



**Engineering, Procurement and Construction
(EPC) Agreement with Schedule G-1 for
“Construction of New Double Line between
New Palghar & Vadhavan Port (Varor Station)
including Electrification works in Mumbai
Division of Western Railway.”**

**Ministry of Railways
Government of India**

Part I
Preliminary

ENGINEERING, PROCUREMENT AND CONSTRUCTION AGREEMENT

THIS AGREEMENT¹ is entered into on this the day of, 20.....

BETWEEN

- 1 The President of India, represented by Chief Engineer(Const)-I, Churchgate, Western Railway, Mumbai, and having its principal offices at 1st Floor Station Building, Churchgate, Western Railways HQ, Mumbai 400020. (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 {.....}², means the selected bidder³ 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 Western⁴ Railway zone⁵.
- (B) The Authority had resolved to Construction of New Double Line between New Palghar & Vadhavan Port (Varor Station) including Electrification works in Mumbai Division of Western 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. Dy CE (C)/CCG/358 [EPC] dated 16/06/2026 from the bidders for undertaking the Project.

¹ Serially numbered footnotes 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.

² 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.

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

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

⁵ All project-specific provisions in this Standard 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.

- (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 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.
- 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 effected 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 mainline sleepers, loop line sleepers, Turnout sleepers, Special sleepers (for SEJ/Guard Rails, bridge & bridge Approaches etc), Points (Thick web switches) & Crossings (CMS Crossings) with all matching fastening components, Glued Joints, H-beam/Composite sleepers over Girder Bridges, SEJs, Guard rails, Check Rails, [fishplates],[welding portions] etc., all Signalling, Telecom and OHE/PSI/Electrification/Lighting materials as per laid down specifications.**
- (b) **Mainline & Loop line Rails, except those covered in Clause 2.1(a) above shall be supplied by the Authority free of cost.**
- (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.

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 40% (forty per cent) of the Contract Price and shall carry out Works for at least 60% (sixty 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 [rails, sleepers and track fittings, signalling and telecommunication & Power supply equipments]. 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 works equal to at least 30% (thirty per cent) of the Contract Price shall be discharged solely by the Lead Member.} ^{\$}Procurement of material, hire of equipment or engagement of labour by prime contractor or procuring entity will not mean sub-contracting.

^{\$} May be deleted if the Contractor is not a Consortium/Joint Venture.

- 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-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 Concession Agreement, the Concessionaire 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. Concessionaire 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.
- 3.2.6 Contractor shall be liable for the regular payment to the sub-Contractor.
- 3.2.7 Contractor in each Interim payment certificate (IPC) reflect the amount of payment to be paid to the Sub-Contractor. The invoices raised by Sub-Contractor for his bill shall be submitted along with IPC, duly attested by the Sub-Contractor.
- 3.2.8 In the subsequent Interim Payment Certificate (IPC), the Contractor shall submit a certificate of Sub-Contractor that they have received the bill amount of previous stage payment statement.

- 3.2.9 In case of dispute over sum of amount to be paid to the sub-Contractor or non-payment to Sub-Contractor, Authority Engineer may raise the issue to the Contractor. After, issue has been raised, Contractor shall resolve the issue within 10 days. In case issue is not resolved, *Authority Engineer shall pay payment due as decided by authority*, to the Sub-Contractor from the forthcoming IPC of Contractor.

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 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 signalling and telecommunication equipment. The number of persons to be trained shall not exceed [6 (six)] and the period of training shall be for a period of [** (**)] weeks. 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 Contractor shall provide training to the personnel of the Authority in SCADA. The number of persons to be trained shall not exceed [6 (six)] and the period of training shall be at least [01] weeks. The training shall be completed before the issuance of the Provisional Certificate/ Completion Certificate.]⁶

⁶Delete it if not applicable.

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.

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% (ninetyfive 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) all environmental and forest clearances as required under Clause 4.3⁷before appointed date; and
 - [(c) approval of the general arrangement drawings (the “**GAD**”) from concerned authorities to enable the Contractor to constructroad over-bridges, under-bridges on the Railway Project in accordance with the Scope, Specifications and Standards, and subject to the terms and conditions specified in such approval, within a period of 60 (sixty) days from the Appointed Date.]⁸
- 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.

[For the avoidance of doubt, the Parties agree that the Damages for delay in approval of GAD by the road authorities for a particular railway over-bridge or a railway under-bridge or a canal crossing shall be deemed to be equivalent to the Damages payable under the provisions of Clause 8.3 for delay in providing Right of Way for a

⁷Clause 4.1.3(b) may be suitably modified in the event that all the environmental clearances for the Project Railway have been received or are not required. It should be clearly stated that all the environmental clearances for the Project Railway have been received; or such environmental clearances for the Project Railway are not required.

⁸Clause (c) may be omitted if the Project does not include a road over-bridge/under-bridge.

length of 1 (one) kilometre for each such railway over-bridge or railway line under-bridge or canal crossings, as the case may be.]

- 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 be 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

The Authority represents and warrants that the environmental and forest clearances of Land mentioned in clause 4.1.3 (a) will be obtained before Appointed Date. In the event of any delay, the Contractor shall be entitled to Time Extension for the period of such delay in accordance with the provisions of Clause 10.4 of this Agreement and shall also be entitled to Damages calculated as if the Right of Way for and in respect of such sections of the Railway Project has not been provided in accordance with the provisions of Clause 8.2 and as a consequence thereof, the Contractor shall be entitled to Damages under and in accordance with the provisions of Clause 8.3. For the avoidance of doubt, the present status of environmental and forest clearances is specified in Schedule-A.¹⁰

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 In the event that the Authority does not provide any machinery and equipment at the designated time in pursuance of the provisions of Clause 4.4.1, the Contractor shall be entitled to Damages in an amount equal twice the rates specified in Schedule-P. Provided further that the Contractor shall be entitled to Time Extension in accordance with the provisions of Clause 10.4 if the number of days for which the machinery has

¹⁰Clause 4.3 may be suitably modified in the event that all the environmental/forest clearances for the Project Railway have been received or are not required. It should be clearly stated that all the environmental/forest clearances for the Railway Project has been received; or such environmental/forest clearances for the Railway Project are not required.

not been provided continuously exceeds 7 (seven) and/ or the total number of days of not providing the machinery exceed 15 (fifteen) days in a period of 03 months.¹¹

[4.5 Electricity transmission lines

The Authority shall procure the Applicable Permits and right of way for the erection, installation, and energisation of the transmission lines required for operating the Railway Project.]¹²

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.

¹¹Delete if not applicable.

¹²Delete if not applicable.

- 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. The Parties expressly agree that in the event of any default in providing such additional blocks for compensating the Contractor, the Authority shall pay to the Contractor Damages at the rate of Rs.1,000 (Rupees one thousand) per day for each hour which has not been provided as required hereunder and until such hour is provided during any of the 6 (six) following weeks.
- 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 fivepercent) 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

ARTICLE 7

PERFORMANCE SECURITY**7.1 Performance Security¹³**

- 7.1.1 Contractor shall, for the performance of its obligations hereunder, provide to the Authority, within 30(Thirty) days of issue of LOA, Performance security in the form of [Insurance Surety Bond*/ account payee demand draft/ fixed deposit receipt from a commercial bank/ online payment in an acceptable form/ an irrevocable and unconditional Bank Guarantee (the “**Performance Security**”)], for an amount equal to 5% (five percent) of the Contract Price and additional performance security as per para 7.1.4 from a Bank in the form set forth in Annex-I/IA 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 provided by the Contractor pursuant hereto and the same comes into effect, the ‘Bid Security’ shall remain in force and effect, and upon such provision 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 5% (five percent) 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.

***Note (In case PG in for of Insurance Surety Bond):**

In case of extension of Date of Completion, selected bidder needs to submit extended Insurance Surety Bond/Fresh Insurance Surety Bond/fresh Performance Security, in any form as given above, before expiry of existing Insurance Surety Bond.

- 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

¹³This is different from Retention Money

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 0.01% (zero point zero one percent) of the Contract Price for each day until the Performance Security is provided. (i.e. from 31st day to 60th day).

- 7.1.4. If a tender is accepted below the advertised tender value, an additional performance security shall be submitted by the bidder as below:

Bid quoted in % of advertised cost	Additional Performance Guarantee (%)
Below 0 - 5% (inclusive)	Nil
Below 5%	5%

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.

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 Money¹⁴

- 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% (sixper cent) thereof asguarantee 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-For FDR/Insurance surety bonds, 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 or FDR/Insurance surety bondsafter 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.
- 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.

¹⁴This is different from Performance Security

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 [alignment plan, Longitudinal section, Yard Plans/ESP and electrification sectioning diagram] 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, locations boxes 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.]

- (b) obtaining environmental clearance and forest clearance for the Railway Project.

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 a 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 per cent) 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 grant a suitable extension to time and no damages will be paid to the contractor.

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 The works of shifting of utility (ies) owned by Railways and already communicated to Contractor as part of Tender document shall be part of schedule-G. List of utilities (Railway owned or other) is being made available to the contractor as part of Tender document. However, the contractor shall have to conduct the inspection/investigation of the utilities before execution of the work independently.

9.1.2 Diversion of utility(ies) not owned by Railways or not communicated to Contractor as part of Tender document shall be payable under BOQ items of relevant Schedule-G1

9.1.3 List of utilities (Railway owned or other) is being made available to the contractor as part of Tender document. However, the contractor shall have to conduct the inspection/investigation of the utilities before execution of the work independently.

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 utility(ies) as per 9.1.2 (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 utilities are to be diverted with proper liaison and approval of the utility owning agencies. NOC & Approval of schemes of Diversion of Utilities from the concerned regulatory /statutory / Local Authority is the responsibility of the Contractor. Cost of such utility shifting unless otherwise specified will be paid separately under relevant item of BOQ (Schedule G1B). No claim on account of delay in execution of utility diversion will be entertained.

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 shall 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 “**a Resource loaded 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.

In case of non- submission of documents beyond 30 days from appointed date the damages shall be imposed as under –

- a) QAP which includes design quality plan, MTP, ITP etc. @ Rs. 25,000/- per day
- b) Environmental management plan @ Rs. 10,000/- per day
- c) Method Statement @ Rs. 10000/- per method statement per day.

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.

Part IV Monthly account of resources (Men and Machinery) proposed to be deployed to complete the milestone/contract in specified time. Failure to deploy the resources will make contractor liable for penalty as decided by authority. The penalties so recovered can be refunded if the contractor make good the resources and achieve next milestone.

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

10.1.4 The Contractor shall plan the project work by keeping Schedule-G and 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.

10.2.1 In case Contractor is not having in house design team then - The Contractor shall appoint a “Design Consultant” at its cost after proposing to the Authority a panel of 3 (three) names of qualified, reputed and experienced firms and Authority will select one Design 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 Design 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 Design 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.

10.2.2 The Railway shall appoint a proof checking consultant at its cost (the “**Proof Consultant**”). For the avoidance of doubt, it must be ensured that no firm or person having any conflict of interest shall be engaged for a Proof checking consultant.

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 route control chart, the following shall apply:

- (a) route control chart
 - (i) The Contractor shall prepare and submit to the Authority Engineer all route control charts conforming to the ESP/SIPs, within a period of 3 (three) months from the Appointed Date;
 - (ii) The Authority Engineer shall review the route control chart within two weeks and submit it with its comments to the Authority for its approval; and
 - (iii) The Authority shall communicate the route control chart as approved by it within a period not exceeding 2(two) months from the date of submission of the route 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 the signalling interlocking plan or route control chart, as the case may be, within the period specified in Clause 10.2.4 for any reason other than Force Majeure or breach of this agreement by the Authority, the Contractor shall pay Damages to the Authority in a sum equal to 0.01% (zero point 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 signalling interlocking plan or route control chart as the case may be, 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 0.01% (zero point 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**"), at its own cost, 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.

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 [900th (nine hundredth) 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.

However, Authority may consider the request of contractor to defer the recovery of these damages if the same is considered essential to maintain the progress of work. The contractor shall submit a resource loaded plan to make good the delay and achieve next Milestone.

- 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 effected 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 GAD by road / state/canal authorities,] environmental/ forest clearances, or [signalling interlocking plan] and route control chart 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) compact discs 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, 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 tests 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 disc 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 tests 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 Punch List shall be completed by the Contractor within 90 (ninety) days of the date of issuance of the Provisional Certificate 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 lower of (a) 0.005% (zero point zero zero five per cent) of the contract price and (b) 0.2% (zero point two percent) 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 Punch List items. For the avoidance of doubt, it is agreed that if completion of any item in the 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 BankRate 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;
- (d) Variation in the quantities of certain items (positive or negative) necessitated due to any change(s) in the L-Section/Alignment/ESPs of the Project with respect to those attached with this document, except on account of existing ground conditions/ground levels mentioned in L-Section/Alignment/ESPs. For avoidance of doubt, it is clarified that the existing ground conditions/ground levels are to be validated by bidders before bid and hence no change on this account is payable, except for works under schedule G1.
- (e) 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;

(a) For Items related to work of foundation	No Limits
(b) For Items in Schedule G1 related to works other than foundation	25%

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.

The Contractor shall submit such proposal, supported with the relevant details including the amount of reduction in the Contract Price, if any, to the Authority to consider such Change of Scope. The Authority shall, within 15 (fifteen) days of receipt of such proposal, either accept such Change of Scope with modifications, if any, and initiate proceedings therefor in accordance with this Article 13 or reject the proposal and inform the Contractor of its decision.

- (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[, if required]; 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 [Zonal Railway, CORE, whichever is applicable] for item other than building works and as per CPWD's AOR for building works and by applying the prevailing market rates of various input construction materials, labour, machinery and T&P.

For working out rate of item in change of scope, the following shall be considered –

- (a) Input of man days, quantities of materials etc.
- (b) The market rates of various materials, labour, machinery shall be as follows:
 - i. For materials market rate shall be based on invoices submitted by contractor or Purchase order placed by contractors for the supply of materials
 - ii. Rates for unskilled, semi-skilled and skilled workers as per the records maintained by the Contractor in accordance with the Laws subject to maximum of those payable as per minimum wages act.
- (c) Contractor's overheads and profit at the rate of 15 (Fifteen) percent of the cost arrived by above AOR.
- (d) Applicable Taxes.

- (B) In case AOR of any items is not available in [Zonal Railway's or CORE's 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[§], 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.

[§] 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, the Defects Liability Period for and in respect of any Structure or Important Bridge specified in Schedule B, or interlocking and telecom switching equipment comprising a new technology shall be deemed to be extended by a further period of 2 (two) year after the expiry of the Defects Liability Period specified in Clause 15.1.1.] Defect Liability Period shall also cover the extensions covered under clause 15.6]

[15.1.3 Without prejudice to the provisions of Clause 15.1.1, the Contractor shall be responsible for making arrangement for signing of agreement for AMC of SCADA as per clause 3.9 of Annexure - I (Schedule-B) between OEM/Approved SCADA vendor and concerned Railway/Division 6 months prior to defects liability period as defined in 15.1.1. In the event that the Contractor fails to make above Arrangement, the Authority shall be entitled to remedy the defects and deficiency of the Contractor in Accordance with the clause 15.4 or may extend the Defects Liability Period in accordance with clause 15.6.1].

[15.1.4 Without prejudice to the provisions of Clause 15.1.1, the Contractor shall be responsible for making arrangement for signing of agreement for AMC of EI system /Axle Counters/ Automatic Train protection system between OEM/Approved vendor and concerned Railway/Division 6 months prior to defects liability period as defined in 15.1.1. for duration of Defect liability period including extended defect liability period. In the event that the Contractor fails to make above Arrangement, the Authority shall be entitled to remedy the defects and deficiency of the Contractor in Accordance with the clause 15.4 or may extend the Defects Liability Period in accordance with clause 15.6.1].

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 Contractors 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 (a) the SCADA system; (b) traction sub-stations and switching posts and (c) EI system /Axle Counters/ Automatic Train protection system. 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 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 route 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. *****) 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. 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 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) 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 up to 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 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 1st 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 1st (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 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.
- 17.2.7 For large value (Contract price not less than 500 cr.) and complex projects, the Authority shall make Advance Payment up to 15% (fifteen per cent) of the Contract Price. The payment shall be made in two installments of up to maximum 7.5% (seven and half per cent) of the contract price each on fulfilment of conditions stipulated in clause 17.2.2 and 17.2.3.

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 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 crore 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 7th (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 04 (four) 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 03 (three) 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.

17.6 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

17.8.1 The amounts payable to the Contractor for Works shall be adjusted in accordance with the provisions of this Clause 17.8.

17.8.2 Subject to the provisions of Clause 17.8.3, the amounts payable to the Contractor for Works shall be adjusted in the IPC issued by the Authority Engineer for the increase or decrease in the index cost of inputs for the works, by the addition or subtraction of the amounts determined by the formulae specified in Clause 17.8.4.

17.8.3 To the extent that any compensation or reimbursement for increase or decrease in costs to the Contractor is not covered by the provisions of this or other Clauses in this Agreement, the costs and prices payable under this Agreement shall be deemed to include the amounts required to cover the contingency of such other increase or decrease of costs and prices.

17.8.4 The Contract Price for Works under schedule G shall be adjusted for increase or decrease in rates and prices of labour, Materials, fuel and lubricants, equipment, Machinery, Plant and other Materials or inputs in accordance with the principles, procedures and formulae specified below:¹⁵

- (a) Price adjustment shall be applied on completion of the specified stage of the respective item of work in accordance with Schedule-G. The 1st Quarter will start from Bid Due date month;
- (b) Adjustment for each item of work/stage shall be made separately;

¹⁵The following changes may be made for project specific cases:

- (a) For project which includes both (i) civil and track works, and (ii) signalling and telecommunication works, retain paragraphs (c), (d), (e), (f), (g) and (h); and delete paragraphs (i), (j) and (k) relating to electrification works.
- (b) For project for signalling and telecommunication works only, delete paragraphs (c), (d), (e) relating to civil works and track works, renumber paragraphs (f), (g) and (h) as (c), (d) and (e) respectively; and change reference to sub-paragraph (h) to sub-paragraph (e) in the renumbered paragraphs; and delete paragraphs (i), (j) and (k) relating to electrification works.
- (c) For electrification works only, delete paragraphs (c), (d), (e) relating to civil works and track work, delete paragraphs (f), (g) and (h) relating to signalling and telecom works; renumber paragraphs (i), (j) and (k) relating to electrification works as (c), (d) and (e) respectively; and also change reference to sub-paragraph (k) to sub-paragraph (e) in the renumbered paragraphs.

- (c) The following expressions and meanings are assigned to the value of the work done for civil and track work:

EW = Value of work done for the completion of a stage under the item earthwork;

BRIMP = Value of work done for the completion of a stage under the item Important Bridges;

BR = Value of work done for the completion of a stage under the items Major Bridges, Minor Bridges, RCC box/pipe culverts, Flyovers, RUB, and ROB in accordance with Schedule-G;

TRK = Value of work done for the completion of a stage under the item Track Works;

TUNL = Value of work done for the completion of a stage under the items Tunnel;

OEW = Value of work done for the completion of a stage under the item Other Engineering Works;

INVCIV = Value of work done for under the item inventory;

INTGTESTCIV = Value of work done for the item integrated testing and commissioning of the Railway Project.

- (d) Price adjustment for change in costs of civil and track work shall be paid in accordance with the following formula:

$$(i) \quad VEW = 0.85 \text{ EW} \times [\text{PLB} \times (\text{LBi} - \text{LBo})/\text{LBo} + \text{PC} \times (\text{Ci} - \text{Co})/\text{Co} + \text{PF} \times (\text{Fi} - \text{Fo})/\text{Fo} + \text{PMACH} \times (\text{MACHi} - \text{MACHo})/\text{MACHo} + \text{POTH} \times (\text{OTHi} - \text{OTHo})/\text{OTHo}];$$

$$(ii) \quad \text{VBRIMP} = 0.85 \text{ BRIMP} \times [\text{PLB} \times (\text{LBi} - \text{LBo})/\text{LBo} + \text{PC} \times (\text{Ci} - \text{Co})/\text{Co} + \text{PS} \times (\text{Si} - \text{So})/\text{So} + \text{PF} \times (\text{Fi} - \text{Fo})/\text{Fo} + \text{PMACH} \times (\text{MACHi} - \text{MACHo})/\text{MACHo} + \text{POTH} \times (\text{OTHi} - \text{OTHo})/\text{OTHo}];$$

$$(iii) \quad \text{VBR} = 0.85 \text{ BR} \times [\text{PLB} \times (\text{LBi} - \text{LBo})/\text{LBo} + \text{PC} \times (\text{Ci} - \text{Co})/\text{Co} + \text{PS} \times (\text{Si} - \text{So})/\text{So} + \text{PF} \times (\text{Fi} - \text{Fo})/\text{Fo} + \text{PMACH} \times (\text{MACHi} - \text{MACHo})/\text{MACHo} + \text{POTH} \times (\text{OTHi} - \text{OTHo})/\text{OTHo}];$$

$$(iv) \quad \text{VTRK} = 0.85 \text{ TRK} \times [\text{PLB} \times (\text{LBi} - \text{LBo})/\text{LBo} + \text{PC} \times (\text{Ci} - \text{Co})/\text{Co} + \text{PS} \times (\text{Si} - \text{So})/\text{So} + \text{PF} \times (\text{Fi} - \text{Fo})/\text{Fo} + \text{PMACH} \times (\text{MACHi} - \text{MACHo})/\text{MACHo} + \text{POTH} \times (\text{OTHi} - \text{OTHo})/\text{OTHo} + \text{PR} \times (\text{Ri} - \text{Ro})/\text{Ro}];$$

$$(v) \quad \text{VTUNL} = 0.85 \text{ TUNL} \times [\text{PLB} \times (\text{LBi} - \text{LBo})/\text{LBo} + \text{PC} \times (\text{Ci} - \text{Co})/\text{Co} + \text{PS} \times (\text{Si} - \text{So})/\text{So} + \text{PF} \times (\text{Fi} - \text{Fo})/\text{Fo} + \text{PMACH} \times (\text{MACHi} - \text{MACHo})/\text{MACHo} + \text{POTH} \times (\text{OTHi} - \text{OTHo})/\text{OTHo} + \text{PXL P} \times (\text{XLPi} - \text{XLPo})/\text{XLPo}];$$

- (vi) $VOEW = 0.85 \text{ OEW} \times [\text{PLB} \times (\text{LBi} - \text{LBo})/\text{LBo} + \text{PC} \times (\text{Ci} - \text{Co})/\text{Co} + \text{PS} \times (\text{Si} - \text{So})/\text{So} + \text{PF} \times (\text{Fi} - \text{Fo})/\text{Fo} + \text{PMACH} \times ((\text{MACHi} - \text{MACHo})/\text{MACHo} + \text{POTH} \times (\text{OTHi} - \text{OTHo})/\text{OTHo}]$;
- (vii) $\text{VINVCIV} = 0.85 \text{ INVCIV} \times [\text{PR} \times (\text{Ri} - \text{Ro})/\text{Ro} + \text{POTH} \times (\text{OTHi} - \text{OTHo})/\text{OTHo}]$; and
- (viii) $\text{VINTGTESTCIV} = 0.85 \text{ INTGTESTCIV} \times [\text{PLB} \times (\text{LBi} - \text{LBo})/\text{LBo} + \text{POTH} \times (\text{OTHi} - \text{OTHo})/\text{OTHo}]$;

Where

VEW = Increase or decrease in the cost of earthwork during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (e);

VBRIMP = Increase or decrease in the cost of Important Bridges during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (e);

VBR = Increase or decrease in the cost of Major Bridges, Minor Bridges, Flyovers, RCC box/pipe culverts (ROB/RUB) during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (e);

VTRK = Increase or decrease in the cost of track works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (e);

VTUNL = Increase or decrease in the cost of tunnels during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (e);

VOEW = Increase or decrease in the cost of Other Engineering Works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (e);

VINVCIV = Increase or decrease in the cost of inventory during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (e);

VINTGTESTCIV = Increase or decrease in the cost of integrated testing and commissioning during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (e);

PC, PF, PLB, PMACH, POTH, PR, PS and PXLPL are the percentages of cement, fuel and lubricants, labour, Plant Machinery and tools, other materials, rails, steel/ components (including strands and steel cables), and explosives respectively for the relevant item as specified in sub-paragraph (e);

Co = The wholesale price index as published by the Ministry of Commerce and Industry, Government of India (hereinafter called “WPI”) for sub-group Cement, Lime & Plaster for the month of the Base Month;

C_i = The WPI for sub-group Cement, Lime & Plaster for the average price index of the 3 months of the quarter under consideration;

F_o = The wholesale price index as published by the Ministry of Commerce and Industry, Government of India (hereinafter called “**WPI**”) for group Fuel & Power for the month of the Base Month

F_i = The WPI for group Fuel & Power for the average price index of the 3 months of the quarter under consideration

LBo = The consumer price index for industrial workers – All India, published by Labour Bureau, Ministry of Labour, Government of India, (hereinafter called “**CPI**”) for the month of the Base Month;

LBi = The CPI for industrial workers – All India for the average price index of the 3 months of the quarter under consideration;

$MACH_o$ = The wholesale price index as published by the Ministry of Commerce and Industry, Government of India (hereinafter called “**WPI**”) for category- k “Manufacturing of Machinery for Mining, quarrying and construction’ under (R) Manufacturing of Machinery and Equipment for the month of the Base Month;

$MACH_i$ = The WPI for category- k “Manufacturing of Machinery for Mining, quarrying and construction’ under (R) Manufacturing of Machinery and Equipment for the average price index of the 3 months of the quarter under consideration;

OTH_o = The wholesale price index as published by the Ministry of Commerce and Industry, Government of India (hereinafter called “**WPI**”) for all commodities for the month of the Base Month;

OTH_i = The WPI for all commodities for the average price index of the 3 months of the quarter under consideration;

Ro = The Price for Rails (60kg) published by the Bhilai Plant of the Steel Authority of India for the month of the Base Month;

Ri = The Price for Rails (60kg) published by the Bhilai Plant of the Steel Authority of India for the month which is three months prior to the month to which the IPC relates;

So = The rate provided by the Joint Plant Committee for the relevant category of steel item as mentioned in clause 17.8.4(A) as published for the month of the Base Month;

Si = The average rate provided by the Joint Plant Committee for the relevant category of steel item as mentioned in clause 17.8.4-A as published for the 3 months of the quarter under consideration;

$XLPo$ = The wholesale price index as published by the Ministry of Commerce and Industry, Government of India (hereinafter called “**WPI**”) for explosives for the month of the Base Month; and

XLPI = The WPI for explosives for the average price index of the 3 months of the quarter under consideration.

