11. Schedule-F, Annexure-III : Signing Date
12. Schedule-L, Annexure-I : Clause 1.1 : Scope

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<sup>s</sup> This Appendix-I contains a list of clauses that would need to be suitably modified for reflecting bid-specific provisions after the contractor has been selected. This Appendix-I may be included in the draft EPC Agreement forming part of the bid documents. It may, however, be deleted when the Contract Agreement is to be executed.

## APPENDIX-II

### LIST OF PROJECT SPECIFIC CLAUSES<sup>20</sup>

#### **A. Clauses with serially numbered footnotes**

1. First line of Contract Agreement (footnote no.1)
2. Recital : Para 2 (footnote no.2 & 3)
3. Recital : Para 2 : Item A (footnote 4 & 5)
4. Clause 3.9.2 : Training of Authority's Personnel (footnote no.6)
5. Clause 4.1.3(b) and (c) : Obligation of the Authority (footnote no. 7 & 8)
6. Clause 4.3 : Environmental and forest clearances (footnote no.9)
7. Clause 4.4.3 : Machinery and equipment (footnote no.10)
8. Clause 4.5 : Electricity transmission lines (footnote no.11)
9. Clause 7.1.1 : Performance Security (footnote no.12)
10. Clause 7.5 : Retention Money (footnote no.13)
11. Clause 17.2.1 : Advance Payment (footnote no.14)
12. Clause 17.8.4 : Price adjustment for the works (footnote no.15)
13. Schedule-A, Annexure-I : Site (footnote no.16)
14. Schedule-B, Annexure-I : Description of Railway Project (footnote no.17)
15. Schedule-C : Project facilities (footnote no.18)
16. Schedule-D, Annexure-I : Specifications and standards for construction (footnote no.19)

#### **B. Clauses with square [ ] parenthesis:**

1. Recital : Para 1
2. Recital (B)
3. Clause 3.2.1 : Obligations relating to sub-contracts and any other agreements
4. Clause 3.4.1 : Contractor's Personnel
5. Clause 3.9 : Training of Authority's Personnel
6. Clause 4.1.3(c) : Obligations of the Authority

7. Clause 4.1.4 : Obligations of the Authority
8. Clause 4.4.1(c) : Machinery and equipment
9. Clause 4.5 : Electricity transmission lines
10. Clause 4.7 : Provision of power blocks and traffic blocks
11. Clause 8.1(a) : The Site
12. Clause 10.3.1 : Construction of Railway Project
13. Clause 10.4.1(a) : Extension of time for completion
14. Clause 12.2.1 : Provisional certificate
15. Clause 15.1.2 : Defects liability period
16. Clause 17.8.4 : Price adjustment for the works (formulae for price adjustment)
17. Clause 18.1.6 : Insurance for works
18. Clause 20.1 : Governing Law and Jurisdiction
19. Clause 25.13(a) and (b) : Notices
20. Article 26 : Definitions
  - “GAD” or “General Arrangement Drawings”
  - “Project Assets”
21. Signature of the Authority on the last page of the Agreement
22. Schedule-A, Annexure-I : Site
23. Schedule-A, Annexure-II : Date for providing Right of Way
24. Schedule-A, Annexure-III : Alignment Plans
25. Schedule-B, Annexure-I : Description of Railway Project
26. Schedule-C : Project Facilities
27. Schedule-D, Annexure-I : Specifications and Standards for Construction
28. Schedule-F, Annexure-I : Form of Bank Guarantee for Performance Security
29. Schedule-F, Annexure-II : Form of Guarantee for Withdrawal of Retention Money
30. Schedule-F, Annexure-III : Form of Guarantee for Advance Payment
31. Schedule-G : Contract Price Weightages
32. Schedule-I : Project Completion Schedule

33. Schedule-J : Tests on Completion

34. Schedule-N : Insurance

35. Schedule-O : Provision of traffic blocks and power blocks

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<sup>20</sup> This Appendix-II contains a list of clauses that would need to be suitably modified prior to issue of bid documents for reflecting project specific provisions. This Appendix-II should be omitted before issuing the draft Concession Agreement, forming part of the bid documents.