- (f) ~~The following expressions and meanings are assigned to the value of the work done for signalling and telecommunication works:~~

~~SIGWK = Value of signalling works for a stage payment of the item signalling works;~~

~~INVSIG = Value of inventory for signalling works for a stage payment of the item inventory for signalling works;~~

~~INTGTESTSIG = Value of integrated testing and commission for signalling works of the Railway Project;~~

~~COMWK = Value of telecommunication works for a stage payment of the item telecommunication works;~~

~~INVCOM = Value of inventory for telecommunication works for a stage payment of the item inventory for telecommunication works; and~~

~~INTGTESTCOM = Value of integrated testing and commission for telecommunication works of the Railway Project.~~

- (g) ~~Price adjustment for changes in cost of signalling works and telecommunication works shall be paid in accordance with the following formula:~~

(i) ~~$$VSIGWK = 0.85 \text{ SIGWK} \times [\text{PELEX} \times (\text{ELEX}_i - \text{ELEX}_o) / \text{ELEX}_o + \text{POFC} \times (\text{OFC}_i - \text{OFC}_o) / \text{OFC}_o + \text{PLB} \times (\text{LBI} - \text{LBo}) / \text{LBo} + \text{POTH} \times (\text{OTH}_i - \text{OTH}_o) / \text{OTH}_o + \text{S30C} \times (\text{P30C}_i - \text{P30C}_o) / \text{P30C}_o + \text{S24C} \times (\text{P24C}_i - \text{P24C}_o) / \text{P24C}_o + \text{S19C} \times (\text{P19C}_i - \text{P19C}_o) / \text{P19C}_o + \text{S12C} \times (\text{P12C}_i - \text{P12C}_o) / \text{P12C}_o + \text{S9C} \times (\text{P9C}_i - \text{P9C}_o) / \text{P9C}_o + \text{S6C} \times (\text{P6C}_i - \text{P6C}_o) / \text{P6C}_o + \text{S4C} \times (\text{P4C}_i - \text{P4C}_o) / \text{P4C}_o + \text{S2C} \times (\text{P2C}_i - \text{P2C}_o) / \text{P2C}_o + \text{S12C2.5} \times (\text{P12C2.5}_i - \text{P12C2.5}_o) / \text{P12C2.5}_o + \text{S2C2.5} \times (\text{P2C2.5}_i - \text{P2C2.5}_o) / \text{P2C2.5}_o + \text{S2C25} \times (\text{P2C25}_i - \text{P2C25}_o) / \text{P2C25}_o + \text{QC} \times (\text{PQC}_i - \text{PQC}_o) / \text{PQC}_o];$$~~

(ii) ~~$$VINVSIG = 0.85 \text{ SIGWK} \times [\text{PELEX} \times (\text{ELEX}_i - \text{ELEX}_o) / \text{ELEX}_o + \text{POTH} \times (\text{OTH}_i - \text{OTH}_o) / \text{OTH}_o];$$~~

(iii) ~~$$VINTGTESTSIG = 0.85 \text{ INTGTESTSIG} \times [\text{PLB} \times (\text{LBI} - \text{LBo}) / \text{LBo} + \text{POTH} \times (\text{OTH}_i - \text{OTH}_o) / \text{OTH}_o];$$~~

(iv) ~~$$VCOMWK = 0.85 \text{ COMWK} \times [\text{PELEX} \times (\text{ELEX}_i - \text{ELEX}_o) / \text{ELEX}_o + \text{POFC} \times (\text{OFC}_i - \text{OFC}_o) / \text{OFC}_o + \text{PLB} \times (\text{LBI} - \text{LBo}) / \text{LBo} + \text{POTH} \times (\text{OTH}_i - \text{OTH}_o) / \text{OTH}_o + \text{S30C} \times (\text{P30C}_i - \text{P30C}_o) / \text{P30C}_o + \text{S24C} \times (\text{P24C}_i - \text{P24C}_o) / \text{P24C}_o + \text{S19C} \times (\text{P19C}_i - \text{P19C}_o) / \text{P19C}_o + \text{S12C} \times (\text{P12C}_i - \text{P12C}_o) / \text{P12C}_o + \text{S9C} \times (\text{P9C}_i - \text{P9C}_o) / \text{P9C}_o + \text{S6C} \times (\text{P6C}_i - \text{P6C}_o) / \text{P6C}_o + \text{S4C} \times (\text{P4C}_i - \text{P4C}_o) / \text{P4C}_o + \text{S2C} \times (\text{P2C}_i - \text{P2C}_o) / \text{P2C}_o + \text{S12C2.5} \times (\text{P12C2.5}_i - \text{P12C2.5}_o) / \text{P12C2.5}_o + \text{S2C2.5} \times (\text{P2C2.5}_i - \text{P2C2.5}_o) / \text{P2C2.5}_o + \text{S2C25} \times (\text{P2C25}_i - \text{P2C25}_o) / \text{P2C25}_o];$$~~

$$P2C25_o)/P2C25_o + QC \times (PQC_i - PQC_o)/PQC_o + PCEQP \times (CEQP_i - CEQP_o)/CEQP_o];$$

$$(v) \text{ ~~VINVCOM = 0.85 SIGWK} \times [PELEX \times (ELEX_i - ELEX_o)/ELEX_o + PCEQP \times (CEQP_i - CEQP_o)/CEQP_o + POTH \times (OTH_i - OTH_o)/OTH_o]; \text{ and}~~$$

$$(vi) \text{ ~~VINTGTESTCOM = 0.85 INTGTESTCOM} \times [PLB \times (LB_i - LB_o)/LB_o + POTH \times (OTH_i - OTH_o)/OTH_o].~~$$

Where

~~VSIGWK = Increase or decrease in the cost of signalling works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (h);~~

~~VINVSIG = Increase or decrease in the cost of inventory for signalling during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (h);~~

~~VINTGTESTSIG = Increase or decrease in the cost of integrated testing and commissioning of signalling works of the Railway Project during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (h);~~

~~VCOMWK = Increase or decrease in the cost of communication works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (h);~~

~~VINVCOM = Increase or decrease in the cost of inventory for telecommunications works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (h);~~

~~VINTGTESTCOM = Increase or decrease in the cost of integrated testing and commissioning of telecommunication works of the Railway Project during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (h);~~

~~PCEQP, PELEX, PIC, PLB, POFC, and POTH are the percentages of communication equipment, electronics, PVC insulated cables, labour, optical fibre cables, and other materials respectively;~~

~~CEQP_o = The wholesale price index as published by the Ministry of Commerce and Industry, Government of India (hereinafter called “WPI”) for communication equipment for the month of the Base Month;~~

~~CEQP_i = The WPI for communication equipment for the average price index of the 3 months of the quarter under consideration;~~

~~ELEX_o = The WPI for electronics for the month of the Base Month;~~

~~ELEX_i = The WPI for electronics for the average price index of the 3 months of the quarter under consideration;~~

~~P30C_i = Price payable per Km as adjusted in accordance with price variation Clause for size 30C x 1.5 sq mm signalling cable~~

~~P30C_o = Price per Km of cable as per purchase order/ Contract agreement.~~

~~S30C = Percentage of size 30C x 1.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.~~

~~P24C_i = Price payable per Km as adjusted in accordance with price variation Clause for size 24C x 1.5 sq mm signalling cable~~

~~P24C_o = Price per Km of cable as per purchase order/ Contract agreement.~~

~~S24C = Percentage of size 24C x 1.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.~~

~~P19C_i = Price payable per Km as adjusted in accordance with price variation Clause for size 19C x 1.5 sq mm signalling cable~~

~~P19C_o = Price per Km of cable as per purchase order/ Contract agreement.~~

~~S19C = Percentage of size 19C x 1.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.~~

~~P12C_i = Price payable per Km as adjusted in accordance with price variation Clause for size 12C x 1.5 sq mm signalling cable~~

~~P12C_o = Price per Km of cable as per purchase order/ Contract agreement.~~

~~S12C = Percentage of size 12C x 1.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.~~

~~P9C_i = Price payable per Km as adjusted in accordance with price variation Clause for size 9C x 1.5 sq mm signalling cable~~

~~P9C_o = Price per Km of cable as per purchase order/ Contract agreement.~~

~~S9C = Percentage of size 9C x 1.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.~~

~~P6C_i = Price payable per Km as adjusted in accordance with price variation Clause for size 6C x 1.5 sq mm signalling cable~~

~~P6C_o = Price per Km of cable as per purchase order/ Contract agreement.~~

~~S6C = Percentage of size 6C x 1.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.~~

~~P4C_i = Price payable per Km as adjusted in accordance with price variation Clause for size 4C x 1.5 sq mm signalling cable~~

~~P4C_o = Price per Km of cable as per purchase order/ Contract agreement.~~

~~S4C = Percentage of size 4C x 1.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.~~

~~P2C_i = Price payable per Km as adjusted in accordance with price variation Clause for size 2C x 1.5 sq mm signalling cable~~

~~P2C_o = Price per Km of cable as per purchase order/ Contract agreement.~~

~~S2C = Percentage of size 2C x 1.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.~~

~~P12C2.5_i = Price payable per Km as adjusted in accordance with price variation Clause for size 12C x 2.5 sq mm signalling cable~~

~~P12C2.5_o = Price per Km of cable as per purchase order/ Contract agreement.~~

~~S12C2.5 = Percentage of size 12C x 2.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.~~

~~P2C2.5_i = Price payable per Km as adjusted in accordance with price variation Clause for size 2C x 2.5 sq mm signalling cable~~

~~P2C2.5_o = Price per Km of cable as per purchase order/ Contract agreement.~~

~~S2C2.5 = Percentage of size 2C x 2.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.~~

~~P2C25_i = Price payable per Km as adjusted in accordance with price variation Clause for size 2C x 25 sq mm signalling cable~~

~~P2C25_o = Price per Km of cable as per purchase order/ Contract agreement.~~

~~S2C25 = Percentage of size 2C x 25 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.~~

~~PQC_i = Price payable per Km as adjusted in accordance with price variation Clause for size 0.9mm dia, 6 Quad cable.~~

~~PQC_o = Price per Km of cable as per purchase order/ Contract agreement.~~

~~QC = Percentage of size 0.9mm dia, 6 Quad cable shall govern the price.~~

~~LBo = The consumer price index for industrial workers — All India, published by Labour Bureau, Ministry of Labour, Government of India; (hereinafter called “CPI”) for the month of the Base Month;~~

~~LBi = The CPI for industrial workers — All India for the average price index of the 3 months of the quarter under consideration;~~

~~OFCo = The WPI for fibre cables for the month of the Base Month;~~

~~OFCi = The WPI for fibre cables for the average price index of the 3 months of the quarter under consideration;~~

~~OTHo = The WPI for all commodities for the month of the Base Month; and~~

~~OTHi = The WPI for all commodities for the average price index of the 3 months of the quarter under consideration.~~

- (h) The following percentages shall govern the price adjustment of the Contract Price for signalling and telecommunication works:-

Component	Signalling			Telecommunication		
	Signalling Works	Signalling inventory	Integrated testing and Commissioning	Telecommunication Works	Telecomm inventory	Integrated testing and Commissioning
-						
Electronics (PELEX)	***0%	***0%	—	***0%	***0%	—
Communication Equipment (PCEQP)	—	—	—	***0%	***0%	—
Optical Fibre Cable (POFC)	***0%	—	—	***0%	—	—
30C x 1.5 sq mm signalling cable (S30C)	***0%	—	—	***0%	—	—
24C x 1.5 sq mm signalling cable (S24C)	***0%	—	—	***0%	—	—
19C x 1.5 sq mm signalling cable (S19C)	***0%	—	—	***0%	—	—
12C x 1.5 sq mm signalling cable (S12C)	***0%	—	—	***0%	—	—
9C x 1.5 sq mm signalling cable (S9C)	***0%	—	—	***0%	—	—
6C x 1.5 sq mm signalling cable (S6C)	***0%	—	—	***0%	—	—
4C x 1.5 sq mm signalling cable (S4C)	***0%	—	—	***0%	—	—
2C x 1.5 sq mm signalling cable (S2C)	***0%	—	—	***0%	—	—
12C x 2.5 sq mm signalling cable (S12C2.5)	***0%	—	—	***0%	—	—
2C x 2.5 sq mm signalling cable (S2C2.5)	***0%	—	—	***0%	—	—
2C x 25 sq mm signalling cable	***0%	—	—	***0%	—	—

(S2C25)						
0.9 mm dia, 6Quad cable (QC)	***0%	=	=	***0%	=	=
Labour (PLB)	***0%	=	***0%	***0%	***0%	***0%
Other materials	***0%	***0%	***0%	***0%	***0%	***0%
Total	100%	100%	100%	100%	100%	100%

(a) ~~PRICE VARIATION FORMULA FOR SIGNALING & TELECOM CABLE~~

~~The price payable for signalling cables is variable as per Price Variation Formula given below:~~

~~**For Signalling Copper Cables:**~~

$$P_i = P_o + CuF (Cu - Cu_o) + CCFCu(CC - CC_o) + FeF (Fe - Fe_o)$$

~~**For Telecom Copper Cables For Jelly Filled, 0.9 mm dia, 6 quad cable**~~

$$P_i = P_o + CuF (Cu - Cu_o) + AlFcu(Al - Al_o) + CCFCu (CC - Cc_o) + FeF (Fe - Fe_o)$$

~~**For Aluminium Power Cables:**~~

$$P_i = P_o + AlF (Al - Al_o) + CCFAI(CC - CC_o) + FeF (Fe - Fe_o)$$

~~Where,~~

~~P_i = Price payable per KM as adjusted in accordance with Price variation clause.~~

~~P_o = Price per KM of cable as per Purchase order.~~

~~CuF = Variation factor for Copper~~

~~Cu_o = Price of copper Rod in Rs. Per MT~~

~~CCFCu = Variation factor for PVC Compound for Copper Signalling & Telecom cable~~

~~CC_o = Price of PVC Compound in Rs. Per MT~~

~~AlF = Variation factor for Aluminium~~

~~Al_o = Price of EC grade LME Aluminium rods (Properzi rods) in Rs. Per MT.~~

~~CCFAI = Variation factor for PVC Compound for Aluminium power cable~~

~~FeF = Variation factor for Steel~~

~~Fe_o = Price of Steel for Armour (Flat strip 4 mm. x 0.8mm/ Round 1.4mm dia) in Rs. Per MT~~

~~(Prices per MT for Cu_o, CC_o, Fe_o, Al_o as applicable on the 1st working day of the month, one month prior to the deadline for submission of bids. The above prices and indices are as published by IEEMA vide circular reference no. IEEMA (PVC) /CABLE -- / -- one month prior to the deadline for submission of bids.)~~

~~Cu= Price of Copper Rod in Rs. Per MT.~~

~~CC= Price of PVC Compound in Rs. Per MT.~~

~~Fe= Price of Steel for Armouring (Flat strip 4mm x 0.8 mm/ Round 1.4mm dia) in Rs. Per MT.~~

~~Al= Price of EC grade LME Aluminium rods (Properzi rods) in Rs. Per MT.~~

(Prices per MT for Cu, CC, Fe, Al as prevailing on 1st working day of the calendar month covering the date One month prior to the date of inspection call letter will be applicable for the calculation of updated price. The above prices and indices are as published by IEEMA vide circular reference no. IEEMA (PVC) /CABLE / / one month prior to the date of inspection.)

~~The value of variation factors for copper, steel and PVC Compound are different for different sizes of signalling cables. Accordingly, the PVC formula for some of the types of signalling cable is as given under:-~~

~~Underground Railway Signalling Cable unscreened and armoured copper conductor~~

~~(i) Size 30 C x 1.5 sq.mm.~~

$$~~P_{30C_i} = P_{30C_o} + 0.391(Cu - Cu_o) + 0.557(CC - CC_o) + 0.425(Fe - Fe_o)~~$$

~~For armouring, price of steel flat strip of size 4mmx0.8mm is to be taken into consideration.~~

~~(ii) Size 24C x 1.5 sq.mm~~

$$~~P_{24C_i} = P_{24C_o} + 0.313(Cu - Cu_o) + 0.481(CC - CC_o) + 0.398(Fe - Fe_o)~~$$

~~For armouring, value of steel flat strip of size 4mmx0.8mm is to be taken into consideration.~~

~~(iii) Size 19C x 1.5 sq.mm~~

$$~~P_{19C_i} = P_{19C_o} + 0.248(Cu - Cu_o) + 0.395(CC - CC_o) + 0.343(Fe - Fe_o)~~$$

~~For armouring, value of steel flat strip of size 4mmx0.8mm is to be taken into consideration.~~

~~(iv) Size 12C x 1.5 sq.mm~~

$$~~P_{12C_i} = P_{12C_o} + 0.157(Cu - Cu_o) + 0.277(CC - CC_o) + 0.289(Fe - Fe_o)~~$$

~~For armouring, value of steel wire size 1.4mm dia is to be taken into consideration.~~

~~(v) Size 9C x 1.5 sq.mm~~

$$~~P_{9C_i} = P_{9C_o} + 0.117(Cu - Cu_o) + 0.241(CC - CC_o) + 0.383(Fe - Fe_o)~~$$

~~For armouring, value of steel wire size 1.4mm dia is to be taken into consideration.~~

~~(vi) Size 6C x 1.5 sq.mm~~

$$~~P_{6C_i} = P_{6C_o} + 0.078(Cu - Cu_o) + 0.199(CC - CC_o) + 0.329(Fe - Fe_o)~~$$

~~For armouring, value of steel wire size 1.4mm dia is to be taken into consideration.~~

~~(vii) Size 4C x 1.5 sq.mm~~

$$~~P_{4C_i} = P_{4C_o} + 0.052(Cu - Cu_o) + 0.152(CC - CC_o) + 0.277(Fe - Fe_o)~~$$

~~For armouring, value of steel wire size 1.4mm dia is to be taken into consideration.~~

~~(viii) Size 2C x 4 sq.mm(multistrand)~~

$$P2C_i = P2C_o + 0.073(Cu - C_{uo}) + 0.156(CC - C_{Co}) + 0.3(Fe - F_{eo})$$

~~For armouring, value of steel wire size 1.4mm dia is to be taken into consideration.~~

~~(ix) Size 12C x 2.5 sq.mm~~

$$P12C2.5_i = P12C2.5_o + 0.282 (Cu - C_{uo}) + 0.371 (CC - C_{Co}) + 0.342 (Fe - F_{eo})$$

~~For armouring, value of steel flat strip of size 4mmx0.8mm is to be taken into consideration.~~

~~(x) Size 2C x 2.5 sq.mm~~

$$P2C2.5_i = P2C2.5_o + 0.047 (Cu - C_{uo}) + 0.139 (CC - C_{Co}) + 0.277 (Fe - F_{eo})$$

~~For armouring, value of steel wire size 1.4mm dia is to be taken into consideration.~~

~~(xi) Size 2C x 25 sq.mm PVC insulated, armoured, Aluminium power cable~~

$$P2C25_i = P2C25_o + 0.146 (Al - A_{lo}) + 0.303 (CC - C_{Co}) + 0.306 (Fe - F_{eo})$$

~~For armouring, value of steel flat strip of size 4mmx0.8mm is to be taken into consideration.~~

~~(xii) For Jelly filled, 0.9mm dia, 6 quad cable~~

$$PQC_i = PQC_o + 0.135 (Al - A_{lo}) + 0.139 (Cu - C_{uo}) + 0.515 (CC - C_{Co}) + 0.693 (Fe - F_{eo})$$

~~For PVC Compound Grade CW 22, is to be taken into consideration.~~

- (i) The following expressions and meanings are assigned to the value of the work done for electrification works:

OHE = Value of work done for the completion of a stage under the item Overhead Equipment Work;

SP = Value of work done for the completion of a stage under the item Switching Posts;

TRANSBOO = Value of work done for the completion of a stage under the item Booster Transformer;

TRANSAUX = Value of work done for the completion of a stage under the item Auxiliary Transformer;

TSS = Value of work done for the completion of a stage under the item Traction Sub Station;

TLOH = Value of work done for the completion of a stage under the item High Voltage Transmission Line Overhead including monopole;

TLUG = Value of work done for the completion of a stage under the item Underground High Tension Cable Transmission Line;

BAY = Value of work done for the completion of a stage under the item Bay Augmentation work at Grid Sub-Station/Terminal arrangement at TSS;

SCADA = Value of work done for the completion of a stage under the item SCADA;

ELEGWK = Value of work done for the completion of a stage under the item various electrical general services works;

MODHTPWRLINE = Value of work done for the completion of a stage under the item modification of HT power lines and crossings (raising of height);

MODHTLTOUG = Value of work done for the completion of a stage under the item modification of HT power lines and crossings to underground (replacement by underground cabling);

MODLTTLTOUG = Value of work done for the completion of a stage under the item modification of LT power lines and crossings to underground (replacement by underground cabling);

EXTNLTPWRSPLY = Value of work done for the completion of a stage under the item extension/augmentation of power supply for CLS work;

EXTNPWRSUPPLY = Value of work done for the completion of a stage under the item extension/augmentation of general power supply;

MODELETRICAL = Value of work done for the completion of a stage under the item modification to existing electrical works;

INVELECTRICAL = Value of work done for the completion of a stage under the item inventory electrical;

SIGMOD = Value of work done for the completion of a stage under the item Signalling System Modification;

INVSIG = Value of work done for the completion of a stage under the item signalling inventory;

TESTSIG = Value of work done for the completion of a stage under the item integrated testing and commissioning;

COMMODO = Value of work done for the completion of a stage under the item Telecommunications modifications;

INVCOM = Value of work done for the completion of a stage under the item telecommunication inventory;

TESTCOM = Value of work done for the completion of a stage under the item integrated testing and commissioning; and

CIVENG = Value of work done for the completion of a stage under the item Civil Engineering works.

- (j) Price adjustment for changes in cost for electrification works shall be paid in accordance with the following formula:

$$(i) \quad VOHE = 0.85 \text{ OHE} \times [PLB \times (LBi - LBo)/LBo + PC \times (Ci - Co)/Co + PSST \times (SSTi - SSTo)/SSTo + PCU \times (CUi - CUo)/CUo + PINS \times (INSi - INSo)/INSo];$$

$$(ii) \quad VSP = 0.85 \text{ SP} \times [PLB \times (LBi - LBo)/LBo + PC \times (Ci - Co)/Co + PSWGR \times (SWGRi - SWGRo)/SWGRo];$$

$$(iii) \quad VTRANSBOO = 0.85 \text{ TRANSBOO} \times [PLB \times (LBi - LBo)/LBo + PSST \times (SSTi - SSTo)/SSTo + PTR \times (TRi - TRo)/TRo];$$

- (iv) $VTRANS AUX = 0.85 TRANS AUX \times [PLB \times (LB_i - LB_o)/LB_o + PSST \times (SST_i - SST_o)/SST_o + PTR \times (TR_i - TR_o)/TR_o]$;
- (v) $VTSS = 0.85 TSS \times [PLB \times (LB_i - LB_o)/LB_o + PTR \times (TR_i - TR_o)/TR_o + PC \times (C_i - C_o)/C_o + PSST \times (SST_i - SST_o)/SST_o + PSWGR \times (SWGR_i - SWGR_o)/SWGR_o]$;
- (vi) $VTLOH = 0.85 TLOH \times [PLB \times (LB_i - LB_o)/LB_o + PSST \times (SST_i - SST_o)/SST_o + PCOND \times (COND_i - COND_o)/COND_o + PC \times (C_i - C_o)/C_o + PINS \times (INS_i - INS_o)/INS_o + POTH \times (OTH_i - OTH_o)/OTH_o]$;
- (vii) $VTLUG = 0.85 TLUG \times [PLB \times (LB_i - LB_o)/LB_o + PPC \times (PC_i - PC_o)/PC_o]$;
- (viii) $VBAY = 0.85 BAY \times [PLB \times (LB_i - LB_o)/LB_o + PSST \times (SST_i - SST_o)/SST_o + PC \times (C_i - C_o)/C_o + PCU \times (CU_i - CU_o)/CU_o]$;
- (ix) $VSCADA = 0.85 SCADA \times [PLB \times (LB_i - LB_o)/LB_o + PELEX \times (ELEX_i - ELEX_o)/ELEX_o]$;
- (x) $VELEGWK = 0.85 ELEGW \times [PLB \times (LB_i - LB_o)/LB_o + POTH \times (OTH_i - OTH_o)/OTH_o]$;
- (xi) $VMODHTPWRLINE = 0.85 MODHTPWRLINE \times [PLB \times (LB_i - LB_o)/LB_o + PSST \times (SST_i - SST_o)/SST_o + POTH \times (OTH_i - OTH_o)/OTH_o]$;
- (xii) $VMODHTLTOUG = 0.85 MODHTLTOUG \times [PLB \times (LB_i - LB_o)/LB_o + PPC \times (PC_i - PC_o)/PC_o + POTH \times (OTH_i - OTH_o)/OTH_o]$;
- (xiii) $VMODLTLTOUG = 0.85 MODLTLTOUG \times [PLB \times (LB_i - LB_o)/LB_o + PPC \times (PC_i - PC_o)/PC_o + POTH \times (OTH_i - OTH_o)/OTH_o]$;
- (xiv) $VEXTNLTPWRSPLY = 0.85 EXTNLTPWRSPLY \times [PLB \times (LB_i - LB_o)/LB_o + POTH \times (OTH_i - OTH_o)/OTH_o]$;
- (xv) $VEXTNPWRSUPPLY = 0.85 EXTNPWRSUPPLY \times [PLB \times (LB_i - LB_o)/LB_o + POTH \times (OTH_i - OTH_o)/OTH_o]$;
- (xvi) $VMODELETRICAL = 0.85 MODELETRICAL \times [PLB \times (LB_i - LB_o)/LB_o + POTH \times (OTH_i - OTH_o)/OTH_o]$;
- (xvii) $INVELECTRICAL = 0.85 INVELECTRICAL \times [POTH \times (OTH_i - OTH_o)/OTH_o]$;
- (xviii) $VSIGMOD = 0.85 SIGMOD \times [PLB \times (LB_i - LB_o)/LB_o + PELEX \times (ELEX_i - ELEX_o)/ELEX_o + PPC \times (PC_i - PC_o)/PC_o + POTH \times (OTH_i - OTH_o)/OTH_o]$;
- (xix) $VINVSIG = 0.85 INVSIG \times [POTH \times (OTH_i - OTH_o)/OTH_o]$;
- (xx) $VTESTSIG = 0.85 TESTSIG \times [PLB \times (LB_i - LB_o)/LB_o + POTH \times (OTH_i - OTH_o)/OTH_o]$;
- (xxi) $VCOMMODO = 0.85 COMMODO \times [PLB \times (LB_i - LB_o)/LB_o + PELEX \times (ELEX_i - ELEX_o)/ELEX_o + POFC \times (OFC_i - OFC_o)/OFC_o]$;

- (xxii) $VINVCOM = 0.85 \text{ INVCOM} \times [\text{POTH} \times (\text{OTH}_i - \text{OTH}_o)/\text{OTH}_o]$;
- (xxiii) $VTESTCOM = 0.85 \text{ TESTCOM} \times [\text{PLB} \times (\text{LB}_i - \text{LB}_o)/\text{LB}_o + \text{POTH} \times (\text{OTH}_i - \text{OTH}_o)/\text{OTH}_o]$; and
- (xxiv) $VCIVENG = 0.85 \times VCIVENG \times [\text{PLB} \times (\text{LB}_i - \text{LB}_o)/\text{LB}_o + \text{PS} \times (\text{S}_i - \text{S}_o)/\text{S}_o + \text{PC} \times (\text{C}_i - \text{C}_o)/\text{C}_o + \text{POTH} \times (\text{OTH}_i - \text{OTH}_o)/\text{OTH}_o]$.

Where

VOHE = Increase or decrease in the cost of Over Head Equipment and other related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VSP = Increase or decrease in the cost of Switch Post and other related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VTRANSBOO = Increase or decrease in the cost of booster transformer and other related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VTRANSAUX = Increase or decrease in the cost of auxiliary transformer and other related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VTSS = Increase or decrease in the cost of Traction Sub-Station and other related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VTLOH = Increase or decrease in the cost of overhead transmission line and related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VTLUG = Increase or decrease in the cost of underground high voltage transmission line and related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VBAY = Increase or decrease in the cost of bay augmentation work at grid sub-station/ terminal arrangement at TSS and related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VSCADA = Increase or decrease in the cost of SCADA and related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VELEGWK = Increase or decrease in the cost of various electrical general services works and related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VMODHTPWRLINE = Increase or decrease in the cost of modification of HT power lines and crossings (raising of height) and related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VMODHTLTOUG = Increase or decrease in the cost of modification of HT power lines and crossings to underground (replacement by underground cabling) and related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VMODLTLTOUG = Increase or decrease in the cost of modification of LT power lines and crossings to underground (replacement by underground cabling) and related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VEXTNLTPWRSPLY = Increase or decrease in the cost of extension/augmentation of power supply for CLS work and related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VEXTNPWRSUPPLY = Increase or decrease in the cost of extension/augmentation of general power supply and related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VMODELETICAL = Increase or decrease in the cost of modification to existing electrical works and related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VINVELECTRICAL = Increase or decrease in the cost of inventory electrical during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VSIGMOD = Increase or decrease in the cost of signalling system modification and related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VINVSIG = Increase or decrease in the cost of signalling inventory during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VTESTSIG = Increase or decrease in the cost of SCADE and related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VCOMMODO = Increase or decrease in the cost of communication and related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VINVCOM = Increase or decrease in the cost of telecommunication inventory during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VTESTCOM = Increase or decrease in the cost of integrated testing and commissioning and related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

VCIVENG = Increase or decrease in the cost of civil engineering and related works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (k);

PC, PCOND, PCU, PELEX, PINS, PLB, POFC, PSWGR, , PPC, and PSST are the percentages of cement, conductor, copper wire, electronic items, insulators, labour, fibre optic cables, electrical switch gears, PVC insulated cable and structural steel respectively for the relevant item as specified in sub-paragraph (k);

Co = The wholesale price index as published by the Ministry of Commerce & Industry, Government of India (hereinafter called “**WPI**”) for cement, lime, plaster for the month of the Base Month;

Ci = The WPI for cement, lime, plaster for the average price index of the 3 months of the quarter under consideration;

CONDo = **Aluminium LME SELLER Settlement Price including Premium for AL Ingots and Customs duty published by IEEMA** for the month of the Base Month;

CONDi = **Aluminium LME SELLER Settlement Price including Premium for AL Ingots and Customs duty published by IEEMA** for the average price index of the 3 months of the quarter under consideration;

CUo = **Copper: (Cu) Price of copper wire rod published by IEEMA** for the month of the Base Month;

CUi= **Copper: (Cu) Price of copper wire rod published by IEEMA** for the average price index of the 3 months of the quarter under consideration;

ELEXo = **The WPI for Manufacture OF Electronic Components** for the month of the Base Month;

ELEXi = **The WPI for Manufacture OF Electronic Components** for the average price index of the 3 months of the quarter under consideration;

INSo = The WPI for insulators for the month of the Base Month;

INSi = The WPI for insulators for the average price index of the 3 months of the quarter under consideration;

LBo = The consumer price index for industrial workers – All India, published by Labour Bureau, Ministry of Labour, Government of India, (hereinafter called “**CPI**”) for the month of the Base Month;

LBi = The CPI for industrial workers – All India for the average price index of the 3 months of the quarter under consideration

OFCo = The WPI for optical fibre cables for the month of the Base Month;

OFCi = The WPI for optical fibre cables for the average price index of the 3 months of the quarter under consideration;

OTHo = The WPI for all commodities for the month of the Base Month;

OTHi = The WPI for all commodities for the average price index of the 3 months of the quarter under consideration;

P_{Co} = The WPI for PVC insulated cable for the month of the Base Month;

P_{Ci} = The WPI for PVC insulated cable for the average price index of the 3 months of the quarter under consideration;

S_o = The WPI for steel (rods) for the month of the Base Month;

S_i = The WPI for steel (rods) for the average price index of the 3 months of the quarter under consideration;

SST_o = **Price for BLOOMS-Retail (SBLR) 150mmx150mm published by IEEMA** for the month of the Base Month;

SST_i = **Price for BLOOMS-Retail (SBLR) 150mmx150mm published by IEEMA** for the average price index of the 3 months of the quarter under consideration;

$SWGR_o$ = **The WPI for MANUFACTURE OF ELECTRICAL EQUIPMENT** for the month of the Base Month;

$SWGR_i$ = **The WPI for MANUFACTURE OF ELECTRICAL EQUIPMENT** for the average price index of the 3 months of the quarter under consideration;

TR_o = The WPI for transformers for the month of the Base Month; and

TR_i = The WPI for transformers for the average price index of the 3 months of the quarter under consideration.

$P30C_i$ = Price payable per Km as adjusted in accordance with price variation Clause for size 30C x 1.5 sq mm signalling cable

$P30C_o$ = Price per Km of cable as per purchase order/ Contract agreement.

$S30C$ = Percentage of size 30C x 1.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.

$P24C_i$ = Price payable per Km as adjusted in accordance with price variation Clause for size 24C x 1.5 sq mm signalling cable

$P24C_o$ = Price per Km of cable as per purchase order/ Contract agreement.

$S24C$ = Percentage of size 24C x 1.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.

$P19C_i$ = Price payable per Km as adjusted in accordance with price variation Clause for size 19C x 1.5 sq mm signalling cable

$P19C_o$ = Price per Km of cable as per purchase order/ Contract agreement.

$S19C$ = Percentage of size 19C x 1.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.

$P12C_i$ = Price payable per Km as adjusted in accordance with price variation Clause for size 12C x 1.5 sq mm signalling cable

$P12C_o$ = Price per Km of cable as per purchase order/ Contract agreement.

S12C = Percentage of size 12C x 1.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.

P9C_i = Price payable per Km as adjusted in accordance with price variation Clause for size 9C x 1.5 sq mm signalling cable

P9C_o = Price per Km of cable as per purchase order/ Contract agreement.

S9C = Percentage of size 9C x 1.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.

P6C_i = Price payable per Km as adjusted in accordance with price variation Clause for size 6C x 1.5 sq mm signalling cable

P6C_o = Price per Km of cable as per purchase order/ Contract agreement.

S6C = Percentage of size 6C x 1.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.

P4C_i = Price payable per Km as adjusted in accordance with price variation Clause for size 4C x 1.5 sq mm signalling cable

P4C_o = Price per Km of cable as per purchase order/ Contract agreement.

S4C = Percentage of size 4C x 1.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.

P2C_i = Price payable per Km as adjusted in accordance with price variation Clause for size 2C x 1.5 sq mm signalling cable

P2C_o = Price per Km of cable as per purchase order/ Contract agreement.

S2C = Percentage of size 2C x 1.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.

P12C2.5_i = Price payable per Km as adjusted in accordance with price variation Clause for size 12C x 2.5 sq mm signalling cable

P12C2.5_o = Price per Km of cable as per purchase order/ Contract agreement.

S12C2.5 = Percentage of size 12C x 2.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.

P2C2.5_i = Price payable per Km as adjusted in accordance with price variation Clause for size 2C x 2.5 sq mm signalling cable

P2C2.5_o = Price per Km of cable as per purchase order/ Contract agreement.

S2C2.5 = Percentage of size 2C x 2.5 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.

P2C25_i = Price payable per Km as adjusted in accordance with price variation Clause for size 2C x 25 sq mm signalling cable

P2C25_o = Price per Km of cable as per purchase order/ Contract agreement.

S2C25 = Percentage of size 2C x 25 sq mm signalling cable shall govern the price adjustment of the contract price for signalling and telecommunication works.

PQC_i = Price payable per Km as adjusted in accordance with price variation Clause for size 0.9mm dia, 6 Quad cable.

PQC_o = Price per Km of cable as per purchase order/ Contract agreement.

QC = Percentage of size 0.9mm dia, 6 Quad cable shall govern the price

(ii) For transmission lines overhead, underground high tension cable transmission line, bay augmentation work at Grid Sub-station etc., various electrical general services works and modification of HT power lines and crossings (raising of height):

Component	Transmission lines overhead including monopole except commissioning	Underground high tension cable transmission line except commissioning	Bay augmentation work at grid sub-station/ terminal arrangement at TSS	Various electrical general services works	Modification of HT power lines and crossings (raising of height)	Commissioning of transmission lines overhead, underground high tension cable transmission line, bay augmentation work.
Labour (PLB)	***0%	***0%	***0%	***0%	***0%	100%
Structural steel	***0%	-	***0%	-	***0%	-
Cement (PC)	***0%	-	***0%	-	-	-
Conductor (PCOND)	***0%	-	-			
PVC Insulated Cable (PIC)	-	***0%	-	-	-	-
Copper wire (PCU)	-	-	***0%	-	-	-
Insulators (PINS)	***0%	-	-	-	-	-
Other items (POTH)	***0%	-	-	100%	***0%	-
Total	100%	100%	100%	100%	100%	100%

(iii) For SCADA, modification of HT power lines and crossings to underground (replacement by underground cabling), modification of LT power lines and crossings to underground (replacement by underground cabling except commissioning, Extension/augmentation of power supply for CLS work, extension/augmentation of general power supply, modification to existing electrical works:

Component	SCADA except com-missioning for the Division	Modification of HT power lines and crossings to underground (replacement by underground cabling) except commissioning	Modification of LT power lines and crossings to underground (replacement by underground cabling except commissioning	Extension/ augmentation of power supply for CLS work except commissioning	Extension/ augmentation of general power supply	Modification to existing electrical works	Commissioning of SCADA, Modification of HT power lines, Modification of LT power lines, and Extension/ augmentation of power supply for CLS work
Labour (PLB)	***%	***%	***%	***%	***%	***%	100%
Electronics (PELEX)	**%	-	-	-	-	-	-
PVC Insulated Cable (PIC)	-	***%	***%	*	*	*	-
Fibre Cable (POFC)	-	-	-	-	-	-	-
All other commodities (POTH)	***%	***%	***%	***%	***%	***%	-
Total	100%	100%	100%	100%	100%	100%	100%

(iv) For modification of signalling works, modification of telecommunications works, inventory for electrification. Signalling and telecommunication works; and integrated testing and commissioning of the electrification, signalling and telecommunication works:

Component	Modification of signalling works	Modification of telecommunications works	Inventory for electrification. signalling and telecommunication works	Integrated testing and commissioning of electrification. signalling and telecommunication works
Labour (PLB)	***0%	***0%	-	***0%
Electronics (PELEX)	***0%	***0%	-	-
30C x 1.5 sq mm signalling cable(S30C)	***0%	***0%	-	-
24C x 1.5 sq mm signalling cable (S24C)	***0%	***0%	-	-
19Cx 1.5 sq mm signalling cable (S19C)	***0%	***0%	-	-
12C x 1.5 sq mm signalling cable (S12C)	***0%	***0%	-	-
9C x 1.5 sq mm signalling cable (S9C)	***0%	***0%	-	-
6C x 1.5 sq mm signalling cable (S6C)	***0%	***0%	-	-
4C x 1.5 sq mm signalling cable (S4C)	***0%	***0%	-	-
2C x 1.5 sq mm signalling cable (S2C)	***0%	***0%	-	-
12C x 2.5 sq mm signalling cable	***0%	***0%	-	-

(S12C2.5)				
2C x 2.5 sq mm signalling cable (S2C2.5)	***%	***%	-	-
2C x 25 sq mm signalling cable (S2C25)	***%	***%	-	-
0.9 mm dia, 6Quad cable (QC)	***%	***%	-	-
Fibre Cable (POFC)	-	***%	-	-
All other commodities (POTH)	***%	***%	***%	***%
Total	100%	100%	100%	100%

(v)For Civil Engineering Works:

Component	Civil Engineering Works
Labour (PLB)	***%
Steel (PS)	***%
Cement (PC)	***%
All other commodities (POTH)	***%
Total	100%

17.8.4 (A)

(1) Relevant categories of steel for the purpose of operating Price Variation formula as mentioned in this Clause shall be as under:

SL	Classification	Rates to be used for calculating Sq or Sb
1.	Reinforcement bars and other rounds	Average of per tonne rates of 10mm dia TMT & 25mm dia TMT; confirming IS1786; Fe 500
2.	All types and sizes of angles, channels and joists	Average of per tonne rates of 'Angle 75x75x6mm, Mild Steel Plate 10mm thickness and Channel 150x75mm; confirming IS2062, E250 Gr "A"
3.	All types and sizes of plates	Average of per tonne rates of 'MS Plates 10mm thickness and 25mm thickness; confirming IS2062, E250 Gr "A"
4.	Any other section of steel not covered in the above categories	Average of price for the 3 categories covered under SL 1, 2 & 3 in this table.

(2). Relevant city for referring "JPC (Joint Plant Committee)" rates of steel items (SQ /SB) in different Zonal Railways shall be as under :

SL	City	Railway
1.	Delhi	Northern , North Central, North Eastern, North Western
2.	Kolkata	Eastern, East Central, East Coast, Northeast Frontier, South Eastern, Southeast Central
3.	Mumbai	Central, Western, West Central
4.	Chennai	Southern, South Central & South Western

All these rates shall be as per rates provided by JPC.

17.8.4-B

The Contract Price for Works under schedule G1 shall be adjusted for increase or decrease in rates and prices of labour, Materials, fuel and lubricants, equipment, Machinery, Plant and other Materials or inputs in accordance with the principles, procedures and formulae specified below:

- (a) Price adjustment shall be applied on execution of the respective item of work in accordance with Schedule-G1. The 1st Quarter will start from Bid Due date month;
- (b) Adjustment for each item of work shall be made as per classification of those item of work. Classification for item/ work for determining applicable components will be mentioned either in the work order against Schedule G1 or sub schedules of G1.

For Civil Engineering Works

S N	Classification		1A&2	5A	6A	7	8A	9A	1B, 5B, 6B 8B & 9B	1C, 5C, 6C, 8C & 9C	5D,6D, 8D& 9D	5E,6E, 8E& 9E
	Components											
1	Fixed	*	15	15	15	15	15	15	15	15	15	15
2	Labour	Lc	20	30	20	50	20	20	0	0	10	25
3	Steel	Sc	0	0	0	0	0	0	85	0	50	0
4	Cement	Cc	0	15	0	0	0	0	0	85	0	0
5	Plant Machinery &Spares	PMc	30	5	20	15	20	30	0	0	10	30
6	Fuel & Lubricants	Fc	25	5	15	15	20	15	0	0	10	20
7	Other Materials	Mc	10	30	30	5	25	20	0	0	5	10
Total			100	100	100	100	100	100	100	100	100	100

* It shall not be considered for any price variation.

The classification mentioned in the table above represents following type of item(s) in the work(s)–

1 Earthwork in Formation

1A All Item(s) excluding 1B or/and 1C

1B Item(s) for supply of Steel

1C Item(s) for supply of Cement

2 Ballast Supply Works

3 DELETED

4 DELETED

5 Building Works

5A All Item(s) excluding 5B or/and 5C or/and 5D or/and 5E

5B Item(s) for supply of Steel

5C Item(s) for supply of Cement

5D Item(s) for Fabrication & Erection of Structures including supply of Steel

5E Item(s) for Fabrication & Erection of Structures excluding supply of Steel.

6 Bridges&Protectionwork

6A All Item(s) excluding 6B or/and 6C or/and 6D or/and 6E

6B Item(s) for supply of Steel

6C Item(s) for supply of Cement

6D Item(s) for Fabrication, Assembly, Erection& Launching of Girders including supply of Steel

6E Item(s) for Fabrication, Assembly, Erection & Launching of Girders excluding supply of Steel

7 Permanent Way linking Platform,**8 Passenger Amenities**

8A All Item(s) excluding 8B or/and 8C or/and 8D or/and 8E

8B Item(s) for supply of Steel item/fittings

8C Item(s) for supply of Cement Item

8D Item(s) for Fabrication & Erection of Structures including supply of Steel

8E Item(s) for Fabrication & Erection of Structures excluding supply of Steel

9 Any Other Works not covered in Classification 1 to 8

9A All Item(s) excluding 9B or/and 9C or/and 9D or/and 9E

9B Item(s) for supply of Steel

9C Item(s) for supply of Cement or/and Grout

9D Item(s) for Fabrication & Erection of Structures including supply of Steel

9E Item(s) for Fabrication & Erection of Structures excluding supply of Steel

Formulae: The Amount of variation in prices in various components (labour, material etc.) shall be worked out by the following formulae:

$$(i) L = \frac{(W \text{ or } WSF \text{ or } WF \text{ or } W_{SFL} \text{ or } W_{FL}) \times (L_Q - L_B) \times L_C}{L_B \times 100}$$

$$(ii) M = \frac{(W \text{ or } WSF \text{ or } WF \text{ or } W_{SFL} \text{ or } W_{FL}) \times (M_Q - M_B) \times M_C}{M_B \times 100}$$

$$(iii) F = \frac{(W \text{ or } WSF \text{ or } WF \text{ or } W_{SFL} \text{ or } W_{FL}) \times (F_Q - F_B) \times F_C}{F_B \times 100}$$

(iv) DELETED

$$(v) PM = \frac{(W \text{ or } WSF \text{ or } WF \text{ or } W_{SFL} \text{ or } W_{FL}) \times (PM_Q - PM_B) \times PM_C}{PM_B \times 100}$$

$$(vi) S = \frac{(W \text{ or } W_S \text{ or } WSF) \times (S_Q - S_B) \times S_C}{S_B \times 100}$$

$$(vii) C = \frac{(W \text{ or } W_C) \times (C_Q - C_B) \times C_C}{C_B \times 100}$$

Where,

L Amount of price variation in Labour

M	Amount of price variation in Materials
F	Amount of price variation in Fuel
PM	Amount of price variation in Plant, Machinery and Spares
S	Amount of price variation in Steel Supply Item
C	Amount of price variation in Cement Supply Item
T	Percentage variation payable on the gross value of bill of Concreting (Bill(s) of Quantities for concrete items)
L _C	% of Labour Component in the item(s)
M _C	% of Material Component in the item(s)
F _C	% of Fuel Component in the item(s)
PM _C	% of Plant, Machinery and Spares Component in the item(s)
S _C	% of Steel Supply item Component in the item(s)
C _C	% of Cement Supply item Component in the item(s)
W	Gross value of work done by Contractor under work orders in schedule G1 or sub schedule of G1, as per stage payment certificate excluding the Gross value of work under W _S or/and W _C or/and W _{SF} or/and W _F or/and W _{SFL} or/and W _{FL} and cost of materials supplied by Railway either free or at fixed rate,
W _S	Gross value of work done by Contractor under work orders in schedule G1 or sub schedule of G1, for item(s) of supply of steel.
W _C	Gross value of work done by Contractor Gross value of work done by Contractor under work orders in schedule G1 or sub schedule of G1, for item(s) of supply of cement and /or supply of grout material.
W _{SF}	Gross value of work done by Contractor Gross value of work done by Contractor under work orders in schedule G1 or sub schedule of G1, for item(s) of Fabrication & Erection of Structures including supply of Steel.
W _F	Gross value of work done by Contractor Gross value of work done by Contractor under work orders in schedule G1 or sub schedule of G1, for Fabrication & Erection of Structures excluding supply of Steel.
W _{SFL}	Gross value of work done by Contractor Gross value of work done by Contractor under work orders in schedule G1 or sub schedule of G1, for item(s) of Fabrication, Assembly, Erection/Launching of Girders including supply of Steel.
W _{FL}	Gross value of work done by Contractor Gross value of work done by Contractor under work orders in schedule G1 or sub schedule of G1, for item(s) of Fabrication, Assembly, Erection/Launching of Girders excluding supply of Steel.
L _B	Consumer Price Index for Industrial Workers- All India: Published in R.B.I. Bulletin for the base period

L _Q	Consumer Price Index for Industrial Workers- All India: Published in R.B.I. Bulletin for the average price index of the 3 months of the quarter under consideration
M _B	Wholesale Price Index: All commodities – as published in the R.B.I. Bulletin for the base period
M _Q	Wholesale Price Index: All commodities – as published in the R.B.I. Bulletin for the average price index of the 3 months of the quarter under consideration
F _B	The average of official prices of Diesel available on the official website of ‘Petroleum Planning and Analysis cell’ under Ministry of Petroleum and Natural Gas for Delhi, Kolkata, Mumbai & Chennai, for the base period
F _Q	The average of official prices of Diesel available on the official website of ‘Petroleum Planning and Analysis cell’ under Ministry of Petroleum and Natural Gas for Delhi, Kolkata, Mumbai & Chennai, for the 3 months of the quarter under consideration
PM _B	Index Number of Wholesale Prices in India by Groups and Sub Groups (Averages)for ‘Manufacture of machinery for mining, quarrying and construction’– published in RBI(Reserve Bank of India) Bulletin, for the base period.
PM _Q	Index Number of Wholesale Prices in India by Groups and Sub Groups (Averages)for ‘Manufacture of machinery for mining, quarrying and construction’– published in RBI(Reserve Bank of India) Bulletin, for the average price index of 3 months of the quarter under consideration.
SB	The average rate provided by the Joint Plant Committee for the relevant category of steel item as mentioned in Clause 46A.9; for the base period.
S _Q	The average rate provided by the Joint Plant Committee for the relevant category of steel item as mentioned in Clause 46A.9; for the 3 months of the quarter under consideration.
C _B	Index No. of Wholesale Price Index of sub-group Cement, Lime & Plaster as published in RBI Bulletin for the base period
C _Q	No.of Wholesale Price Index of sub-group Cement, Lime & Plasters published in RBI Bulletin for the average price index of the 3 months of the quarter under consideration

Note:--

- A) The demands for escalation of cost shall be allowed on the basis of provisional indices as mentioned in the formulae in clause 17.8.6 above. Any adjustment needed to be done based on the finally published indices shall be made as and when they become available.
- B) Relevant categories of steel for the purpose of operating Price Variation formula as mentioned in this Clause shall be as under:

SL	Classification	Rates to be used for calculating S _Q or S _B
1.	Reinforcement bars and other rounds	Average of per tonne rates of 10mm dia TMT & 25mm dia TMT; confirming IS1786; Fe 500
2.	All types and sizes of angles, channels and joists	Average of per tonne rates of 'Angle 75x75x6mm, Mild Steel Plate 10mm thickness and Channel 150x75mm; confirming IS2062, E250 Gr "A"
3.	All types and sizes of plates	Average of per tonne rates of 'MS Plates 10mm thickness and 25mm thickness; confirming IS2062, E250 Gr "A"
4.	Any other section of steel not covered in the above categories	Average of price for the 3 categories covered under SL 1, 2 & 3 in this table.

C) Relevant city for referring "JPC (Joint Plant Committee)" rates of steel items (S_Q /S_B) in different Zonal Railways shall be as under :

SL	City	Railway
1.	Delhi	Northern , North Central, North Eastern, North Western
2.	Kolkata	Eastern, East Central, East Coast, Northeast Frontier, South Eastern, Southeast Central
3.	Mumbai	Central, Western, West Central
4.	Chennai	Southern, South Central & South Western

All these rates shall be as per rates provided by JPC.

Note: - PVC calculation for Casing pipes shall be done under classification of "All types and sizes of angles, channels and joists".

17.8.5 In case an IPC relates to a month which is within 3 (three) months from the Base Month, no price adjustment shall be applicable.

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 therefor 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.

17.10 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.

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.

17.10.2 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.

17.13 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 effect 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 effect 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 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

DISPUTERESOLUTION

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 08th 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 Contactor shall not be altered by reasons of issue being or under reference to DAB.
- 24.2.13 The DAB shall conduct the proceedings at [Delhi] 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 [Mumbai] 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 08th 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 [Mumbai] 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 [Mumbai] 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 [Mumbai] 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;

[*****]

- (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 [Head of the Authority] 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 [Delhi] , 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 15th day from the date of signing of this Agreement,
- (b) the 30th 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 as set forth in Clause 13.2.1;

“Change of Scope Order” shall have the meaning as set 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;}[§]

“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, gunties 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;

[§] This definition may be omitted if the Contractor is not a Consortium/Joint Venture.

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

“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; }[§]

[§] 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 civil works and equipment including [foundations, embankments, pavements, road surface, interchanges, bridges, culverts, road over-bridges, drainage works, traffic signals, sign boards, kilometre-stones, electrical systems, communication systems, rest areas, relief centres, maintenance depots and administrative offices]; and (b) 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 *** to *** having a length of *** kms in *** 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

[...***, *** Railway] by:

(Signature)

(Name)

(Designation)

SIGNED, SEALED AND

DELIVERED

For and on behalf of

THE CONTRACTOR by:

(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

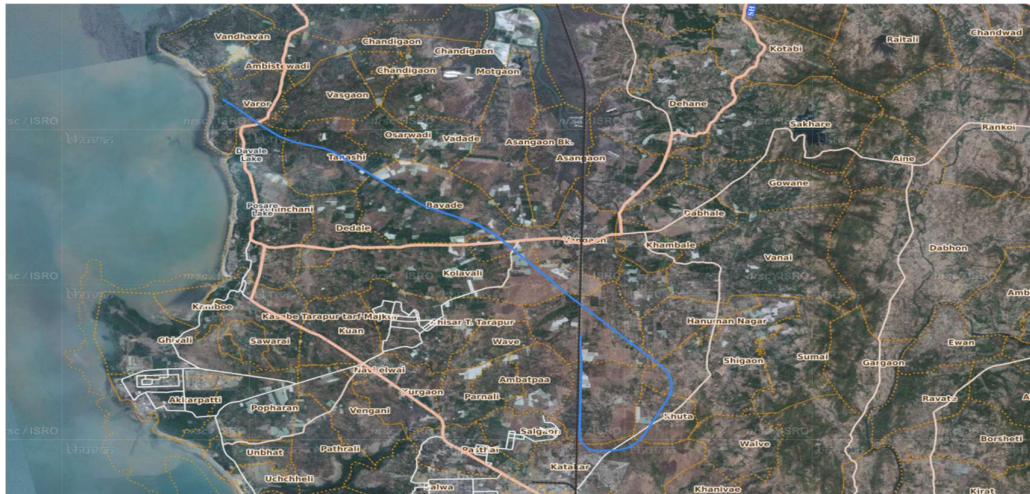
- 1.1 Site of the Railway Project shall include the land, buildings, structures and track works as described in Annex-I of this Schedule-A.
- 1.2 The dates of handing over Right of Way to the Contractor are specified in Annex-II of this Schedule-A.
- 1.3 An inventory of the Site including the land, buildings, 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.

Annex - I
(Schedule-A)
Site¹⁶

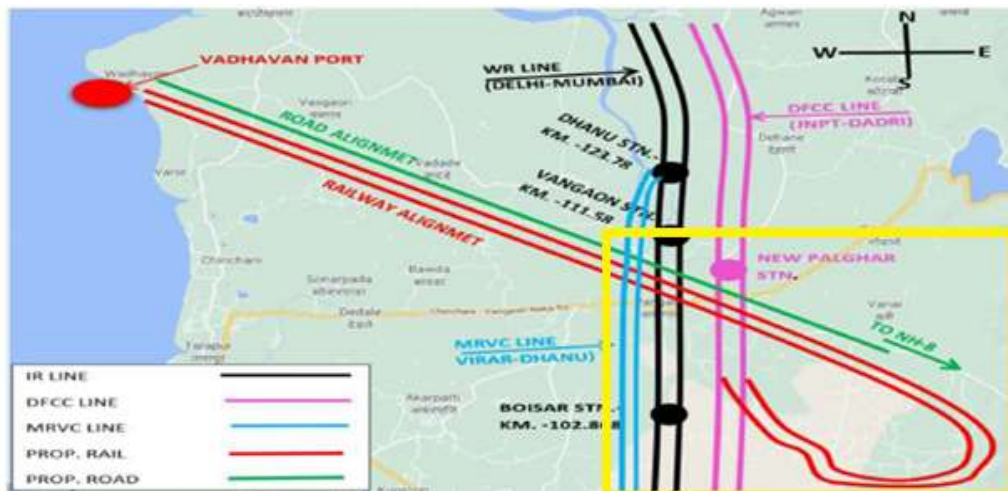
[For construction of New Railway Double Line From New palghar & Vadhwan Port (Varor Station) including electrification works in Mumbai Division of Western Railway]

1. Site

The Site of the Railway Project comprises the section commencing from Km 0.00 to Km 22.23 Km, **excluding the Rail Flyover with Approaches of length 3.62 Km (From Km 9.64 to 13.26)**, i.e., approximately 18.61 Km between the proposed VPPL Yard (near existing New Palghar station of DFCCIL) and the proposed Varor yard (near Vadhavan port project) in Palghar District, in the State of Maharashtra, under the Mumbai Central Division of the Western Railway Zone. The proposed alignment shall cross the existing Mumbai–New Delhi railway tracks between Boisar and Vangaon stations on the Mumbai–Surat Section of Mumbai Central Division of Western Railway, adjoining Vangaon Station. The Google Map indicating the proposed Project Site is appended below for reference.



¹⁶The contents of this Annexure-I may be suitably modified to reflect project specific requirements.



Salient Features of the Site are given below:

- Latitude- $19^{\circ}55.8'N$
- Longitude $-72^{\circ}39.6'E$
- Maximum Temperature $-32.7^{\circ}C$
- Minimum Temperature $-20.5^{\circ}C$
- Humidity -86%
- Rainfall season – June to October
- Average rainfall – 200 to 487 mm
- Seismic zone as per IS:1893 –Zone-3

2. Route Length

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

Sr. No	Name of Location From	Name of Location to	Start Chainage (Km)	End Chainage (Km)	Length (Km)	Remarks
1	New Palghar DFCCIL Station	Proposed Rail Flyover Start at Km 9.64	0.00	9.64	9.64	The stations included in the section are VPPL Holding Yard, Varor Station Yard. (apart from its alteration in existing Vangaon yard as per proposed ESP is also included in the scope of this work.)
2	Proposed Rail Flyover Start at Km 9.64	Proposed Rail Flyover End at Km 13.26	9.64	13.26	3.62	
3	Proposed Rail Flyover End at Km 13.26	Proposed Vadhavan Port	13.26	22.23	8.97	
Total Length					22.23	

The work in above stretches (Sr No 1 and 3 of above table) includes Earthwork in

formation, construction of major and minor bridges, ROBs, RUBs, construction of High-Level Platform(Varor Yd),Cover over Platforms, Pathways, Quarters, Service Buildings, Civil, Electrical and S&T structures, P way & OHE Works and all other passenger amenities. The chainage of Existing New Palghar Station (KM.141+490) center is taken as Km 0.00 and the chainage is continued up to Vadhavan Port. **However, there is only P.waywork,TRD work (Excluding OHE footing & mast erection) is involved from Km 9.64 to Km 13.26 (where the Rail Flyover is being constructed under another contract i.e Sr No 2 of above table).**

However, the proposed alignment and location are indicative in nature. The same shall be validated and finalized by the contractor after conducting detailed engineering surveys, including hydrological investigations.

In parallel, a project by the National Highways Authority of India (NHAI) is proposed for the development of a road network alongside the proposed railway alignment. Approximately 180 meters of total land width is being acquired by NHAI for this purpose. Out of this:

- Approximately 120 meters width will be utilized by NHAI for construction of the Expressway.
- Approximately 60 meters width (in most portions of the alignment; in certain stretches it is less than 60 meters) has been allotted to Railways for the subject project.

The Railway Project site intersects the existing Mumbai–Delhi Rajdhani route between Boisar and Vangaon stations under the jurisdiction of Western Railway.

3.

3. a. Core Land

The Site of the Railway Project comprises the land described below:

S. No	Name of location from	Name of location to	Start Chainage (km)	End Chainage (km)	Land width (m)	Remarks
1	New Palghar DFCCIL Station	Rail Flyover starts Ch. Km	0.00	9.64	60.0	The extent of land available is given in Annexure-II of this Schedule.
2	Rail Flyover End Ch. Km 13.26	Vadhavan	13.26	22.23	60.0	

There is a proposed NHAI project of providing Road network alongside the proposed alignment of the Railway Project.

b. Non CoreLand

The Site of the Railway Project comprises the land described below:

S. No	Name of location From	Name of location To	Start chainage (km)	End chainage (km)	Land width (m)	Remarks

NA

4. Details of existing structures and facilities on adjoining railway track (For doubling or 3rd line projects or electrification)

Not Applicable (details of existing structures in new Palghar station and Vangaon station are as per enclosed ESPs).

4.1 Permanent Way

Details of the Permanent Way on the Right of Way are:

S. No.	No. of railway line	km from (b)	km to (c)	Route km	Minimum and Maximum Implantation (if electrified)	Remarks
1	Double line	Details of existing structures in New Palghar station and Vangaon station are as per enclosed ESPs				
2	Single Line					

4.2 Important Bridges

The Site includes the following Important Bridges:

S. No.	Bridge No. and location (km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundat ion	Sub-structu re	Superstru cture		
NIL						

4.3 Major Bridges

The Site includes the following Major Bridges:

S. No.	Bridge No. and location (km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundat ion	Sub-structu re	Superstruc ture		
NIL						

4.4 Minor Bridges/culverts

The Site includes the following Minor Bridges and culverts:

S. No.	Bridge No. and location (km)	Type of Structure			No. of Spans with span length (m)	Width of the bridge (m)
		Foundation	Sub-structure	Superstructure		
1	160 (110/6-8)	-	-	RCC BOX	1x2.64m	2.64
2	153-A (LC 54) (107/16-18)	-	-	RCC BOX	1 x 5.5 x 4.5	5.5
3	153 (106-6-8)	-	-	RCC BOX	1 x 2 x 1.5	2
4	152 (105/18-20)	-	-	RCC BOX	1 x 6.1 x 3.5	6.1
5	151A (LC 53) (105/4-6)	-	-	RCC BOX	1 x 5 x 4	5
6	151 (105/2-4)	-	-	RCC BOX	1 x 3 x 4.5	3

- Br. No. 160 at KM:110/6-8 is an existing bridge on the IR network Near Vangaon yard proposed to be extended as per GAD.

4.5 Tunnels

S. No.	Block Section	km from	km to	Remarks
NA				

4.6 Railway Flyovers

The Site includes the following Railway Fly Over:

S. No.	Block Section	Bridge No and location (Km)	Type of Structure			Span (Nos. length) ×	Width (m)
			Found ⁿ	Sub-structure	Super-structure		

NA

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

The Site includes the following RUB (Road under railway line)/ ROB (road over railway line):

S. No.	Block Section	Bridge No. and location (km)	Type of Structure		Span (Nos. × length)	Width (m)/ height (m)	ROB/ RUB
			Found ⁿ	Super-structure			
NA							

4.8 Railway level crossings

The Site includes the following railway level crossings:

S. No.	Block Section	Chainage	LC No	TVUs	L C Classification	Remarks
NA						

4.9 Railway stations on Railway Project

The Site includes the following railway stations

S. No.	Station	C.L. km	Nos. of Lines	Station Building Area	Nos. of P.F. & Length	Remarks(W hether Jn. Station)
1	Vangaon Station	IR Km: 111/345	8	-	5 Nos each 600 m long	No
2	New Palghar Station of DFCCIL	Project KM "0"	3	1120 Sqm	1 No of about 160 m long	-

* Vangaon Station is proposed to be modified for passenger traffic movement from the IR network to the proposed project route as per proposed ESP.

4.10 Railway Yards

The Site includes the following railway yards:

Sr. No.	Name of Yard	Number of Lines	Remarks
1	Vangaon Station	8 Nos (2 Nos MRVC + 4 Nos IR + 2 Nos DFCCIL)	Crossing Station
2	New Palghar DFCCIL Station	8 Nos (2 Nos MRVC + 2 Nos IR + 4 Nos DFCCIL)	Crossing Station

4.11 Foot over bridges on Railway Project

The Site includes the following foot over bridges:

S. No.	Station Block Section	Chainage	Span/Nos. of Track	Remarks
NA				

4.12 Transmission lines crossing the Right of Way

The Site includes the following transmission lines crossing the Right of Way:

S.No.	Block Section	Chainage	HT/LT (Specify KV)	OH/UG	Height above RL/Depth below RL
1	-	2725	400 KV		20.59
2	-	2800	400 KV		20.67
3	-	2900	220 KV		17.36
4	-	4775	220 KV		-
5	-	5219	11KV		-
6	-	6526	11KV		-
7	-	6723	11KV		-

8	-	7560	11KV		-
9	-	8175	220 KV		17.36
10	-	8240	400 KV		20.59
11	-	8685	400 KV		20.67
12	-	11020	11KV		-
13	-	11100	11KV		-
14	-	11250	11KV		-
15	-	12650	11KV		-
16	-	14000	11KV		-
17	-	14200	11KV		-
18	-	14250	11KV		-
19	-	15400	11KV		-
20	-	15600	132 KV		19.27
21	-	16500	11KV		-
22	-	16750	11KV		
23	-	16900	132 KV		9.42
24	-	16950	11KV		-
25	-	17000	11KV		-

26	-	17500	11KV		-
27	-	17550	11KV		-
28	-	18150	11KV		-
29	-	18250	11KV		-
30	-	18300	11KV		-
31	-	18350	11KV		-
32	-	18900	11KV		-
33	-	18900	132 KV		-
34	-	20500	11KV		-
35	-	21100	11KV		-
36	-	21250	11KV		-
37	-	21500	11KV		-
38	-	21950	11KV		-

***UGPL indicates : Underground Power Line**

The distance of towers is with reference to Railway Alignment. The Remarks mentioned may vary considering the Highway Alignment and ROW

Note:-All 11KV Electrical utilities as brought out in above table (clause 4.12) are to be shifted by Contractor at his own cost. Electrical utilities other than 11KV will be got shifted by Railways; however, contractor to assist railways from time to time for getting shifted and followup with concerned departments for the said utilities.

4.13 Underground power line crossing the Right of Way

The Site includes the following Underground Power Line Crossings

Sr. No.	Location	System Voltage	Distance of Structure from centre of Track	Remarks
NA				

4.14 Signalling infrastructure

The Site includes the following signalling infrastructure:

S.No.	Station	Standard of Interlocking	Existing Signalling System (RRI/TBM Rly etc.)	Type of Signals (Single distant/ double distant/ colour light etc.)	Remarks
In the patch of proposed Railway work, while carrying out the work, if any Signalling cables are found then they are needed to be safeguarded/shifted before starting the work. The bidder may conduct a site survey and ascertain the presence or otherwise.					

4.15 Telecommunication infrastructure

The Site includes the following telecommunication infrastructure:

S.No.	Station	Control Phone	DOT	Any other Communication	Availability of OFC
In the patch of proposed Railway work, while carrying out the work, if any Telecom cables are found then they are needed to safeguarded/shifted before starting the work. The bidder may conduct site survey and ascertain the presence or otherwise.					

4.16 [Any Other Structures]

Existing pipelines belonging to NPCIL cross the alignment and shall be protected during execution of the work. In the event of any damage to these pipelines, the cost of repair and restoration shall be borne by the Contractor to the full satisfaction of NPCIL/BARC/TAPS.

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:

(The Contractor shall make its own arrangements for access to the Site, including construction, operation, and maintenance of temporary approach roads, diversions, and associated facilities, at its own cost and risk. The Contractor shall also liaise with local authorities and villagers to resolve any access-related issues or disputes arising during execution of the Works.

In respect of access through Railway land and within Railway working areas, the Authority shall facilitate such access by obtaining necessary approvals from the concerned Railway departments, including permission for temporary closure or regulation of stabling lines, wherever required for execution of the Works. Contractor to assist Railways for this.

Such facilitation by the Authority shall be subject to operational feasibility, safety requirements, and prevailing Railway rules and procedures, and shall not relieve the Contractor of its responsibilities regarding safety, work planning, statutory compliance, or adherence to applicable laws and Railway instructions.)

Sl. No	From km to km	Length (km)	Distance of Railway Boundary from C/L of [UP/DN] line (in m)		Date 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 percent) of the core land length and 90% (ninety percent) of the non-core length of the Project, under Clauses 4.1.3 read with Clauses 8.2 and 8.3 of the Agreement	Km 0.00 to Km 22.23 (Including Rail Flyover with Approaches 3.62 Km being constructed under another contract)	22.23	30	30	Within 15 (fifteen) days of the signing of the Agreement or within 30 (thirty) days of the date of receiving the Performance Security from the Contractor, whichever is later.
(i) Full Right of Way (full width)	Km 0.00 to Km 22.23 (Including	22.23	30	30	Within 180 (One hundred eighty)

	Rail Flyover with Approaches 3.62 Km being constructed under another contract)				days of the signing of the Agreement.
(ii) Part Right of Way (part width) a) Section b) Section c) Section	Not Applicable				
	Total length	22.23km			
Part B					
Balance of the Right of Way not covered in Part A above.	Not Applicable				
(iii) Balance Right of Way a) Section b) Section c) Section	Not Applicable				
Total length		**** km			

For Electrification Work*

[The dates on which the Authority shall provide the Right of Way to the Contractor on different sections of the Site are specified below:

Sl. No	From km to km	Length (km)	Width (m)	Date of Providing Right of way
1	2	3	4	5
For OHE work (a) Section (b) Section (c) Section	Km 0.00 to Km 22.23	22.23	60	Within 180 (One hundred eighty) days of the signing of the Agreement.

For Sub-Station work (a) (b)	Not Applicable			
For Switching Posts (a) (b)	02 Nos SSP (one each at VPPL & varor yard)	As per GAD	As per GAD	Within 180 (One hundred eighty) days of the signing of the Agreement.
For Signalling work (a) Station.... (b) Station.... (c) Relay hut For Telecom works Site for Telecom Towers , Cable Huts etc. (a)..... (b).....	Not Applicable			
Site for Service Buildings, Tower Wagon Sheds, Quarters (a) (b)	VPPL Holding Yard Varor Yard	-	As per GAD	Within 180 (One hundred eighty) days of the signing of the Agreement.

* Details to be provided for electrification works only.

Annex - III
(Schedule-A)

Plan and Profile

Tentative Plans of the proposed alignment plan, L-sections, Engineering Scale Plans (ESPs), ~~Facility chart, Signalling Interlocking Plans (SIPs)~~ of the Railway Project Line are attached. This is based on survey conducted by the Authority. The Contractor shall verify alignment plan, L-sections, ESPs, ~~Facility chart, SIPs~~ for ensuring technical feasibility within the Right of Way boundaries. Any deviation [positive/negative] from the approved Engineering Scale Plans, Alignment plan, L section, ~~Facility chart and Signal Interlocking Plan~~ will be treated as Change of scope, except on account of existing ground conditions mentioned in L- section/ alignment / ESPs. Refer clause No. 13.1.2 for the meaning of change of scope. The bidder has to verify the existing ground conditions before bid and hence any change on this account will not be considered as change of scope.

The tentative drawings of proposed Structures are attached as per Annexure given in the following table. All the Drawings of the proposed structures as shown in this list are tentative indicative/reference drawings based on Preliminary Surveys by Railways. Final Surveys are to be conducted by the Contractor, Detailed Design and Drawings to be prepared and got approved by Railways before execution as per design procedure described in relevant clauses of this document: -

Sl. No	Name of the Drawing	Description
1	Tentative alignment plan, concept plan, L- sections (5 Nos) from Km (0.00 to Km. 22.23 .	Tentative plans enclosed in Tender document
2	Tentative Engineering Scale Plan (Alt only) for Vanagon Yard	Tentative ESP alt of VGN yard enclosed in Tender document.
3	Tentative Engineering Scale Plan for VPPL Holding Yard	Tentative Engineering Scale Plan for VPPL Holding Yard enclosed in Tender document.
4	Tentative Engineering Scale Plan for Varor Yard	Tentative Engineering Scale Plan for Varor Yard enclosed in Tender document.
5	GADs Minor Bridges (27 No)	Tentative Typical GADs Attached
6	GAD of Major Bridge (1 No)	Tentative Typical GADs Attached
7	GADs of RUB (22 No)	Tentative Typical GADs Attached
8	GADs of ROB (2 No)	Tentative Typical GADs Attached

[For Railway Electrification]*

The proposed sectioning arrangement of the Railway Electrification Project is attached. The Contractor shall verify the same for ensuring technical feasibility within the Right of Way boundaries.

Tentative Layout Plan (LOP) of proposed double line are as per tentative ESP.

* Delete it if not required.

Annex - IV
(Schedule-A)

Environment Clearances and Forest Clearances

1. Environment clearances*

The scope of work under this contract includes construction of earthwork, important bridges, major bridges, minor bridges, Road Over Bridges (ROBs), Road Under Bridges (RUBs), track laying, and other miscellaneous civil works. No component of the project presently requires environmental clearance. However, any statutory regulations or conditions imposed by Government authorities, if applicable at any stage, shall be complied with by the contractor.

(a) The following environment clearances have been obtained:

No environmental clearance is required

(b) The following environment clearances are awaited:

No Environmental clearances are awaited

2. Forest clearances

(a) The following forest clearances have been obtained:

Forest clearance for the project is being obtained jointly by NHAI for both the railway as well as the NHAI project. Stage-I (Mar 2026)& stage-II forest clearance has already been obtained from REC (May 2026)committee and pending with STATE Authorities.

(b) The following forest clearances are awaited:

Working permission balance for two no of villages (Boisar & Shigaon).

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 1 to this Schedule-B and in Schedule-C.

Annex - I
(Schedule-B)

Description of Railway Project¹⁷

Description of Railway Project

[The project envisages the construction of a new Broad Gauge (BG) double line railway track from New Palghar(DFCCIL) Station (Km 0.00) to Vadhavan Port (Km 22.23) in the Mumbai Central Division of Western Railway. The scope specifically excludes the Rail Flyover portion along with its approaches between Km 9.64 and Km 13.26, having an approximate length of 3.62 km, which is being executed under a separate contract. However, P.Way work and associated OHE works (excluding foundation, OHE mast supply & erection work in flyover portion) is to be carried out under this contract.

The works under this contract shall be executed on Engineering, Procurement and Construction (EPC) basis and shall include detailed design, engineering, procurement, construction, testing, and commissioning of all components required for completion of the project.

The scope of work (hereinafter referred to as “the Scope of Work”) shall broadly comprise Design and Construction of Civil Engineering works, Track works, ~~Signalling & Telecommunication works~~, and Railway Electrification works for the project titled: **“Construction of New Double Line between New Palghar & Vadhavan Port (Varor Station) including Electrification works in Mumbai Division of Western Railway”**.

The Civil Engineering works shall include, but not be limited to, site clearance, earthwork in formation, blanketing, construction of minor bridges, major bridges (excluding the construction of flyover portion), culverts, retaining structures, side drains, OHE related works, Cable Ducts, Rail laying and other ancillary works required for formation of the double line track in accordance with approved drawings and Railway standards.

The major scope under the instant contract is covered under Sch’G’, however foundation work (700mm below GL) for minor (Other than box), major bridge, ROB & RUBs (other than boxes) are covered under Sch-G1 i.e BOQ basis. The structural design & drawings for the portion of works covered under Sch G-1 shall also be provided by EPC agency and the proof checking will be arranged by authority.

Payment for shifting of uncharted utilities such as water pipelines, power cables etc shall also be made under Sch’G1’.

Track works shall comprise supply and laying of ballast, sleepers, rails (to be supplied by authority), turnouts, and all associated fittings and fixtures, including linking, packing, and alignment to meet the required standards for safe and efficient train operations for

¹⁷The contents of this Annexure-I may be suitably modified to reflect project specific requirements and there should be no mismatch in payment milestone and this schedule.

complete length of section i.e. from Km 0.00 to Km 22.23 for double line including Railway Flyover portion.

Railway Electrification works shall include design and execution of Overhead Equipment (OHE) systems, including provision of foundations for masts and portals, erection of masts, wiring, bonding, and associated electrical infrastructure as per approved layouts and standards suitable for heavy haul and freight operations.

All works shall be carried out in accordance with the provisions of the EPC Agreement, applicable Indian Railway standards, approved designs, and statutory regulations. The Contractor shall be fully responsible for conducting surveys and investigations, preparing detailed designs and drawings, obtaining necessary approvals, and ensuring quality control and assurance throughout the execution of the project.

The project is located within the State of Maharashtra, and the Contractor shall comply with all applicable State Government regulations, including payment of royalties, seigniorage charges, and other statutory levies as per prevailing rules.

All incidental and ancillary works necessary for the completion and commissioning of the double line section, including coordination with various agencies, shifting of utilities (if required), and ensuring operational readiness, shall form part of the Contractor's scope.

All 11KV Electrical utilities as brought out in above table (clause 4.12) to be shifted by Contractor at his own cost. Electrical utilities other than 11KV will be got shifted by Railways, however contractor has to assist railways from time to time for getting shift and followup with concerned departments for the said utilities

Salient Features of the Project

Features	Description
Length of the Line	Km 0 to Km 22.23 (inclusive of only track work in ROR portion from Km 9.62 to 13.26)
Details of yard lines	VPPL yd- 6 nos of loop lines, 2 nos of main lines as per Attached ESP.varor yd- 2 nos of loop lines, 2 nos of Main lines etc as per attached ESP.Vgn yd- Loop lines, Cross overs, SEJs, Trap point, Dead end etc as per Proposed ESP (Alt) attached herewith.
Gauge	Broad Gauge (1676 mm)
Track Structure	Suitable for 25T axle load to fit for Double Stack Container
Maximum Permissible Speed	110 Kmph
Track Centres	6.0 m
Ruling Gradient	1 in 200
Maximum Degree of Curvature	3.646°
Stations	03 Nos. (Vanagaon, VPPL Holding Yard & Varor)
Major Bridges	01 No.
Minor Bridges	27 Nos.
ROBs (With approaches on both sides)	02 Nos.
RUBs	22 Nos.
Electrification	High rise 2 x 25 kV AC Traction System fit for double stacked container

Features	Description
Approach road	at VPPL yard (with connection to Bridge no 6/ROB) &varor yd (circulating area) as per attached ESP
Service buildings	As per table under clause 1.8.

i) Site Surveys and Investigations

The Contractor shall verify and validate all data provided by the Authority and carry out additional surveys and investigations wherever required. These shall include topographical survey, centre line survey, geotechnical investigations, hydrological studies, and utility mapping. The Contractor shall establish horizontal and vertical control points, benchmarks, and reference pillars. Based on approved designs, the Contractor shall carry out setting out and alignment of the works. The provisions mentioned in Article 3&6 of EPC agreement shall be followed in this regard.

ii) Materials and Disposal

All excavated earth/stones from the site is deemed to be the property of the Contractor. The excavated earth/stones suitable for embankment or any other works of this agreement shall be used by the Contractor duly leading the surplus useful earth to embankment and rock/boulders may be used for different purposes as per the suitability. The remaining surplus earth/stones to be disposed by the Contractor away from the Railway boundary at their own cost. All dismantled debris can either be utilised by the contractor for finishing purposes for the project or to be disposed away from the railway boundary, after taking approval from Authority Engineer.

The data and information related to L-section/ Geo technical data provided are indicative and for guidance only. These should be rechecked, verified and modified by conducting site investigation to suit the site conditions. Site Investigation should include but not limited to topographical survey, hydrological survey and geotechnical surveys etc. Any change on account of existing ground conditions/ground levels mentioned in L-Section/Alignment/ESPs shall not be considered as Change of Scope. For avoidance of doubt, it is clarified that the existing ground conditions/ground levels are to be validated by bidders before bid and hence no change on this account is payable.

1. Construction of Civil and Track Works

1.1 Operational Requirements

- 1.1.1 The Permanent Way shall be [double line] and designed to permit the Authority to operate satisfactorily at a maximum design speed of **110km/h**. All the bridges and formation shall be constructed for **IR 25T-2008** loading standard. Track shall be constructed for an axle load of **IR 25T-2008**. ~~[The Laying of track to be done by NTC, if Project length is 100 Km or more.] In case a particular stretch/es is not suitable for NTC working, the Authority Engineer may permit track laying without NTC. —~~

1.2 Alignment

- 1.2.1 The alignment of the Railway Project shall be as per the alignment plans given in Schedule A, Annex III. The Contractor is required to review and

revalidate Engineering Scale Plans, Alignment & L section, ~~SIPs~~ for technical feasibility.

1.3 Geometric design and general features

- 1.3.1 Geometric design, gradients, curves and all other general features of the Railway Project shall be in accordance with provisions of the Indian Railway Permanent Way Manual.
- 1.3.2 The formation level at various chainages along the alignment is indicated in the project sheets. These shall be verified and corrected by the Contractor in the final alignment design in conformity with the Specification and Standards specified in the Permanent Way Manual.
- 1.3.3 Wherever modification is proposed with respect to the alignment provided in the tender document all parameters like Ruling gradient, curvature, free Board, vertical clearance of bridges shall be notified while seeking approval of Authority Engineer
- 1.3.4 Earthwork & Blanketing: Earth work in formation shall be designed according to the type of existing soil and to be used for making embankment. The design of blanketing material and thickness shall be decided as per RDSO specifications and Railway Board Guidelines and got approved from Competent Authority. The soil conforming the SQ1 classification shall not be allowed in the earthwork above the lower fill. The earthwork and blanketing should be done in compacted layers of specified thickness as per approved profile/cross-sections. Necessary works of surface Erosion control is to be done as per latest RDSO guidelines. Slope stability analysis to be done as per RDSO Specification No. RDSO/2020/ GE: IRS- 0004, Sept-2020. Latest RDSO guidelines shall be used while designing earth work and blanketing layer.
- 1.3.5 Contractor shall prepare a detailed methodology for soil testing and compaction conforming to the specification and shall establish a soil testing lab with all required latest equipment. The plan and equipment for the lab shall be approved by the Authority Engineer. The establishment of lab and testing confirming to the specification is within the scope of the contract. Based on the above criteria,
- 1.3.6 Ground improvement for weak soil for earthwork as per RDSO guidelines is in the scope of contractor. Contractor shall carry out survey and geotechnical investigation for determining the weak soil needing ground improvement work. The necessity of ground improvement work shall be determined based on the chapter 2 “Suitability of sub soil and ground improvement technique” of the RDSO guidelines. The strengthening of sub soil shall be required when: (i) E_v value is less than 20 MPa, or (ii) Undrained cohesion (C_u) is less than 25 kPa, only for soils having particles finer than 75 microns exceeding 12% or, (iii) N-value less than 5. Based on the above criteria, Contractor shall carry out survey and soil investigation for determining the stretches needing ground improvement work for weak soil and shall submit the details to Authority engineer for approval. No earthwork in bank shall be carried out on weak and expansive soil as detailed in RDSO guidelines. The ground improvement work has been included in the scope of work.

- 1.3.7 Earthwork for Rail Track Formation: Design and Construction of the Earthworks in Embankment or Cutting including Rock Cutting for the Railtrack Formation for the Proposed Main Lines including but not limited to (a) Clearing & Grubbing and Stripping, (b) Excavation with or without Blasting, (c) Embankment, (d) Sub-Grade, (e) Blanket Layer, (f) Slope Protection & Erosion Control For Rock Cutting Areas, following shall also be included (a) Protection Bund at the GL on both sides of rock cutting (b) Provision of Berms as per design (c) Catch Ditch to receive falling boulders if any (d) Slope stability measures (e) Safety refuge (f) Permanent Drainage arrangement for storm water (I) All other related works like pitching, turfing, chute drains, pathways, etc as considered necessary
- 1.3.8 Treatment and Disposal of Earthwork Material A). The Contractor shall be responsible for the provision of all classes of earthworks material required for the Works, whether sourced from the excavations within the Contract area or obtained from any other sources, which are located outside the Site, for which the Authority Engineer has given the consent. B). All excavated material from the Site is deemed to be the property of the Authority and shall not be disposed of unless it is not suitable or otherwise not required by the Authority. All the excavated materials to the extent it is suitable and is required at Site shall be consumed in the Site in embankment, ballast , aggregates , boulders etc free of cost with approval of authority. However, levies / royalties if any, chargeable by state/ local authorities, shall be borne by contractor. Should the removal of the excavated material from the Site is considered necessary, contractor shall make all necessary arrangements to remove the material to a location away from the site of work as directed by Authority Engineer and provisions of relevant specifications and guidelines. A comprehensive plan and programme for the activity shall be submitted by Contractor to the Authority Engineer for his consent. C). The disposal of surplus material, waste material, bentonite fluid and material contaminated with bentonite, debris of demolished existing structures or buildings and unsuitable material etc . shall be the full responsibility of the Contractor and these materials shall be treated and disposed of by the Contractor at an approved location(s) at his own cost. The disposal plan and programme shall be subject to consent by the Authority Engineer

RDSO documents for Earthwork All earthwork shall be executed as per the Guidelines issued by RDSO vide letter No.GE/GEN/185-Vol-I Dtd. 17.09.2020 i.e. Comprehensive Guidelines and Specifications for Railway Formation–Specification No. RDSO/2020/GE: IRS-0004, Sept-2020. Note: The execution of work shall not only be limited to the above guidelines but shall also be confirming to the relevant specifications issued by RDSO and relevant provisions of code, manuals and circulars issued by Western Railway.

1.4 Bridges

1.4.1 All bridges shall be designed and constructed in accordance with the design standards and specifications as per codes and manuals specified in Schedule-D. Use of RDSO standard drawings if available, shall be preferred. As far as possible, the new bridges should have RDSO standard spans and RDSO standard drawings for Railway loading standard. For intermediate span/heights, structural design details for immediately higher

span/height configuration shall be adopted. Contractor shall provide RDSO standard design of the box as indicated in the scope of work.

The Contractor should give reasons in writing to the Authority Engineer wherever Standard RDSO drawing cannot be used, subject to approval of Authority Engineer. Contractor may propose suitable alternate structure, while conforming to relevant codes, stipulations, subject to approval of Authority engineer.

Detailed designs and drawings for all bridges, including ROBs (Road Over Bridges), RUBs (Road Under Bridges), and other structures, shall be submitted by the Contractor for approval.

NHAI/ Road corridor is proposed in parallel along the Railway alignment from KM 13.62 to 22.23. The skew angles, bed levels, road levels, sizes, drainage facilities, foot paths, etc for the structures provided between these chainages should be in align with structures provided by NHAI to have smooth flow of traffic/pedestrians or water flow as per the case.

All bridge substructures and superstructures including minor bridges, major bridges, RCC box structures, ROBs, and RUBs shall be constructed using Stainless Steel reinforcement bars of Grade G410L-SS550 (High Yield Strength), conforming to IS 16651:2017 (with latest amendments), subject to approval of the design.

Provision of Transition System on bridge approaches including Dry Lean Concrete (DLC) and Geo-composite drains shall be made as per latest RDSO guidelines. Bridge protective works including pitching, turfing, flooring, toe walls, curtain walls, drop wall, and river training works shall be provided as per approved drawings. Filter media shall be provided behind abutments, return walls, and under pitching as per RDSO specifications. Testing of PSC girders/slabs shall be carried out as per Railway specifications and approval procedures. Proper connection/interface arrangements shall be ensured between adjacent structures and at interface points with the excluded flyover section.

1.4.2 All bridges shall be designed for the following minimum recurrence interval of floods:

a) For Important and Major Bridges: 1 in 100 years

b) For Minor Bridges: 1 in 50 years

1.4.3 Width and cross-sections features of bridges:

[Attach Typical Type plan attached herewith]

[All bridges shall be provided with suitable arrangement for carrying S&T/TRD/Power cables.]

1.4.4 Minimum size of RCC box shall be in accordance with the Specifications and Standards.

1.4.5 Important Bridges shall be constructed at the following locations:

S. No.	Bridge No	Proposed Location	Linear length of Bridge (in m)	Type of Super str
NA				

1.4.6 Major Bridges shall be constructed at the following locations:

S. No.	Bridge No	Proposed Location	Span Arrangement	Type of Super str
1	47	21.278	5 x 30.5	Composite Girder(For Six tracks as per Typical GAD)

Note: -

1. The Major Bridge shall be designed & constructed to such length that under no circumstances, the existing water way of any water body shall be restricted & reduced.
2. Tentative GADs wherever required are enclosed in relevant sections of drawings. The contractor has to carry out detailed hydrological and geological investigations as per the codal provisions and submit detailed design drawings for foundation, substructure and superstructure for approval of railways for execution in the field.
3. The type of foundation/sub structure/superstructure given in the tentative drawings are only indicative and the agency has to design the bridge such that it fulfils all the parameters of loading, vertical clearances, design discharge etc keeping in view the launching of super structure.
4. Any change in scheme, design, or foundation type, as required to meet site conditions or approval requirements, shall not be treated as a change in scope of the Works.

1.4.7 Minor Bridges shall be constructed at the following locations:

a) Slab Bridges

S. No.	Bridge No	Proposed Location	Span arrangements	Type of Super str
1	IR Br no 160	110/6-8 (IR km)	1 x 3.05 m as per design	PSC slab

b) RCC Box Bridges

S. No.	Bridge No	Proposed Location	Box perpendicular opening size (in m),w.r.t. to track	Remarks
1	2	2.500	1x2.0x2.0m	-
2	3	3.088	1x6.1 x 3.5m	-
3	5	3.696	1x3.0x4.5m	-
4	7	5.700	1x4.0x3.0m	-
5	14	13.720	1x4.0x3.0m	-
6	16	13.872	1x5.0x4.0m	-
7	18	14.198	1x5.0x4.0m	-
8	19	14.280	1x4.0x3.0m	-
9	21	14.829	1x4.0x3.0m	-
10	23	15.735	1x5.0x4.0m	-
11	24	15.769	1x5.0x4.0m	-
12	27	16.588	1x4.0x2.0m	-
13	29	16.838	1x4.0x3.0m	-
14	31	17.373	1x4.0x2.0m	-
15	33	17.928	1x5.0x4.0m	-
16	35	18.588	1x4.0x3.0m	-
17	37	19.128	1x4.0x3.0m	-

18	38	19.210	1x5.0x4.0m	-
19	40	19.695	1x4.0x3.0m	-
20	41	19.804	1x5.0x4.0m	-
21	42	19.903	1x4.0x3.0m	-
22	45	20.852	1x5.0x4.0m	-
23	48	21.454	1x4.0x3.0m	-
24	49	21.747	1x5.0x4.0m	-
25	50	21.834	1x4.0x3.0m	-
26	52	22.035	1x4.0x3.0m	-

* Br. No. 160 at KM:110/6-8 is an existing bridge on the IR network Near Vangaon yard proposed to be extended.

Note:- RDSO standard drawings for the above RCC box bridges shall be used.

1.4.8 Pipe Culvert

Pipe culverts will be constructed at the following locations:

S. No.	Location (km)	Type of culvert	Dia (m)	Length of barrel (m)
No Pipe Culverts will be constructed to carry the track in this section.				

1.4.9 Railway flyovers

Railway Flyovers shall be provided at the following crossings as per GAD attached:

S. No.	Bridge No	Crossing (Chainage)	Linear length of Flyover(dirt wall to dirt wall) (in m)	Vertical clearance w.r.t rail level
No Rail Flyover shall be provided in this project section.				

1.4.10 Road under bridges (RUB)

Road under-bridges (RUB) shall be provided at the following crossings as per typical GAD attached

S. No.	Bridge No	Crossing (Chainage)	Box perpendicular opening size ((in m),w.r.t. to track	Remarks
1	1	1078.66	1x6.0x4.5m	RCC BOX
2	4	3530.505	1x5.0x4.0m	RCC BOX
3	9	7050	1x6.0x4.0m	RCC BOX
4	10	7556.156	1x12.2 m	PSC Slab
5	11	7960	1x6.0x4.0m	RCC BOX
6	12	8726.702	1x6.0x4.0m	RCC BOX
7	15	13735.946	1x12.2 m	PSC Slab
8	17	14068.974	2 x 24.4 m	Composite Girder
9	20	14735.850	1x6.0x4.0m	RCC BOX
10	22	15123.91	1x12.2m	PSC Slab
11	25	16150	1x12.2m	PSC Slab
12	26	16216.41	1x4.0x3.0m	RCC BOX
13	28	16.708	1x12.2	PSC Slab
14	30	17068.06	1x6.0x4.0m	RCC BOX
15	32	17598.06	1x12.2m	PSC Slab
16	34	18286.45	1x12.2m	PSC Slab

17	36	18785.38	1x18.3x5.5m	Composite Girder
18	39	19472.02	1x12.2m	PSC Slab
19	43	20157.42	1x6.0x4.0m	RCC BOX
20	44	20525.69	1x12.2m	PSC Slab
21	46	20927.64	1x12.2m	PSC Slab
22	51	21939.21	1x18.3x5.5m	Composite Girder

NOTE:

1. Skew angles of the bridges must be verified & validated by the Contractor, as per site conditions, before preparation of the GADs.
2. Vertical clearances necessary for the type of road must be ensured by the Contractor before preparation of the GADs. In any case it should not be less than the existing clearance. It should also be ensured while execution that the existing vertical clearance is not reduced for the extended portion of the RUB.
3. Necessary drainage arrangements/designs shall be carried out as per site conditions duly utilising the existing drainage arrangements by raising the chambers or to have new provisions deviating from the existing arrangements as required.
4. Existing RUBs with RCC boxes are to be extended either with RCC boxes or pre-cast PSC elements along with suitable ballast retainers (including footpath & side pedestals) over the existing/extended abutments.
5. Necessary diversion road, including temporary leasing of land outside Railway boundary if required, for free movement of road vehicles should be provided by Contractor before commencement of RUB work and to be maintained till commissioning of RUB.
6. Height Gauges are required to be provided on both the approaches of the RUBs, as per standard RDSO drawings.

1.4.11 Road over bridges (ROB)

Road over bridges (ROB) shall be provided at the following crossings as per typical GAD attached:

S. No.	Bridge No	Location (Chainage)	Span arrangement w.r.t. to track	Length of approach of ROB in and Type	Vertical clearance w.r.t rail level
--------	-----------	----------------------	----------------------------------	---------------------------------------	-------------------------------------

1	6	5229.05	2 x 30.5 m Composite Girder Railway Portion	10 x 30.5 + Required RE wall (Approach Portion)	As per Approved GAD (Min 8.525m)
2	8	6550	2 x 30.5 m Composite Girder (Railway Portion)	10 x 30.5 + Required RE wall (Approach Portion)	As per Approved GAD (Min 8.525m)

1.4.12 Road diversions:

Necessary temporary road diversions are to be provided during construction of RUBs/ROBs and retaining walls. Existing roads are to be realigned, Rising/lowering of road surfaces, if necessary to be done at RUB locations as per the requirement at site. The road diversions shall be laid to the same standards of existing approach roads. Suitable signages (Reflective) shall be provided to guide the road users. All the temporary diversion roads shall be maintained satisfactorily for the smooth passage of road traffic, as long as the temporary diversion road is in use.

1.4.12.1 The Contractor shall ensure safety of adjacent/existing structures and works during execution. Adequate protection measures such as sheet piling, shoring, or other methods shall be adopted.

1.4.12.2 Temporary diversion of streams and construction arrangements such as cofferdams shall be included in the scope wherever required.

1.5 Track

1.5.1 The track layout shall be based on the provisions contained in the Indian Railways Permanent Way Manual ~~[and specify other manuals, if any]~~.

1.5.2 The final designs of the track layouts, including horizontal and vertical alignment, station yard layouts, LWR plans etc shall be reviewed by the Authority Engineer in accordance with the provisions of the Agreement.

1.5.3 The glued joints can be either pre-fabricated or in situ, the decision of the Authority is final and binding.

1.5.4 Tower Wagon Line, Loco holding line, Shunting line, stabling line shall be constructed as shown in ESP with the following facilities:

Station	Concrete Pathway	Fencing	3 Phase Power Supply	Water Supply	Approach Road	Any Other Item
Vanagaon Yard	-	-	-	-	-	-
VPPL Holding Yard	yes	Yes	Yes, 3 Phase	Yes	Yes,	-
Varor Yard	-	Yes	Yes, 3 Phase	Yes	Yes,	-

- 1.5.5** The track layout shall be based on the provision contained in the Indian Railways Permanent Way Manual, LWR manual, welding manuals and other manuals specified in “specification and standard for EPC contracts issued by Railway Board and latest specifications, correction slips and guide lines and codes & manuals specified in schedule D.
- 1.5.6** The final designs of the track layouts, including horizontal and vertical alignment, station yard layouts, LWR plans etc shall be reviewed by the Authority Engineer in accordance with the provisions of the Agreement.
- 1.5.7** The track will be laid with R260 rail /60Kg rail on 60Kg PSC sleepers (wider base) of 1660 per km density with 350mm ballast cushion on main line. On loop line the track structure consists of 60Kg second hand rail on 60Kg PSC sleepers (wider base) of 1660 per Km density with 300mm ballast cushion.
- 1.5.8** Thick web switches and CMS crossing 60 kg should be provided on main line, loop line, all siding as per direction of the Authority Engineer
- 1.5.9** Design, Manufacture / Procure / Supply and Construction / Laying of the Track Works capable of running trains with an axle load of 25.0 tonnes operating at a maximum speed of 110km/hr using mechanized track laying technique including but not limited to rails, sleepers, ballast, fasteners, fittings and fixtures, spares as required, welding and laying, ballast tamping, testing, de-stressing, guard rail/ check rail (wherever required), turnouts, expansion joints, wayside signs, drainage including yard drainage etc. and all other related works as necessary for the following :
- (a) Main Line & Connecting Line electrified track capable of operating at a maximum train speed of 110km/h
 - (b) Loop Line, Yards and Siding (yard layout) at each Station including but not limited to Machine Siding, Saloon Siding, Goods Siding, Dead Ends / Buffer Stops etc. electrified track capable of operating at a maximum train speed of 30km/h.

1.5.10 Alignment of Track Ways

- A) The indicative Alignment and Yard layout for each Station as developed by the Authority is enclosed in the Alignment Drawings as part in the Reference Drawings. The Authority has acquired the adequate Right of Way (ROW) for the same and is staked at Site.
- B) The Alignment Drawings enclosed in the Reference Drawings are indicative and the Contractor shall be responsible for review, verifying its correctness & modifying / optimizing the same with reference to the Design Criteria and other technical and geometrical obligatory requirements with respect to existing IR tracks.
- C) During review of the alignment, if the Contractor notices any conflict with respect to the Right of Way, design-ability and constructability, the Contractor

shall immediately notify the same to the Authority's Engineer with supporting documents including data, calculations, maps and drawings etc.

1.5.11 Supply of Ballast

All ballast shall be procured from the quarries approved by the Authority's Engineer. All ballast shall be machine crushed and comply with the specifications set out in "IRS GE 1 June 2016/ Latest amendments time to time". When transported by road vehicle all ballast shall be dampened prior to leaving the quarry.

1.5.12 Spreading of ccess Ballast

- a) The center line, ballast toe lines shall be marked by the contractor with lime as per the directives of Authority's Engineer or his authorized representative.

The ballast shall be spread on formation centrally to the central line of the proposed track, in a width of 4720/4870 mm. Initial spreading of the ballast shall be for a loose thickness of 250/300 mm or upto the pre-determined marks on reference posts, so that after rolling at least 200mm thick ballast bed is available for P.Way linking.

- b) Ballast shall spread uniformly ensuring that no muck from the ballast tracks comes to the track. While picking up the ballast from bottom layer of stacks, proper care shall be taken not to lift the ballast along with earth, dust etc. the same shall be carried out at contractors cost and for which no extra payment shall be made. While picking up the ballast from the stacks, no ballast shall be left to waste at the stacking ground and on the slopes of banks or in cuttings.
- c) The balance quantity of the ballast shall be spread after P.Way linking in stages in order to achieve the required cushion and ballast profile as per latest IRPWM.
- d) The work of carrying and spreading the ballast from stacks shall include all lead, lift, decent crossing of tracks, roads and nullahs complete with contractor's own labour, tools and equipment, payment of taxes, incidental charges etc.

1.5.13 Materials for linking of Track

- i. Rails for main line, loop line and miscellaneous siding linking shall be issued to Contractor or his nominated representative free of cost. The materials thus issued, are to be accounted for by the Contractor and he shall be held responsible for any shortage or breakage till the track is taken over by the Authority. All other P.way materials as per RDSO drawings and specifications need to be procured by the agency at its own cost along with transportation. After linking of track , main line rails will be supplied by Railway wagon in panels whose loading & unloading & subsequent TRR with new Rail panels is within the scope of the contract.

- ii. Service rails & SH rail in 13m-6.5 m length of required Quantity shall be issued to the contractor for temporary use progressively. After linking of track over service rail, new rail (free rail / 3 rail panel / 260m panel) will be arranged by the Authority. These will be welded using mobile Flash butt welding plant by the Contractor. The Contractor will have to lift the rails from nominated steel plant or nominated locations in Zonal Railway. The unloading of rails is to be done by the Contractor in case rail supply is available through railway wagons.
- iii. All type Sleepers i.e., PSC Line Sleepers, turn out, SEJ, Level Crossing and Bridge sleepers etc. shall be procured by EPC Contractor from RDSO approved sources for the work.
- iv. All track fitting shall be procured by EPC Contractor himself, from RDSO approved sources.
- v. The panels of rail shall be handled as per the guidelines of Railways, so as to avoid any defects like dents/grip marks notching or cuts, bends, damage at the ends etc.

Track shall be laid as per specifications and guidelines provided in IRPWM and LWR manual with latest correction slips.

1.5.14 Linking

- i. Concrete sleepers should be unloaded with great care. Use of rubber tyres and any other similar arrangements are to be used for preventing shock unloading.
- ii. Grooves of the rubber pad should be placed along the length of the rail.
- iii. Driving of the ERC (after greasing with approved graphite grease to prevent rust & binding with inserts) should be in such a way that ends of central leg and the heel are flush with the two edges insert.
- iv. Hammer of desired weight (1.9 to 2 Kg.) should be used for driving ERCs.
- v. After linking of track over service rail, new rail (free rail/3rail panel/260m panel) will be arranged by the authority.
- vi. Before undertaking actual linking, line & level pegs should be fixed as indicated below:
 - a. Level pegs at the beginning, end and at every 10 m. intervals for vertical curves & 30m. on either side of bridge approach.
 - b. Centre line pegs at every 30m. intervals on straight and 10m.interval on curve.
 - c. Centre line pegs at the following locations should be concreted for future reference: -
 - 1. The beginning & end of transitions.

2. Every 30m. on curves.
 3. Approaches of bridges & level crossing.
 4. Every half Km. on straights.
 5. The beginning of every turnout.
- vii.** The rail shall first be straightened for removal of kink with the help of Hydraulic Jim crow of adequate capacity.
- viii.** The rails shall be connected by means of a pair of fish plates using in the first instance only 2 fish bolts and nuts one in each rail. Before fishing the rail ends, the fishing edges of the fish plates the rail ends and fish bolts shall be lubricated with grease, graphite and oil of approved quality & grade as directed by the Authority Engineer at site of work. Correct expansion gaps as directed by the Authority Engineer shall be ensured between ends of rails by inserting liners.
- ix.** Paint marks shall be made on the rails with paint as directed by the Engineer to indicate the spacing of sleepers to be adopted on curves mark on the outer rails to ensure radial spacing while transferring it by 'T' square on the other rail.
- x.** The linked track shall be aligned correctly to the line pegs. Hammering of sleepers which are out of square should be avoided. Sleepers that are squared should be re-gauged immediately, the fastening tightened and repacked. The contractor is responsible for giving correct alignment in straight and in curve portion required as per degree of curve until alignment is approved by Engineer.
- xi.** Oiling and greasing of fish plates before fastening the rails will have to be done with contractors tools and consumables like plumage, kerosene oil, black oil, brushes etc.

1.5.15 Ballasting and Initial Packing

- i.** Ballast should be first spread over the formation as per required thickness approved by Authority Engineer and rolled by using a road roller to ensure uniform & compact ballast cushion under the sleepers.
- ii.** Full ballast sections and profile as prescribed for different types of tracks, i.e., SR/SWR/LWR is to be provided as per the provisions of IRPWM & LWR manual including the provisions regarding extra shoulder width on curves.
- iii.** Initial through packing should be of such standard so as to make track fit for 20 KMPH.
- iv.** The ballast should be spread over the linked track covering it completely to a uniform height and width as directed by the Authority Engineer or his authorized representative.
- v.** Lift the track correctly as directed by the Authority Engineer or his authorized representative.
- vi.** Pack the ballast under the sleepers.

- vii. Correct the alignment of rails square the sleepers, adjust gauge as directed by the Authority Engineer. Check cross levels and lift and repack wherever necessary.

1.5.16 Final Adjustment and Packing

- i. “Picking Up” of slacks after running of test trains which may consist of ballast trains rolling by Diesel/Electric Powers after each packing. The 1st/2nd/3rd packing is considered to be completed once the picking up of slacks is completed and certified by the Authority Engineer, after each packing. The back packing work is normally required to be completed within 2 (two) months after linking of the track and initial packing thereof.
- ii. Test the track with loaded dip-lorry or engine as directed by the Authority Engineer and lifting of the track and packing wherever sags have formed. Engine will be provided by the Railway.
- iii. Any sleepers which have shifted from correct spacing or gone out of square shall be moved back and squared after loosening the fastenings. The fastenings shall be tightened again after squaring work. No hammering of sleepers to be done.
- iv. The track shall be slewed to correct alignment by sighting along the rail head of the base rail. It should be ensured that track does not get lifted in the process of slewing.
- v. Alignment on curves & transitions is to be checked and minor adjustment is to be made.
- vi. Alignment kinks and gauge kinks to be rectified to avoid permanent set.
- vii. Lubrication of gauge in all track is to be done.
- viii. All steps of through packing as given in IRPWM shall have to be followed.
- ix. Pre, During & Post Tamping operations shall be carried as per IR Track Machine Manual (Para 3.12, 3.13 & 3.14) HSD, consumable etc shall be supplied by EPC contractor.
- x. Anti – corrosive painting of Rail 60 KG outside track on rail bottom, web, foot and fishing plane as per requirement with two coats of bituminous emulsion without (IP No. 56192 and RDSO Specification No. IRS –P-30-1996).

1.5.17 Specification for Finished Work.

i. Ballast Section.

The ballast section should be uniform in height, width and side slopes and brought to standard section as directed by the Authority Engineer with the

quantity of ballast made available No ballast shall be left on the cess side slopes of bank or near toe of bank.

- ii. The track geometry will be recorded in floating condition after running of train & the track parameters should be within the following tolerances: -

Sl. No	Track parameter	Item	Laying standard
1.	Gauge	Sleeper to sleeper variation	2 mm.
2.	Expansion gap	Over average gap worked out by recording 20 successive gaps	± 2 mm.
3.	Joints	Low joints not permitted High joints not more than. Squareness of joints on straight	± 2 mm. ± 10 mm.
4.	Spacing of sleepers	With respect to theoretical spacing	± 20 mm.
5.	Cross level	To be recorded on every 4 th sleeper	± 3 mm.
6.	Alignment	On straight on 10M. Chord. On curves of Radius more than 600 M. on 20M. Chord. Variation over theoretical versines: On curves of Radius less than 600 M. on 20M. Chord. Variation over theoretical versines:	± 2 mm. 5 mm. 10 mm.
7.	Longitudinal level	Variation in longitudinal level with reference to approved longitudinal sections.	50mm.

1.5.18 Welding of Rails

The welding of rail joints to convert the track into LWR/CWR is to be carried out as per provisions of “Indian Railway’s manual for flash butt welding of Rails-2012” and “Manual for fusion Welding of Rails by the Alumino-Thermic Process (1998 Edition)” in strict technical supervision of competent authority having a valid competency certificate for the particular category of welding technique issued by DG(M&C) RDSO/Lucknow for firms and by Thermite portion plant of Northern Railway, Lucknow for Zonal Railways. The work of welding of rail joint shall be carried either on cess/track without traffic blocks or under traffic as per the directions of Authority’s Engineer.

- 1 Rails are to be welded as per the provision of Indian Railway’s Manual for Flash Butt Welding of Rails-2012 with Mobile Flash Butt Welding Plant. At special locations where the use of Mobile Flash Butt welding is not practical, Alumino Thermic (A.T) SKV process may be used

with prior permission of the Authority's Engineer. AT welding will be done as per the procedure and specifications laid down in the latest edition of Manual for Fusion Welding of Rails by the Alumino-Thermic Process with the latest amendment slips

2 For mobile flash butt welding, contractor has to deploy the mobile flash butt welding machine and QAP of this machine should be duly approved by RDSO. QAP for welding for every site has to be prepared and got approved by the Railways

3 Contractor shall arrange approved welding portions, prefabricated moulds, consumables, equipment and actual execution of welding from the firms approved by RDSO for manufacturing of the portions and execution of the welding.

4 The contractor shall be responsible for removal of all kinks and twists in the rails, particularly within 1.8m from either end. Once the rails to be welded have been aligned, levelled, cleaned and provided with the specified amount of gap, it shall be the responsibility of the contractor to weld the joint and to guarantee its satisfactory performance.

5 Maximum percentage of defective welds during initial weld testing should not exceed 2%. In addition to free replacement of defective weld, a penalty of Rs10, 000/- be also imposed for each defective weld beyond 2%. The defective percentage be calculated for a group of 500 welds or part thereof.

6 The contractor shall not carry out any welding work between sunset to sun-rise. He should make his own arrangements to protect the work against wind and weather in the course of execution. No welding work shall be done during heavy rains. Work during light rain may be done in accordance with the local instructions. However, the contractor shall keep ready all protective arrangements such as trolley umbrella, non-woven thick polyethylene tarpaulin etc. at his own cost.

7 A finished joint will be accepted as good on considerations of dimensional accuracy, if it satisfied the following tolerances:

- | | |
|-----------------------------------|---|
| (i) Vertical alignment | : Variation not more than +1.0mm, -0.0mm measured at the end of one metre straight edge. |
| (ii) Lateral alignment | : Variation not more than +0.5mm measured at centre of one metre straight edge. |
| (iii) Finishing of top surface of | : +0.4 mm, -0.0mm measured at the end of 10cm straight edge. |
| (iv) Head finishing on sides | : + 0.3 mm over gauge side of the rail head measured at the centre of 10cm straight edge. |

The aforesaid tolerances are only applicable in case of new rails, but in case of existing rails where there is depression of more than 1 mm measured with 1meter long straight edge placed centrally on the rail head before welding

the tolerances would be decided at site between contractor and Authority's Engineer.

8 In case of in-situ welding, the rail fastening for at least 5 sleepers on either side of the proposed weld shall be loosened.

1.5.19 Greasing Rails, ERC & M.S. Liners.

- i.No ERC & M.S. Liners is to be put into the track without greasing. ERC & M.S. Liners are to be greased as per the procedure laid down in IRPWM & as per the instruction of Authority's Engineer.
- ii.Grease graphite used for ERC clips and liner shall be as per IS:408, Grade 'O'.

1.5.20 Track Tamping by Machines:

- (A) **Pre-tamping attention** – To achieve good results the contractor should carry out the following preparatory work before taking up the tamping:-
 - (a)Ballasting where there is shortage of ballast.
 - (b)Heaping up of ballast in the tamping zone, to ensure effective packing.
 - (c)Making up of low cess.
 - (d)Cleaning of pumping joints and providing additional clean ballast, where necessary.
 - (e)Attending to Hogged joints before tamping.
 - (f)Tightening of all fittings and fastenings like fish bolts and keys, splitting of cotters, and replacement of worn-out fittings.
 - (g)Renewing broken and damaged sleepers.
 - (h)Squaring of sleepers and spacing adjustment; re-gauging to be done as necessary.
 - (i)Adjusting creep and expansion gap in rails.
 - (j)Examination of rails for cracks etc.
 - (k)Realigning of curves which are badly out of alignment.
 - (l)Clearing of ballast on sleepers to make them visible to the operator.
 - (m)All obstructions such as signal rods, cables, pipes, level crossing check rails, etc., likely to be damaged by the tampers should be clearly marked and made known to the tamping operator before he starts work. Tight overhead clearance should also be brought to his notice; the beginning and end of transitions should be marked. Super

elevation should be marked on every second sleeper so that it can guide the operator for levelling up correctly.

(B) Post Tamping Attention – The contractor shall pay attention to the following points:

- (a) As some of the rigid fastenings might get loose, tightening of fittings should be done immediately after tamping.
- (b) Any broken fitting should be replaced.
- (c) Proper quality check of work done by tamping machine is important. Immediately after the tamping work, the track should be checked, in respect of cross levels and alignment, and action taken as considered necessary.
- (d) The ballast should be dressed neatly and proper consolidation of ballast between the sleepers should be done.

1.5.21 Laying of LWR

The Contractor should prepare LWR plan and get the approval of Authority's Engineer and Authority.

Destressing

Destressing of LWR /CWR shall be done as per the procedure prescribed in LWR Manual using Hydraulic rail tensors.

For making the closure rail to be put behind the SEJ, abrasive rail cutting machine shall be used. The joints in LWR shall be welded immediately after distressing.

Laying

LWR should be laid as per the LWR plan approved by Authority and as per the instructions contained in LWR manual followed by laying of switch expansion joint. Thereafter, de-stressing of the welded panel shall be carried out as per the laid down guidelines.

Before laying SEJs, they should be completely oiled and greased.

1.5.22 Procurement, fabrication & manufacturer of P. Way material and fittings.

The P.Way material & fittings shall be procured from RDSO approved firms only and testing, checks and approval as prescribed by RDSO/ Railways. The successful bidder should assess and procure the actual requirement as per survey and approved drawings after the work is started.

1.6 Railway level crossings

The railway level crossings shall be provided at following locations:

S. No.	Chainage	LC No.	Class	Road Width
There are no Level crossings in the project Section.				

1.7 Track layouts in station yards

Station yards shall be constructed as per the final engineering scale plans.

Proposed tentative ESPs of VPPL holding yard, Varor yard and vangaon yardare enclosed in Schedule H of this document.

1.8 Building Works:

All items of building works shall conform to specification of works of concerned zonal railway/CPWD specifications. The building work shall include electrical internal wiring with allied work, system electrical power supply arrangement with transformer/main distribution supply, telephone, internet/Wi-Fi connections etc., as per requirements, sanitary fittings, sewerage system, water supply arrangement (bore wells, pump house, water tanks) and internal fittings, approach roads, street lighting, boundary wall, fencing, site levelling, landscape elements, water harvesting and other works incidental to buildings. Building works shall be deemed to include railway stations building, staff quarters, service buildings, buildings required for installation of equipment for signalling, telecommunication and electrification works, and facilities along the railway line.

The tentative minimum area of the permanent buildings to be provided is as follow

Type of Building	Minimum Area in Sqm	Remarks	TentativeLocation
Permanent Office Building	1940	For Dy CE/C/CCG Office, SSE P Way (PWI), SSE IOW Office	VPPL Yard
Station Building	360	B Class Station	one each at VPPL & varor yd
Service Buildings	5524	(As per approved GAD)	VPPL Yard

1.8.1 Railway stations

Railway stations shall be constructed at the following locations:
[Provide preliminary drawings and other details to explain the Authority's requirements]

S. No.	Name of Station	Centre line chainage	Nos. of platform and their individual length and width (m)	Minimum width of platform (m)	Nos. of foot over bridge with width (m)
(1)	(2)	(3)	(4)	(5)	(6)
1	VPPL Holding Yard	Km: 2.541	NIL	Nil	Nil
2	Varor	Km: 20+730	1 (As per ESP)	(As per ESP)	Nil
Nos. of stairs on each platform	Lifts/ Escalators	PF Shelter (Nos.)*L*B	Washable Apron	Watering Line	Parking (Sq. Metre)
(7)	(8)	(9)	(10)	(11)	(12)
Nil	NIL	1 on Varor station (As per Class B station)	Nil	Yes	Yes

1.8.1.1 Passenger platforms, wherever provided under this project (Varor station), shall be of high-level type and constructed with vacuum dewatered concrete surfacing over properly prepared and compacted formation comprising earth fill, granular sub-base, and cement concrete base. Anti-skid tiles of 25 mm thickness conforming to relevant IS specifications shall be provided for a minimum width of 1.8 m from the platform edge along the required platform length. End ramps shall be provided at both ends of platforms with a gradient not steeper than 1 in 6 to facilitate accessibility.

1.8.1.2 Wherever fencing or boundary walls are required adjacent to platforms or operational areas, the same shall be constructed in masonry/RCC as per approved designs. Earthwork shall be executed with adequate width and compaction to ensure stability of such walls. In cutting locations, drainage arrangements including continuation of side drains below platform level, provision of inspection chambers, and protective measures to prevent ingress of soil shall be provided.

1.8.1.3 Provision for Divyangjan accessibility shall be ensured wherever passenger interface is planned, in accordance with applicable Railway Board guidelines and accessibility norms, to the extent applicable for the type of facility being provided.

1.8.1.4 Only essential passenger/user amenities such as limited seating, drinking water points, signage, and basic shelter (if specified) shall be provided, strictly as per approved plans and directions of the Authority. The extent and nature of such amenities shall be kept minimal and commensurate with the operational requirement, and the decision of the Authority in this regard shall be final and binding on the Contractor.

1.8.1.5 Provision on Platform to be provided as below:

Sl. No	Station	Borewell with water arrangement	Water Tap pedestals	Toilet Blocks with Septic Tank	Granite Platform Bench's	Station name Board	Platform display Boards
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Vanagaon	-	-	-	-	-	-
2	VPPL Holding Yard	1	5	1	-	2	-
3	Varor	1	5	1	6	2	6
Urinals	Latrines (Ladies, Gents, Divyangjan)	Fans	Lighting	Clock	Water Cooler	Dustbins	Trolley Path
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
All the facilities shall be provided confirming to the requirement as per the required "Desirable amenities", as mentioned in Railway Board guidelines.							

**Additional Facilities like Divyangjan Ramps in Each station*

1.8.1.6 All the facilities shall be provided confirming to the requirement as per the required "Desirable amenities", as mentioned in Railway Board guidelines.

1.8.2 Service buildings

Service buildings shall be constructed at each station as follows:

Service Buildings as mentioned in above table at clause 1.8 shall be constructed at each station .

The station buildings/RBGE rooms shall be as per standard plan circulated by Railway Board vide Ltr No: 2024/I & Trans. Cell/SOCC, dated: 21.06.2024. Any deviation from these plans shall have the approval of the Authority.

S. No.	Station	Service building	Area at ground floor level
Service Buildings as mentioned in above table at clause 1.8 shall be constructed at each station .			
The station buildings/RBGE rooms shall be as per standard plan circulated by Railway Board vide Ltr No: 2024/I & Trans. Cell/SOCC, dated: 21.06.2024. Any deviation from these plans shall have the approval of the Authority.			

Specification of Service Buildings: - as per approved head quarter letter

SN	Description	Specification	Skirting / Dado
1	All rooms, verandah & concourse	Vitrified tiles of minimum 600 x 600 mm size	Same with 100 mm height
2	Toilet, Bath	Flooring tiles (anti-skid), granite table top for wash basin	Vitrified tiles up to 2100 mm height
3	FOB & Building Staircase	25 mm thick chequered tiles	-
4	Plastering	Fair side: 12 mm thick cement plastering with 2 mm POP putty; Rough side: 15 mm thick cement plastering with 2 mm POP putty	
5	Railing	Stainless Steel Railing	
6	Window frame	3-track coloured powder-coated aluminium section	
7	Ventilator	Coloured powder-coated aluminium section with glass panel and stainless-steel mosquito/insect mesh	
8	Door Shutter	Flush door with 35 mm veneer surface, 3 mm thick on both sides fixed with 4 stainless steel hinges (150 mm); WPC doors for bathrooms with 4 stainless steel hinges (120 mm)	
9	Window Shutter	3-track coloured powder-coated aluminium window with glass panel and stainless-steel mosquito/insect mesh	
10	Grill	MS grill with 12 mm square bars for all window openings	
11	Internal Finish	Walls and ceiling finished with internal putty followed by primer and emulsion paint	
12	External Finish	Texture finish with external emulsion paint of approved make (Asian Paints / Berger / Nerolac)	
13	Water supply & sanitary	Fittings of standard approved make for proper functioning of water supply and sanitary system	

1.8.2.1 Dismantling of existing structures in station areas has to be carried out as per the site conditions, wherever necessary and as per the approved GADs.

1.8.2.2 Contractor has to remove the dismantled debris/soils and take away and dispose at designated dumping yards or other locations away from the railway premises.

1.8.3 Staff quarters

Construction and development of staff colony comprising of following types of staff quarters at each station:

S. No.	Station	Type	Single/Multi-storey	No.	Remarks
1	VPPL Holding	II	Multiple	12 units (900)	The building structure to be designed for one

	Yard			Sqm)	additional floor then provided.
--	------	--	--	------	---------------------------------

CPWD -2023 specifications for residential buildings to be followed.

The Contractor shall design, supply, install, and commission a complete and functional sewerage system, including septic tank, appropriate drainage and disposal arrangements, with provision of compound wall and circulating area for the proposed staff quarters. Similarly, a comprehensive water distribution system shall be provided, ensuring an uninterrupted supply of potable water to all units. The Contractor shall ensure proper integration with existing municipal services wherever applicable. The buildings/quarters to be provided with all necessary needs, facilities like drain, sewerage, water, fire fighting, electricity wiring, switch boards, parking, gardens, play area, etc.

1.8.4 Out-door power supply, distribution, and lighting works

All the new service buildings, extended platforms, quarters etc., shall be provided with lighting and other electrical works as detailed in relevant paras of this Annexure.

1.8.5 Water supply and distribution

Construction of bore wells, pump house, overhead tanks, etc shall be as follows

S. No	Location	Deep Bore Well	GLR	Overhead Tank
1	VVPL Holding Yard	1	--	2000 litre capacity PVC water storage tank on PF toilet block and tanks of 2x2000 lit capacity on each quarter. One tank of suitable capacity over service buildings.
2	Varor	1	--	

Note: Bore well has to be dug after carrying out necessary geological investigation with in the station limits. If there is no water / insufficient yield (say 5000 Litres within 5 hours) then additional bore well has to be dug of contractor's own cost. The pipe lines (GI/UPVC) of required dia are to be provided from bore well to the water storage tank over PF toilet block and to the GLR provided at that station. Separate pipe lines are to be provided from GLR to the roof PVC tanks over quarters also be provided. UPVC pipes shall also be laid on platforms and connection given to water tap pedestals and toilet block. Suitable water pumping arrangements from Bore well/GLR to be provided. Pumps are to be provided as per the yield and availability of water and the same are provided in the Electrical part of the estimate.

1.8.6 Drainage system

Efficient drainage system for disposal of water from the buildings and for drainage of the area shall be provided.

A suitable and efficient drainage system shall be provided for effective collection and disposal of stormwater, wastewater, and sewage from all station buildings, service buildings, staff quarter and other associated facilities.

The drainage system shall be designed to prevent water stagnation and ensure smooth flow, taking into account site conditions, rainfall intensity, topography, and future requirements.

Proper interconnection of drains, inspection chambers, manholes, septic tanks / soak pits or municipal sewerage systems, as applicable, shall be ensured.

Detailed designs, calculations, and drawings of the complete drainage and sewerage system shall be prepared and submitted to the Engineer-in-Charge for approval prior to commencement of work and shall be executed in accordance with Indian Railways standards, CPWD specifications, and relevant IS codes.

1.8.7 Sewerage system

Construction of sewerage system

An efficient and hygienic sewerage system shall be provided for the collection, treatment, and disposal of sewage from all station buildings, service buildings, staff quarters and other associated facilities. The system shall be designed considering passenger footfall, number of staff quarters, occupancy load, and future requirements.

Septic tanks of adequate capacity shall be provided at each station where municipal sewer connection is not available. The septic tanks shall be designed in accordance with Indian Railways/CPWD specifications and relevant IS codes. Proper soak pits and/or dispersion trenches shall be provided to ensure safe and effective disposal of treated effluent. Septic tanks shall be provided for Platform (PF) toilet blocks, staff quarters, office-cum-store buildings, and other proposed buildings.

The complete sewerage system, including internal plumbing, underground sewer lines, inspection chambers, manholes, septic tanks, and disposal arrangements, shall be properly planned, designed, and executed in accordance with Indian Railways standards and specifications. Detailed design calculations, drawings, and layout plans shall be submitted to the Engineer-in-Charge for approval prior to commencement of work.

1.9 Pedestrian Bridges

Foot over bridges for pedestrians crossing railway track/station shall be constructed at as follows:

S. No.	Station/ Block Section	Length	Width	No. of staircase
NIL				

1.10 Service roads/ internal roads/approach roads and footpaths

Service roads/ internal colony roads/approach roads and footpaths shall be constructed at the locations and for the lengths and widths indicated below:

Sl. No	Road/ Circulating Area	Location from Km To Km	Length & width	Remarks
1	Trolley Path	At VPPL Holding Yard &Varor Station	full length between all stabling, shunting lines at VPPL yd &varor yd	CC Pathway on either ends of the proposed platforms.
2	Approach Road	At VPPL Holding Yard &Varor Station	At VPPL yard approach road adjacent to alignment to be provided between ROB(Br no6) & station building. At varor yd approach road connecting station building/Platfor m from nearby existing road to be provided	Approach Road with Rigid Pavement. Quantity including at all stations and service buildings, staff quarters etc.,
3	Circulating Area	At Service Buildings & Staff Quarters	At Varor yd only	80mm heavy duty concrete paver blocks over 150mm thick base concrete of M15. Quantity to be distributed to all locations.
4	Compound Walls	For staff Quarters, service building, station building	At VPPL &varor yd	Cross section of the compound wall given by approval of authority.
5	Greenery	At VPPL Holding Yard &Varor Stations		

1.11 Boundary walls, boundary pillars

- a) Boundary pillars are to be provided on both sides of proposed railway track in complete stretch , however boundary pillar to be provided on one side only where NHAI alignment is parallel to railway alignment as per para 808 & 809 of IRWM. Each and every boundary pillar shall be painted with “Indian Railways” towards the track side. The pillars should be fixed squarely, the outside face representing the boundary with the letters and number facing the railway line. The pillars should be kept clear from jungle growth or shrubs for atleast 1 meter all round within the Railway limits.
- b) Fencing shall be provided along the existing track, maintained throughout the execution of the work, and removed upon completion, as directed by the Engineer. The fencing shall consist of self-supporting steel angle posts of size 50 mm x 50 mm x 6 mm and 1.5 m in length, equipped with hooks, and embedded in cement concrete (CC) blocks of size 0.23 m x 0.23 m x 0.23 m in 1:2:4 mix. These posts shall be spaced at 2-meter center-to-center intervals along the track. Three horizontal layers of 12 mm diameter rods shall be tack welded to the angle posts.

1.12 Signage information boards and posts

All signage, information boards and posts shall be provided which include train Indication Board (TIB), Coach guidance system (CGS), station name boards, utility boards (such as cloak room, parcel, waiting rooms, SM Room, Platform Number board etc.) etc. in accordance with Railway Board Guidelines and Good Industry Practice.

1.13 Drainage along the railway line

Drainage system including surface and subsurface drains for the Railway Project shall be provided . Drains are proposed to be constructed in the entire stretch including station yards. The central yard drains shall be provided with precast RCC covers of 100 mm thickness with perforations. The drainage system, including surface and subsurface drains for the railway project, shall be provided in accordance with the provisions of the Indian Railways Permanent Way Manual / Works Manual and RDSO guidelines, duly considering site requirements and prevailing conditions.

1.14 Embankment/slope protection works

A. Retaining wall:

Approximate length of RCC retaining wall (variable height) along the formation is 2500 m at various locations for retaining the formation, at locations where there is limited railway boundary to maintain the formation at requisite slopes.

Note: The length and height of retaining walls is indicative but not limited to and liable for change as per the L-Sections prepared / re-validated by contractor and approved by competent authority.

B. Bad / weak formation location

The bad bank / weak formation locations identified by the agency shall be provided with the prescribed remedial treatment for the proposed double line. This shall include cutting to a minimum depth of 1.0 m below ground level and replacing it with SQ2 material, and

provision of geo-cells at the junction of BC soil and filled-up SQ2 soil as per IRS GE-004 guidelines.

C. Boulder Pitching: -

Boulder pitching shall be provided on approaches of bridges and at other locations to the extent required as per approved drawings/latest Railway board/RDSO guidelines.

D. Provision of Turfing: -

Turfing shall be done for slope protection & erosion control as per latest Railway Board guidelines in the entire doubling stretch where bank height is more than 4m. Turfing / planting with planted doob grass and watering as required until properly rooted with.

1.15 Supply of Materials and Stores

Requirement of store depot/maintenance depot for permanent way,—~~signalling~~, electrification etc. shall be as follows:

The below materials are required for regular maintenance of the section between VPPL Holding Yard & Varor stations and to be handed over to SSE/P.way as per the instructions of the authority.

a) Requirement of Gang Tools:-

Sl. No	Particulars	Qty & Units	Location of Supply
1	Red Hand Signal Flag	42 Nos.	In VPPL Holding Yard-Varor Station section as per requirement
2	Red Banner Flag	28 Nos.	
3	Green Hand Signal Flag	42 Nos.	
4	Detonators	10 sets (Set of 10)	
5	Keying & Spiking Hammer	14 Nos.	
6	Phowrahs, Beaters, Crow Bars & Ballast Forks	70 Each	
7	P.Way Inspection Kit	4 Nos.	
8	Spanners	14 Sets	
9	600 Rollers + 8 Wooden Mallets	2 Sets	

b) Requirement of Small Track Machines: - As per RDSO Specifications

S. No.	Particulars	Qty & Units	Location of Supply
1	Abrasive Rail Cutter	6 Nos.	In VPPL Holding Yard-Varor Station section as per requirement
2	Rail Drilling Machine	4 Nos.	
3	Push Trolley BG with cover on top	2 Nos.	
4	Gauge-cum-level (BG) with spirit level	10 Nos.	
5	Chamfering Kit	4 Nos.	
6	Rail Thermometer	10 Sets	
7	Walkie Talkie	4 Nos.	
8	Track Lifting Jack – 15 Tonne	14 Nos.	
9	Light Weight Motor Trolley for Inspection	2 Nos.	
10	Rail Tenser	2 Set	
11	Rail Dolley	6 Nos	

S. No.	Particulars	Qty & Units	Location of Supply
12	Welding Equipements	2 Sets	

c) Requirement of P.Way Fittings as Material Reserve:-

S. No.	Particulars	Qty & Units	Location of Supply
1	60 Kg, 1 in 12 Points & Crossings on PSC sleepers with weldable CMS crossing and thick web switches including all fittings and sleeper fittings	2 Sets	In VPPL Holding Yard-Varor Station section as per requirement
2	Thick Web SEJ 60 Kg – 80 mm gap with fittings	2 Sets	
3	60 Kg Fish Plates with bolts and nuts (1 metre long)	100 Sets	
4	Metal Liners for 60 Kg wider PSC sleepers	5000 Nos.	
5	Joggled fish plates with bolts & nuts for 60 kg rails	200 Sets	
6	Elastic Rail Clips Mk-V for wider PSC Sleepers	5000 Nos	
7	Elastic Rail Clips (J-Type)	100 Nos	
8	HVN Liners	5000 Nos	
9	PSC Wider Sleepers T 8746	100 Nos	
10	H Beam Sleepers With Fittings	25 Nos	

1.16 Compulsory afforestation and tree plantation

Authority will take clearance for trees identified as required to be cut/ chopped/ trimmed as per finalized alignment plan. Contractor will carry out the chopping/ cutting/ trimming of trees at his own cost and deposit the same with the authority/forest department as per instruction of authority . Any compensatory afforestation, if required by forest authorities, will be done by contractor at his cost.

Apart from the above, 100 nos of shady plants like Neem, Tikoma, Ganuga etc., shall be planted at each station

1.17 Any other requirements:

Provision of Electrical cable ducts of suitable size with approval of authority for a length of approx 8km and signalling cable ducts on both side of tracks for the entire length of the project.

1.18 Change of Scope

The length of structures and bridges specified herein above shall be treated as an approximate assessment. The actual lengths as required on the basis of detailed

investigations shall be determined by the Contractor in accordance with the Specifications and Standards. Any variations in the lengths specified in this Schedule-B shall not constitute a Change of Scope, save and except any variations in the length arising out of a Change of Scope expressly undertaken in accordance with the provisions of Article 13.

2. Signalling and telecommunication

2.1 Signalling works

2.1.1 All signalling works including Survey, design, supply, installation, testing and commissioning shall be executed in accordance with the provisions of the Indian Railway Signal Engineering Manual.

2.1.2 Signalling works at wayside stations

The details of signalling works at wayside stations are:

S N	Description of work	Details of wayside stations								
		Name of station	No of Lines	Std. of interlocking	Type of Signalling	Type of block working	Type of train detection system	Type of point operation & locking arrangement	Type of lifting & barrier locking arrangement	Details of siding
1	Survey, design, supply, installation, testing, manuals for new technology equipment installed each place, supply of completion drawings, and commissioning at wayside stations	i. ii. iii. iv. v. vi.								
2	Inventory. Supply of signalling spares: 2.1 Electronic Interlocking or Relay Interlocking equipment 2.2 Power supply system	[Specify the name of location(s) and the quantity of inventory to be supplied at each location] Quantity with unit								

	2.3 Data logger system 2.4 Axle counter system 2.5 Signalling cables 2.6 Power cables 2.7 Relays 2.8 Point machines with accessories 2.9 Train Detection system 2.10 On Board (Cab) equipment for TPWS system 2.11 Line side equipment for TPWS system 2.12 TMS (with remote operation system) 2.13 Any other item/items for functioning of Signalling system as per contract requirement. 2.14 Testing and measuring tools and equipment as determined in accordance with the manufacturer's manuals		
3	Integrated testing and commissioning		(n)

~~2.1.3 Signalling works at major or junction stations:~~

~~The details of signalling works at major/Junction stations are:~~

S No	Description of	Details of Major/Junction stations
---------	----------------	------------------------------------

		Name of station	No of Lines	Std. of interlocking	Type of Signalling	Type of block working	Type of train detection	Type of point operation & locking	Type of lifting barrier & locking	Details of siding	Junction arrangement with adjacent
1	Survey, design, supply, installation, testing, manuals for new technology equipment installed for each place, supply of completion drawings, and commissioning of major/junction stations	i. ii. iii. iv. :: ::									
2	Inventory: Supply of signalling spares: List spares 2.1 to 2.14 as under paragraph 2.1.2 above.	[Specify the name of location(s) and the quantity of inventory to be supplied at each location]									
3	Integrated testing and commissioning								(aa)		

2.1.4 Block Signalling (BPAC/Token/Token less).

Details of block signalling (BPAC/Token/Token less) are:

S	Description of	Details of Block signalling (BPAC/Token/Token less)
---	----------------	---

		Details of block section									
		Chainage (From)	Chainage (To)	System of Block working	Type of block signalling system (electronic, electrical or electromechanical)	Nominal length of each auto section	No. of aspects for automatic signalling	Type of train detection system	Provision of intermediate block signal	Token/Token less block working	Any other details (pl specify)
1	Survey, design, supply, installation, testing, manuals for new technology equipment installed for each place, supply of completion drawings, and commissioning of block signalling (BPAC/token/ token less)										
2	Inventory: Supply of signalling spares: List spares 2.1 to 2.14 as under paragraph 2.1.2 above.	[Specify the name of location(s) and the quantity of inventory to be supplied at each location]			Quantity with unit						Article II.
3	Integrated testing and commissioning								(b)		

2.1.5 Train Protection and Warning System (TPWS)

The details of the Train Protection and Warning System are:

S N	Description of work	Details of Train Protection and Warning System							Any other details (pl specify)
		Details of block section		On-Board Equipment, Antenna,	Line-side equipment			Single/double line section	
		Chainage (From)	Chainage (To)		Wayside station	Junction station	Auto section		
1	Survey, design, supply, installation, testing, manuals for new technology equipment installed for each place, supply of completion drawings, and commissioning of train protection and warning system (TPWS)								
2	Inventory, Supply of signalling spares: List spares 2.1 to 2.14 as under paragraph 2.1.2 above.	[Specify the name of location(s) and the quantity of inventory to be supplied at each location]	Quantity with unit						
3	Integrated testing and commissioning		(m)–						

2.1.6 Sections

~~[Specify meaning and description of section, and give each section a unique name.]~~

S N	Description of work	Details of Sections												
		Name of section	Operation Control Centre	Section single/ Double line	LC Gate	EL/PI/RR1 (New/ Modification)	Train Detection (TC, Axle Counter, AFTC etc.)	Block Signalling	Block Proving Axle Counter	Point Operation and locking arrangement	Signal arrangement system	LC Gate interlocking	LC Gate telephone	Integrated Power supply at stations and UPS at OCC
1	Survey, design, supply, installation, testing, manuals for new technology equipment installed for each place, supply of completion drawings, and commissioning													
2	Inventory: Supply of signalling spares: List spares 2.1 to 2.14 as under paragraph 2.1.2 above.	Quantity with unit												As
3	Integrated testing and commissioning													

Construction must also include verification and validation of system installed and independent certification for maintenance and operation system during its life cycle. All other associated materials and works for completion not limited to items in the above table as required for execution of the signalling and telecom works to suit 25 KV has to be provided by the Contractor.

2.2—Telecommunication

2.2.1—All telecommunication works including survey, design, supply, installation, testing and commissioning shall be executed in accordance with the provisions of the Indian Railway Telecom Manual.

2.2.2—Optic fibre cable system

Optic fibre cable supply, laying in trench in all types of soil including cable laying through trenchless technique for road/road crossing, jointing, termination, testing and design, supply, installation, testing and commissioning of STM, P-D/I Mux system including all associated control equipment to achieve the end goal.

S N	Description of work	Details of OFC system										
		Chainage		Name of stations	Type of STM equipment		Type of multiplexer	Power supply	Control office equipment with Power supply			Any other details
		From	To		Short Haul	Long haul			Way station	HQ	Emergency control	
1	Survey, design, supply, installation, testing, manuals for new technology equipment installed for each place, supply of completion drawings, and commissioning of optical fibre cable Communication system											

2	Inventory: Supply of communication spares: 2.1 Optical fibre cable with accessories 2.2 HDPE duct with accessories 2.3 Optical fibre Digital equipment's	Quantity with unit
---	--	--------------------

		Article IV.——
3	Integrated testing——and commissioning	(a)——

2.2.3 Six quad telecom cable

Six quad telecom cable supply and laying in trench in all types of soil including cable laying through trenchless technique for road/road crossing, jointing, termination and testing including provision of EC sockets at every km for emergency communication and Level crossing gate.

S N	Description of work	Details of 6 Quad telecom cable system				
		Chainage		Name of stations	LC gate No.	Any other details
		From	To			
1	Survey, design, supply, installation, testing, manuals for new technology equipment installed for each place, supply of completion drawings, and commissioning of 6 Quad telecom cable system (b)					
2	Inventory: Supply of communication spares: (h) (i) 2.1 Six quad telecom cable and accessories 2.2 Emergency sockets with box and pins 2.3 Any other item/items for functioning of telecommunication system as per contract requirement 2.4 Testing and measuring tools and equipment as determined in accordance with the manufacturer's manuals	Quantity with unit				
		Article V.——				
3	Integrated testing and commissioning	(a)——				

2.2.4 Mobile train radio communication

Survey, design, supply, installation, testing and commissioning of mobile train radio communication, including supply and installation of porta cabins/ service buildings, towers, power supply equipment and antenna etc.:

S N	Description of work	Details of Mobile Train Radio Communication system					
		Chainage		Name of station	No. of 3 direction base service station.	No. of 2 direction base service station	Any other Details
		From	To				
1	Survey, design, supply, installation, testing, manuals for new technology equipment installed for each place, supply of completion drawings, and commissioning of mobile train radio communication system						
2	Inventory: Supply of communication spares: 2.1 Master switching centre equipment 2.2 Base switching centre equipment 2.3 DT/Cab radio/Handheld 2.4 Dispatch/Control terminals 2.5 OPH 2.6 GPH 2.7 GSM Set 2.8 Cab radio 2.9 Any other item/items for functioning of telecommunication system as per contract requirement 2.10 Testing and measuring tools and equipment as determined in accordance with the manufacturer's manuals	Quantity with unit					
		Article VI.					
3	Integrated testing and commissioning	(a)					

2.2.5 Other locations

The details of supply, testing and commissioning of telecommunication equipment for other locations are:

(A)

S N	Description of work	Details of telecommunication equipment																							
		Station	LC Gate	Operation control centre(OCC)	Automatic signalling block hut	Single/ double line section	Optical fibre cable equipment	Control office equipment	Master switching centre	Base switching centre	DT/Cab Radio/ Handheld	Dispatcher/Control terminals	ODU	GPH	GSM set	CAB Radio	Master Clock system	Video surveillance System	Telephone exchange	EC Sockets	LC Gate Telephones	Earthing arrangements	Power supply equipment with	Any other Details	
1	Survey, design, supply, installation, testing, manuals for new technology equipment installed for each place, supply of completion drawings, and commissioning of tele-communication equipment at specified locations																								
2	Inventory: Supply of communication spares: 2.1 Optical fibre cable communication system 2.2 Mobile Radio communication system	Quantity with unit																							

	<p>2.3 CCTV system</p> <p>2.4 Electronic Exchange system</p> <p>2.5 Public address system</p> <p>2.6 Passenger Information display system</p> <p>2.7 Digital Clock system</p> <p>2.8 — Control office equipment's with accessories</p> <p>2.9 — Master switching centre equipment</p> <p>2.10 — Base switching centre equipment</p> <p>2.11 — DT/Cab radio/Handheld</p> <p>2.12 Dispatch/Control terminals</p> <p>2.13 — OPH</p> <p>2.14 — GPH</p> <p>2.15 — GSM Set</p> <p>2.16 — Cab radio</p> <p>2.17 — Master clock system</p> <p>2.18 — Any other item/items for functioning of telecommunication system as per contract requirement.</p> <p>2.19 — Testing and measuring tools and equipment as determined in accordance with the manufacturer's manuals.</p>	
3	Integrated testing and	(b) —

commissioning	
---------------	--

(B) Other Equipment

S N	Description of work	Details of telecommunication equipment											
		Station	LC Gate	CCTV	PA system	Passenger information	Electronic exchange	Digital clock					Any other Details
1	Survey, design, supply, installation, testing, supply of manuals for new technology equipment installed for each place, supply of testing tools and testing equipment, completion drawings, and commissioning of tele-communication equipment												
2	Inventory: Supply of communication spares: 2.1 Optical fibre cable communication system 2.2 Mobile Radio communication system 2.3 CCTV system 2.4 Electronic Exchange system 2.5 Public	Quantity with unit											

	<p>address system</p> <p>2.6 Passenger Information display system</p> <p>2.7 Digital Clock system</p> <p>2.8 — Control office equipment's with accessories</p> <p>2.9 — Master switching centre equipment</p> <p>2.10 — Base switching centre equipment</p> <p>2.11 — DT/Cab radio/Handheld</p> <p>2.12 Dispatch/Control terminals</p> <p>2.13 — OPH</p> <p>2.14 — GPH</p> <p>2.15 — GSM Set</p> <p>2.16 — Cab radio</p> <p>2.17 — Master clock system</p> <p>2.18 — Any other item/items for functioning of telecommunication system as per contract requirement.</p> <p>2.19 — Testing and measuring tools and equipment as determined in accordance with the manufacturer's manuals.</p>	
3	Integrated testing and commissioning	(h) —

All other associated materials and works for completion not limited to items in the above table as required for execution of the signalling and telecom works to suit 25 KV has to be provided by the Contractor.

1.3 Automatic Fire Alarm & Detection System:

Way Side Stations		Major/Junction Stations		Other Location Stations	
SN	Name of Stations	SN	Name of Stations	SN	Name of Stations
1		1		1	
2		2		2	
3		3		3	
4		4		4	
5		5		5	
6		6		6	

1.4 Automatic Fuse Alarm System:

Way Side Stations		Major/Junction Stations		Other Location Stations	
SN	Name of Stations	SN	Name of Stations	SN	Name of Stations
1		1		1	
2		2		2	
3		3		3	
4		4		4	
5		5		5	
6		6		6	

1.5 Maintenance Free Earthing & Surge Protection System:

Way Side Stations		Major/Junction Stations		Other Location Stations	
SN	Name of Stations	SN	Name of Stations	SN	Name of Stations
1		1		1	
2		2		2	
3		3		3	

4		4		4	
5		5		5	
6		6		6	

~~2.6 Any other requirements of signalling and telecommunication:~~

~~[Specify with relevant details to explain the Authority's requirements]~~

***Guidelines of requirement for S&T works:**

Authority's Requirement of Works

~~The Authority's Requirement of Works shall be prepared by Zonal Railways, as each project has its own scope of works, specific functional requirement, specific site conditions, specific technical requirements etc. However broad guidelines mentioned below, but not limited to, will facilitate zonal railways in formulating Authority's Requirement of Works.~~

~~The Authority's Requirement of Works should cover in details following requirements:~~

- ~~a) A section should cover Objective of Project, A System Overview and Scope of Works.~~
- ~~b) A section should cover Project Planning and Project Management requirements which stipules requirement of various management plans such as, but not limited to, Signal Interlocking Plan, Document Management Plan, Design Management Plan, Interface Management Plan, Procurement Plan, Site Management Plan, Quality Assurance Plan, Testing & Commissioning Management Plan, RAMS Management Plan, Training Plan and Defect Liability Management Plan.~~
- ~~c) A section should cover Project Program requirements which stipules requirement of various works program such as Overall Works Program, Design Submission Program, Procurement Program, Installation Program, Testing & Commissioning Program and Training Program. This should also include mechanism of monitoring progress through Progress Reports and Progress Review Meetings.~~
- ~~d) A section should cover Design Requirements which stipules various design criteria and design specification to be followed by Contractor while preparing design under the project. It should also cover list of design & documents to prepared by Contractor. It should also stipulate various stages of design and procedures to be followed for review and approval of design.~~
- ~~e) A section should cover interface requirements for System Design, Installation and Testing & Commissioning.~~

- ~~f) A section should cover technical requirements which stipulates various standards and specification of cables, equipment, material, items & accessories to be followed in project.~~
- ~~g) A section should cover system requirements which stipulates requirements related with overall system architecture.~~
- ~~h) A section should cover requirements which stipules various standards, guidelines, procedures, methods to be followed during supply, storage and laying, construction and installation of cables, equipment, material, items & accessories in the project.~~
- ~~i) A section should cover testing requirements. This should cover various stages of testing such as factory, supply, storage, installation, system acceptance etc. This should cover agency responsible for such testing and procedure to followed during such testing.~~
- ~~j) A section should cover requirements related with RAMS. This should also include requirements of redundancy and spare capacity in the system.~~
- ~~k) A section should cover requirements related with Training for Authority's Personnel.~~
- ~~l) A section should cover requirements related with Spares to supplied to Authority's Personnel.~~
- ~~m) A section should cover requirements related with Operation & Maintenance Documents. These documents include Operation Manual, Technical Manuals, Maintenance Manuals, As Built Drawings etc.~~
- ~~n) A section should cover requirements related with Defect Liability Period.~~

[3. Electrification of ~~existing~~ Proposed railway line

3.1 Overhead Equipment (OHE)

Design, supply, erection, testing and commissioning of 2x 25 KV, 50 Hz, AC High rise Overhead equipment fit for double stack containers including Foundations, Structures and all ancillary equipment etc as per following details with PTFE neutral section, insulated catenary wire underoverline structure, Height Gauges at level crossing gate, Protective screens on overline structure, Structure arrangement on bridge piers, feeder wire, all types of caution, warning, instruction and protection boards, Safety Boards at required locations, antitheft charging arrangement, Traction Station Working Rule along with sectioning diagram at required locations (TPC, Traffic control, OHE Depot, AEE office etc.), Safety items (i.e. key box, First aid box, shock treatment chart, Collar ring, men at work board, etc) at required locations, Construction of contractor's depot & sidings and all necessary documentation for EIG sanction, PCEE Inspection/sanction application and CRS Inspection. Break down attention till CRS/PCEE inspection.

3.1.1 Regulated conventional type OHE with normal contact wire height 5.80 Metre

S.N.	From Station to Station	km to km	Total Track km	Remarks
NIL				

3.1.2 Regulated high rise type OHE with normal contact wire height 7.57 Metre

S.N.	From Station to Station	km to km	Total Track km	Remarks
1.	New Palghar to Vadhawan port	0-22.23	65.53	

3.1.3 Regulated Tramway type OHE with normal contact wire height 5.80 metre

S.N.	From Station to Station	km to km	Total Track km	Remarks
NIL				

3.1.4 Regulated tramway type high rise OHE with normal contact wire height 7.57 metre.

S.N.	From Station to Station	km to km	Total Track km	Remarks
NIL				

3.1.5 Unregulated conventional type OHE with normal contact wire height 5.80 metre.

S.N.	From Station to Station	km to km	Total Track km	Remarks
NIL				

3.1.6 Unregulated type OHE high rise with normal contact wire height 7.57 metre.

S.N.	From Station to Station	km to km	Total Track km	Remarks
NIL				

3.2 25 KV Sectioning post (SP) and sub-sectioning post (SSP) (Switching Post)

Design, supply, erection, testing and commissioning of 2x25 KV, 50 Hz, AC Switching Stations (SSP) including Foundations, Structures and all ancillary equipment etc. as per following details:- (Earth work, construction of buildings, retaining wall will be constructed by Engineering department), Internal Wiring with switch/fittings/equipment, Battery Set, All types of caution, warning, instruction, protection, location/Name and schematic diagram boards, earthing stations, Safety items (i.e. Fire fighting equipment, First Aid box, Shock treatment chart, key box etc.), manning till stabilization of SCADA (At least for a period of 06 months from commissioning) and all necessary documentation for EIG sanction and CRS Inspection, breakdown maintenance till CRS/PCEE inspection.

(Note:-SSP is to be designed and constructed keeping in view of Double Line section. Earthwork, Fencing, Foundation activities are to be completed suitable for double line section)

S.N.	Location	Type of Switching Post	Remarks
1.	VPPL Yard and Varor Yd (Final location will be finalized)= 02 Nos.	SSP	OFC connectivity with TPC phone.

3.3 25 KV Booster Transformer and return conductor arrangement [Specify scope of booster transformer stations]

S.N.	From Station to Station	km to km	Length of RC (Metres)	Remarks
NIL				

3.4 25 KV Auxiliary transformer stations

Design, supply, erection, testing and commissioning of Auxiliary Transformer Station as per following details, complete with all structures and fittings etc. along with anti-climbing device and all types of caution, warning, instruction, protection boards and location/Name boards, junction box and all necessary documentation for EIG sanction and CRS Inspection. Break down attention till CRS/PCEE inspection.]

3.4.1 10KVA Auxiliary Transformer Stations

S.N.	Location	Capacity	Quantity	Remarks
1	02 No. Each at all 02 stations	10KVA	04	Location will be finalized later
2	02 No. Each at all 02 SSP	10KVA	04	Location will be finalized later

3.5 Traction sub-stations (TSS)

[Specify scope of TSS work]

S. N.	Location of TSS	Input Voltage	Number of Transformers	Capacity of each Transformer	Remarks
NIL					

3.6 High voltage transmission line from grid sub-station to railway TSS

[Specify scope of work]

3.6.1 Overhead transmission line

S.N.	Location km to km	Total length in km	Nominal Voltage level	Single Circuit/ Double Circuit	3-Phase/ 2- Phase	Remarks
NIL						

3.6.2 Monopole overhead transmission line

S.N.	Location km to km	Total length in km	Nominal Voltage level	Single Circuit/ Double Circuit	3-Phase/ 2- Phase	Remarks
------	-------------------	--------------------	-----------------------	--------------------------------	-------------------	---------

NIL

3.7 Underground high tension cable transmission

S.N.	Location km to km	Total length in km	Nominal Voltage level	Single Circuit/ Double Circuit	3-Phase/ 2- Phase	Remarks
NIL						

**3.8 Bay augmentation work at grid sub-station
[Specify scope of work]**

S.N.	Location	Nominal Voltage level	Number of bays	Remarks
NIL				

3.9 Supervisory control and data acquisition system (SCADA).

The scope covers design, supply, erection, testing and commissioning of Standard Supervisory Control and Data Acquisition (SCADA) equipment as per **RDSO Specification No. TI/SPC/RCC/SCADA/0133** or with latest amendments in the proposed electrified section. The, scope of the work also covers supply of SCADA system at RCC., SCADA software, SCADA equipment at controlled stations.

S.N.	Item	Quantity	Remarks
1.	Remote Control Centre with SCADA Hardware and software	0	
2.	Modification of existing SCADA System	01	Modification At RCC / MMCT
3	SCADA Equipment at Traction Sub-Station	0	
4	SCADA Equipment at Switching Posts (SP/SSP)	02	

3.10 Various electrical general services works

All Electric General works in All Newly Constructed buildings be provided including Service buildings, Office buildings, Station buildings as mentioned in Clause 1.8 of

this schedule with SP/SSP/TSS/RCC, OHE Depot /OHE Cum PSI Depots, Tower Wagon Sheds, AEE/TRD Offices, ASTE offices, SSE/S &T offices, Relay Room, Battery Room etc. including supply and erection for Cabling, wiring, Panels, Switch Gear, Equipment Fittings, Pumps, Yard Lighting, Street Lighting etc. are to be completed and commissioned. Details as per attached GADs and item-wise Quantity Schedule for Electric General Works as attached (for reference only).

All Electric General works in **Traction Power LT Supply through Auxiliary Transformers (ATs)** including supply and erection for Cabling, wiring, CLS Panels, Switch Gear, Equipment Fittings, etc. in all Stations, Cabins, L.C. Gates and ensuring Traction Power LT Supply up to signaling Relay Room / Panel Room, OFC Hut and other required Locations are to be completed and commissioned. Details as per attached GADs and item-wise Quantity Schedule for Electric General Works as attached (for reference only).

All Electric General work in **Newly Constructed Officer's and Staff quarters** including supply and erection for Cabling, wiring, Panels, Switch Gear, Equipment Fittings, Pumps, Yard Lighting, Street Lighting etc. are to be completed and commissioned. Details as per attached GADs and item-wise Quantity Schedule for Electric General Works as attached (for reference only).

3.11 Modification of HT power lines and crossings (raising of height)

[Specify scope of work]

Serial No.	Item	Nominal Voltage level	Single Circuit / Double Circuit	No of Phases	Designated current carrying capacity	Quantity	Remarks
1.	Track crossing				NIL		
2.	Along the Track			NIL			

3.12 Modification of HT power lines and crossings (replacement by UG cabling)

S.N .	Item	Nominal Voltage level	Single Circuit / Double Circuit	No of Phases	Designated current carrying capacity	Quantity	Remarks
1.	Track crossing			NIL			
2.	Along the			NIL			

	track						
--	--------------	--	--	--	--	--	--

3.13 Modification of LT power lines and crossings (replacement by UG cabling) :

S.N.	Item	Nominal Voltage level	Single Circuit/ Double Circuit	No of Phases	Designated current carrying capacity	Quantity	Remarks
1.	Track crossing	11 KV			28 nos		As per below Table
2.	Along the track						

Electrical Line crossings						
Sr. No	Proposed Line Chainage	Voltage	Distance from Proposed Line		Height (m)	Remarks
			LHS (in M)	RHS in (M)		
1	2725	400 KV	45	204	20.59	Modification not required
2	2800	400 KV	56	151	20.67	Modification not required
3	2900	220 KV	0	230	17.36	Proposed alignment passing through Tower, Tower need to Dismantle and Proposed New Tower
4	4775	220 KV	-	11	-	Proposed alignment passing Nearer the Tower, Tower need to Dismantle and Proposed New Tower
5	5219	11KV	2.550	33.500	-	UGPL Modification Required
6	6526	11KV	9.430	7.830	-	UGPL Modification Required
7	6723	11KV	18.3	19.7	-	UGPL Modification Required
8	7560	11KV	18.2	18.1	-	UGPL Modification

Electrical Line crossings						
Sr. No	Proposed Line Chainage	Voltage	Distance from Proposed Line		Height (m)	Remarks
						Required
9	8175	220 KV	146	56	17.36	Modification not required
10	8240	400 KV	232	142	20.59	Modification not required
11	8685	400 KV	20.4	242	20.67	Proposed alignment passing Nearer the Tower, Tower need to Dismantle and Proposed new tower
12	11020	11KV	38.9	32.1	-	UGPL Modification Required
13	11100	11KV	8.7	39.1	-	UGPL Modification Required
14	11250	11KV	4.1	26.3	-	UGPL Modification Required
15	12650	11KV	15.9	34.1	-	UGPL Modification Required
16	14000	11KV	0	23.29	-	UGPL Modification Required
17	14200	11KV	0	24	-	UGPL Modification Required
18	14250	11KV	0		-	UGPL Modification Required
19	15400	11KV	0		-	UGPL Modification Required
20	15600	132 KV	250	120	19.27	Modification not required
21	16500	11KV	0	30	-	UGPL Modification Required
22	16750	11KV	30	15		UGPL Modification Required
23	16900	132 KV	193	148	9.42	Height of Lowest conductor is Too low as per Standards,Need to Shift tower for Increasing Height of Conductor

Electrical Line crossings						
Sr. No	Proposed Line Chainage	Voltage	Distance from Proposed Line		Height (m)	Remarks
24	16950	11KV	10.5	18	-	UGPL Modification Required
25	17000	11KV	15	25	-	UGPL Modification Required
26	17500	11KV	20	25	-	UGPL Modification Required
27	17550	11KV	20	25	-	UGPL Modification Required
28	18150	11KV	2.7		-	Pole Shifting Required
29	18250	11KV	20	20	-	UGPL Modification Required
30	18300	11KV	3.3		-	Pole Shifting Required
31	18350	11KV	1.9		-	Pole Shifting Required
32	18900	11KV	20	25	-	UGPL Modification Required
33	18900	132 KV	0	0	-	Dismantle Required, No conductor (Off Load Tower)
34	20500	11KV	18.2	18.1	-	UGPL Modification Required
35	21100	11KV	12.5	31.2	-	UGPL Modification Required
36	21250	11KV	28	20	-	UGPL Modification Required
37	21500	11KV	11	27.5	-	UGPL Modification Required
38	21950	11KV	22	28	-	UGPL Modification Required

3.14 Extension of LT power supply for CLS Work:

S.N.	Location	Current capacity/ size of conductor	Quantity	Remarks
------	----------	--	----------	---------

1	AT stations and SSP	2x70 Sqmm	12	As per site condition
----------	----------------------------	------------------	-----------	------------------------------

3.15 Extension/Augmentation of electrical power supply arrangements and associated works

Augmentation of power supply works includes all general supply works from state electricity authority supply point to service building/quarters metering panel. It includes Liasoning with state electricity authorities for releasing of new power connection or augmentation of existing connection duly providing new transformer/substation wherever required, new panel with metering arrangements, laying of HT/LT cables in trench as well as on surface of required size as per requirement and site condition, necessary earthing arrangement, distribution panel with MCCB and laying of cables upto metering panel of service building and quarters. The contractor needs to design the system and get approval from authority through authority engineer. All equipment/cable etc. shall be of approved make as approved by authority.

S.N.	Location	Load (KWH)	Remarks
1.	Between New palghar – Vadhawan (Stations, SSP, Quarters etc)	2-20 Kw/Each as per site requirement	02 Nos. Stations 02-SSP Type –II Qtr-12Nos. Service buildings, station building , office building etc as mentioned in Clause 1.8 of this schedule.

3.16 Modifications of existing electrical works

3.16.1 List modifications to existing switching posts, if any.- NIL

3.16.2 List modifications to existing OHE, including dismantling of OHE, removal of brackets, cutting of masts, dismantling and removal of existing auxiliary transformer-NIL

3.16.3 List modifications to existing traction substation, such as augmentation of bay, addition or replacement of traction transformer, circuit breakers etc.-NIL

3.17 Inventory electrical

1	Pull lift machine 3 tonne pulling capacity and 3 tonne lifting capacity Make TracelTirfer India Pvt Ltd or similar	Nos	2
2	Pull lift machine 5.2 tonne pulling capacity and 3.2 tonne lifting capacity Make TracelTirfer India Pvt Ltd or similar	Nos	2
3	Pull lift machine 1.5 tonne pulling capacity and 2 tonne lifting capacity Make TracelTirfer India Pvt Ltd or similar	Nos	2
4	Earthing discharge rod complete.	Nos	2
5	Aluminium straight ladder (9.3 m) with hook on top.	Nos	2
6	Aluminium folding ladder (11 m) with hook on top.	Nos	2
7	Portable electric drill machine 21mm, single phase 230 Volt (for drilling rails for bonding).	Nos	2
8	Contact wire cutter 36".	Nos	2
9	Dropper wire cutter 12".	Nos	2
10	Single sleeve pully block 3 1/2" x 1/2" groove steel.	Nos	2
11	Contact wire twist cum bender 6"	Nos	2
12	Steel sling 1m long, eye at each end 19 mm dia.	Nos	2
13	Steel sling 2m long, eye at each end 19 mm dia.	Nos	2
14	Steel sling 3m long, eye at each end 19 mm	Nos	2

	dia.		
15	Steel sling 4m long, eye at each end 19 mm dia.	Nos	2
16	Steel sling 5m long, eye at each end 19 mm dia.	Nos	2
17	Fabric metric tape 30 mtr long 15 mm wide each.	Nos	2
18	Engineering ratchet with socket set	Nos	2
19	Earth Megger/tester	Nos	2
20	Screw driver set consisting of 6", 8", 12", 16" & 18"	Set	2
21	Insulated cutting plier (12") & (8")	Set	2
22	Sprit level (12") & (6")	Set	2
23	Tensometer IDT-10 Ton capacity.	Nos	2
24	Hydraulic crimping tool.	Nos	2
25	Bench grinder (Double end pedestal) Motor driven.	Nos	2
26	50W LED flood light IP65 rating	Nos	2
27	Syren covering distance one kilometer (Electric).	Nos	2
28	High Beam (Range 1 km) rechargeable 15W LED torch	Nos	2
29	D' Spanner double ended 24 sizes in a set of 12 pieces Gedore make or equivalent	Nos	2

30	Ring spanner double ended 24 sizes in a set of 12 pieces Gedore make or any other substantially equipment make.	Nos	2
31	Desktop Computer (All in one i3 window 11) HP,Dell, Lenovo make	Each	2
32	Black and white printer with scanner	Each	2
33	Digital Multi Meter, 6000 count backlit digital display,True RMS reCCGng on AC mode, 1000 V DC / 750 V AC ranges,10 A AC / DC ranges,Resistance, frequency and capacitance ranges,CAT IV 600 V as per specification.Megger- AVO410	Set	1
34	Earth Leakage Clamp meter, DC and AC current and voltage,600 A and 600V Resistance and continuity, 3 1/2 digit, 4000 count display with backlight,High resolution digital bargraph,Peak, min/max and data-hold functions, Safety Overvoltage safety category: IEC 61010-1 600V CAT III,Weight 225 g including batteries,having drop-tested to 1.2 m onto a hard floor as per specification. Megger -DCM305E	Set	1
35	Digital Tong tester, AC/DC,DC and AC current up to 1500 A, True RMS measurement for greater accuracy,Large jaw size safely assists with uninsulated conductor measurements,750 VAC and 1000 VDC,Resistance, continuity and frequency,Peak, min/max and data-hold functions,EN61326-1 & IEC61010-1 CAT IV 600 V For use on uninsulated conductors Megger-DCM1500	Nos.	1
36	THERMAL IMAGER HAND HELD 250 Deg suitable for substation & OHE applications measurement up to 15 meter distance with laptop or other accessories. Fluke Make	Nos.	1

37	Insulation Tester 2.5 KV with PI Measurement,selectable Voltage 50V to 2,500V, Resistance Range- 200G ohm,Equipment should Weatherproof IP54,Tough housing along with rechargeable Battery,CAT IV 600 V applications,IEC61010 and EN61557 Megger- MIT 2500	Nos.	1
38	Helmets Class E – Electrical Hard Hat – White should comfort in mind and features multiple adjustment points for a personalized comfortable fit. Compliance withANSI Z89.1-2014 Type 1, Class ECSA Z94. 12015 Type 1, Class E	Nos.	10
39	Insulating Rubber Mats – 33 KV , Type “C”,• Bicolor Mat: The two colors and two layers of the mat serve the purpose of mechanical damage indication and give hint to replace the mat when color change is visible on the surface, should Certified by IS 15652:2006: Ensures the minimum regulatory requirements .Quality assurance: Tested by the any reputed laboratory.Thickness: 3.0 mm, Working Voltage: 33 KV AC Proof Voltage: 36 KV, Dielectric Strength: 65 KV per square meter as per specification Make Raychem	Nos.	10
40	Tools Box Universal for substation (SSP) as per specification Stanley	Nos.	2
41	Oxbo mid back net chair with curved back which will serve as a neck rest and fixed arm rest. Chair is equipped with central tilt mechanism 360° revolving type, upright position locking and tilt tension adjustment pneumatic height adjustment upto 14cm. Make - Godrej, Durian Model No. CLS/59701/MB	Each	4
42	Visitor chair with arm rest and rubber foam cushioned. Make - Godrej, Durion.	Each	8

43	Composite office table with top of pre laminated particle board of 1350x750x750 mm (LxWxH) with 4 drawers (veneered) Type, T-9 of M/S Godrej, Durion or equivalent make.	Each	4
44	Office steel almirah size 60"x30"x18" 4 compartment with locker made of 22/22 SWG sheet & colour should be anti rust powder coated Make - Godrej, Durion.	Each	2
45	Industrial lockers size - 78"x35"x19" with 8 lockers 18"x18"x19" Make - Godrej, Durion.	Each	2
46	Aluminium ladder 9.3M long with hook on top	Each	2
47	Supply of tool kit with box.		1
48	Supply of portable blower		1
49	Supply of 8 locker Steel cup board.		2
50	Supply of Almirah steel.		2
51	Supply of Steel chair.		6
52	Supply of Steel table.		3
53	Supply of clip on meter		2
54	Supply of earth tester		2
55	Supply of insulation tester		2
56	Supply of 8 feet ladder		2
57	Supply of 15 feet ladder		2

58	Supply of box spanner set	2
59	Supply of double ended spanner set.	2
60	Supply of universal tool set.	2
61	Supply of crimping tool kit with dies.	2
62	Supply of digital type vernier caliper of range 0-200mm.	1
63	Supply of digital Micro meter of range 0-25mm.	1

PART-I: GOVERNING SPECIFICATIONS FOR ELECTRICAL TRD (OHE & PSI)

WORK:

1. GENERAL

In general, based on the specifications issued by various bodies, such as Bureau of Indian Standards, British Standard Institution etc. Specifications have been issued by the Purchaser. Such specification may be brought separately from the office of the Purchaser.

All these specifications are included in the set of drawings and specifications.

(b) SPECIAL INSTRUCTIONS

(1) The tenderer should inspect the site of various locations before quoting the rates and should acquaint himself with the scope of work, method of execution and approach roads which are long to the locations so that no difficulty is experienced at the time of execution of the work.

(2) Tenderer should have his own permanent establishment/ independent office and should have experience in executing similar type of works, in any of the Government organization, for which he should submit his credentials, certificate of completion of work.

(3) During the execution of the work, the contractor shall have to observe utmost safety while carrying out digging and laying work of the cable, all the work shall be executed in the presence of Railway Representative. If any damages are done by the contractor's labour during digging, then the loss shall be borne by the contractor.

(4) The contractor should ensure that during the execution of work, either he himself is present at the site or his responsible engineer should always remain present at site. Co-ordination shall be maintained with this office for day to day planning and execution of the work, which is to be completed within the targeted period.

(5) The tenderer should fully understand that the instant work is a targeted work. This work is to be completed well before the target as such every care shall have to be taken to maintain the completion period.

(6) The contractor shall have to make his own arrangement for transportation of materials and keep all materials safely at his own depot at site, tools, labour etc at site for the execution of the work.

(7) Contractor shall have to execute all works in accordance with latest RDSO/IE rules and Track crossing regulations.

(8) All materials should be complying with the latest **RDSO/CORE specifications and SMI/MI&TCs at the time of supply**. All material should also be purchased from **RDSO/CORE approved vendors** and shall be supplied with duly inspected by Rites stage inspection as well as final inspection.

2. COMPLIANCE WITH STANDARD SPECIFICATION

In the technical specifications of equipment's, components and materials, reference is made to the following standard specifications:

(i) International electro Technical Commission (abbreviated as IEC) publications.

(ii) British Standards (abbreviated as BS)

(iii) Bureau of Indian Standards (abbreviated as IS)

Tenderers may, however, offer equipment in accordance with the appropriate national standard specifications of the country of manufacture, but such offers will be treated as deviations and should be quoted for in the manner specified in Para 1.1.7 (d) English rendering of the text and illustrations of the national standard specifications and explanatory notes on the specific deviations from IEC, British Bureau of Indian Standard in question, shall also be submitted in form-3. In case of doubt, the Purchaser shall decide the clause and specification applicable and the contents of the specification and standard mentioned above shall guide such decisions.

3. TECHNICAL SPECIFICATIONS

The following specifications/RDSO drawings/Guide lines & latest (as per version available as on date issue of LOA) will govern the supply and testing of important materials, components and equipment's: -

Structural Steel IS: 2062-1992

IS: 800-1984

IS: 808-1989

Tensile Testing IS:1731-1989

IS:2004-1991

IS:1608-1972 For steel products etc.

Welding IS:816-1969

Dropper Wire IS:282-1982

Annealed Copper jumper Wire IS:9968 (PT.I):1981

Al. jumper wire IS:694-1990

Aluminum conductor IS:398 (PT.I)-1976

Material for Aluminum tubular busbar IS:5082-1981

Dimensions for Aluminum Tubular Busbar IS:2673-1979

Galvannised stay strand IS:2141-1992

PVC insulated cables IS:1554(Part-I)1988

Tin bronze castings IS:306-1983

Aluminum bronze castings IS:3091-1965

Gray iron castings IS:210-1978

Aluminum castings IS:617-1975

Copper strip for formed fittings IS:1897-1983

Cadmium copper conductor for overhead ETI/OHE/50(6/97) with A&C

Rly. Traction slip No.1 to 3 of (4/09) or latest.

Copper Busbar RE/30/OHE/5(11/60) or latest.

Steel tubes ETI/OHE/11(5/89) or latest

Hot dip galvanisation of steel masts (Rolled ETI/OHE/13(4/84) with A&C slip and fabricated) tubes and fittings used on No.1 of (5/86) 2 of (4/90) & 3 of 25 KV A.C. OHE. (4/90) or latest.

Stainless steel wire ropes TI/SPC/OHE/WR/1060(06/06) or latest

25 KV solid core insulator. TI/SPC/OHE/INSCOM/1070(01/07) or latest

For polluted zones (Composite)

25 KV single and double pole isolator. ETI/OHE/16(1/94) or latest

Steel and stainless steel Bolts, Nuts TI/SPC/OHE/FASTNERS/0120(03/13)

and washer. or latest. Aluminium Alloy Section and tube. ETI/OHE/21 (9/74) or latest.

Enamelled steel plates ETI/OHE/33 (8/85) or latest.

Galvanised steel wire ETI/OHE/36 (12/73) with A&C slip

No.1 of (5/98) or latest.

Fittings for 25 KV 50 Hz AC traction ETI/OHE/49 (9/95) with A&C slip

equipment. No.1 of (6/97) & 2 of (4/2000)-CORE-1& 3

of (10/2010) or latest.

25 KV AC 50 Hz Single pole outdoor ETI/PSI/159/(10/94) slip no.1 (3/95)

Vacuum Interrupter. or latest.

25 KV Potential Transformer TI/SPC/PSI/PT/0990 or latest.

25 KV drop out fuse switch & operating ETI/PSI/14 (1/86) with A&C slip No.

pole for use with 10 KVA 1 of (4/87) or latest.

25 KV/230 V LT supply transformer ETI/PSI/15(8/2003) or latest.

25 KV/240 V, 10 KVA LT supply Transformer ETI/PSI/15(8/2003) or latest.

Metal Oxide Gapless Type Lightning TI/SPC/PSI/MOGTLA/0100 or latest. Arrestor use on 25 KV side or latest

3-pulley type Regulating equipment (3:1) TI/SPC/OHE/ATD/0060(8/06) with A&C slip No.1 & 2 91/2013 or latest.

110 V 40 AH battery charger ETI/PSI/1 (6/81) or latest.

Bimetallic (Al-Cu) strip ETI/OHE/55 (4/90) or latest.

Railway board letter No. 2021/CE-I/CT/SI/1, dtd 04.03.2021 for improvement of quality in construction works shall be applicable and compliance of this letter shall be done strictly and to be submitted before CRS/PCEE inspection. Details of the checklist and letters are attached with Tender.

Chapter 3:Description of Scope of each item and its meaning:

PART-I: FOR ELECTRICAL-TRD (OHE & PSI) ITEMS:

❖Earth work & Foundation:

❖Concrete for foundation and plinth in all type of soil including hard/rocky soil (including excavation and supply of all materials viz., sand, cement, and ballast etc.):

All earth works mentioned in all classes of soil, concrete or masonry/drains/walls and rock. The price shall also include the cost of digging, cement concrete & soil refilling.

The price shall be same for any shape and size of concrete blocks for foundation, in calculating the individual volume of concrete, fraction of a cubic meter beyond the third decimal shall be rounded off to the next nearest third decimal. The price shall apply for concreting of all foundations for masts, gantries, portals, anchor blocks for guy rods and fencing uprights. For purposes of computation of volume of concrete, the volume of steel work embedded in

the foundation block and muff shall be ignored. Cost of all concrete will be paid for only under item No.1 and the prices of other item shall not include. For purposes of compilation of volume of concrete, the volume of concrete shall include the volume of sand and bitumen in sand core foundation. For purposes of compilation of volume of concrete, the volume of each muff for all masts shall be taken as 0.02 cum., except for masts with balance weights and for column of portal, each head span masts, 2 or 3 track cantilever masts and special fabricated masts for which the volume of muff shall be taken as 0.08 cum. irrespective of the size and shape of muff on a flat basis. Mixture for casting of foundation shall be 1:3:6 and mixture for grouting shall be 1:2:4. Curing of foundation shall be done by contractor for 28 days. No scroll will be supplied by Railway; contractor will use his scroll. Necessary details like, type, implantation, chainage shall be supplied by Railway. Contractor has to prepare standard cube of size 150x150x150mm for every 25 cum of foundation cast & is to be tested in the Govt. approved laboratory as per IS-516/1959(or Latest) to obtain the result as per IS 456/1978. Cement used shall confirm to IS 1489 - 1976 or latest & grade 53. The price also cover cost for smooth plasters on exposed foundation and muff.

❖Reinforced Concrete for foundation and trench

Excavation and all reinforced concrete work for foundation including supply of steel for reinforcement and other materials Including bending /binding laying of reinforcement shoring and shuttering where necessary, costing concrete including frame work where necessary, grouting and finishing the tops of foundation blocks with the required slope/muff. The price shall include dismantling of all connected temporary arrangement

back filling as required and removal of soil. The price shall also cover all concrete work for cost in situ piles and pedestals /columns for mounting equipment. The volume of cast-insitu piles and pedestals columns shall be added of the volume of foundation block for purposes of payment, Dowel bars will not be considered as reinforcement for the purpose of this item. The price shall include the cost of cement also. Cement will not be supplied by Rlys. The price shall include cost for paint with distemper on exposed portion of foundation. The price also covers cost of smooth plastering on exposed portion of foundation. Cement shall be used of 53 grade and of popular brand.

❖Reinforcement concrete for Cable trench cover

The price shall cover costing of cable trench covers in reinforced concrete as per drawing The cable trench covers will be cashed in on angle iron frame of angle size 40x40x5. The price shall include the supply of steel for reinforcement angle iron for the frame work fabrication of angle iron frame etc. The price shall include Positioning and dressing up of the trench covers, if required. The price shall include the cost of cement, ballast and sand

also. Cement will not be supplied by Rlys. Cement shall be used of 53 grade and of popular brand. Curing of concrete shall be carried out for 28 Days.

❖ *Spreding and leveling of 20 mm downgraded ballast, padding 150mm in Switching post*

The price shall be per cum rate and shall cover supply and spreCCGng of uniformly graded gravel/ballast of size 20 mm, in the outdoor switch yard after completing all the works and levelling the switch yard area, but before commissioning of the sub-station. The gravel/ballast shall be of good quality and free from any dust and dirt. Prior approval of ballast shall be taken from the Purchaser for the gravel samples. The gravel/ballast shall be spread out uniformly to a depth of 15cm. over the area indicated by the Purchaser's Engineer.

Note: for Earth work

- 1. The prices under item shall be same for any shape of size of Concrete blocks, cable trenches & brick wall. In calculating the individual volume of concrete and brick wall fraction of a cubic meter beyond the third decimal shall be rounded off to the nearest third decimal.*
- 2. The prices under Item shall apply for concreting at all pedestals plinths and foundations for gantries/portals and supporting steel work and cable trenches.*
- 3. For purpose of computation of volume of concrete and brick wall under Item, the volume of steel work embedded in the foundation block or muff shall be ignored.*
- 4. The volume of each muff will be included in the volume of concrete for the respective foundation for purpose of computation of volume of concrete.*
- 5. The prices shall include cost of embodiment of drain pipes, conduits for cable or earthing flats where necessary.*
- 6. In respect of concrete for cable trenches the price shall not include the cost of cable supports and trays, which shall be supplied and erected by the contractor and shall be paid for under item.*
- 7. Dowel bars in special foundations and nominal reinforcement in black cotton soil foundation will be necessary such nominally reinforced foundations in black cotton soil will be payable under item. The steel for nominal reinforcement and dowel bars will be supplied by the contractor and the concrete mixture in such a case shall be as for normal foundation 1:3:6.320*

❖ Steel and OHE items :

❖ *Rolled or fabricated and galvanized traction mast, TTC, Portals, auxiliary*

transformer masts, feeder mast, bridge masts etc.

Supply of traction main masts of OHE comprising rolled, broad flanged beams, fabricated K-series, B series, portal upright, boom pieces & associated fittings, D.A., extension chairs and AT Masts, feeder mast, bridge mast etc.

- 1. The price shall cover cost of fabrication, galvanization, and supply of individual tractions masts.*
- 2. Galvanization thickness shall be as per Railway Specification No. ETI/OHE/13(4/84) with c.s. 4/90 or latest with galvanization thickness of 1000 gram per sq. meter.*
- 3. In case, required size of channels are not available as per approved drawing, higher size of channels can be used with approval of Dy. Chief Electrical Engineer. (construction) and payment as per actual black weight will be paid.*
- 4. The price shall also include the straightening of masts/portal uprights etc bent during transit and cutting of masts/portal uprights to suit the site condition.*
- 5. For standard fabrication of steel work or structures for which RDSO/CORE approved drawing are available, the black steel weight of steel work as specified in RDSO/CORE drawing, shall be considered for payment.*
- 6. 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 and the same will be considered for payment for the nonstandard fabricated steel work, the calculated weight to be considered for payment under this item shall be included in the relevant drawing based on latest IS sectional weight at the time of submitting the designs for approval of the purchaser.*
- 7. There will be no addition for increased weight due to galvanizing or painting or reduction for holes or screw cut.*
- 8. Galvanization damaged during transportation/ carting will be touch up with cold ZINC paints by tenderer.*
- 9. Crane will be arranged by railway for Portal boom erection only on demand by contractor.*
- 10. Materials will be supplied at site of work.*
- 11. Payable unit weights for standard mast.*

Fabricated and galvanized steel works other than traction mast, TTC, portals etc. (SPS)

- 1. The price shall cover cost for supply of SPS for different type of masts, portals, DA, isolator, boom. Payment of SPS will be made as per black steel weight of material as per RDSO/CORE latest approved drawings and supplier.*
- 2. The price shall cover cost of fabrication, galvanization, supply setting before grouting of individual tractions masts.*

3. Galvanization thickness shall be as per Railway Specification No. ETI/OHE/13(4/84) with c.s.4/90 or latest with galvanization thickness of 1000 gram per sq. meter.
4. In case, required size of channels are not available as per approved drawing, higher size of channels can be used with approval of Dy. Chief Electrical Engineer (construction) and payment as per actual black weight will be paid.
5. The price shall also include the straightening of masts/portal uprights etc bent during transit and cutting of masts/portal uprights to suit the site condition.
6. For standard fabrication of steel work or structures for which RDSO/CORE approved drawing are available, the black steel weight of steel work as specified in RDSO/CORE drawing, shall be considered for payment.
7. 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 and the same will be considered for payment for the nonstandard fabricated steel work, the calculated weight to be considered for payment under this item shall be included in the relevant drawing based on latest IS sectional weight at the time of submitting the designs for approval of the purchaser.
8. There will be no addition for increased weight due to galvanizing or painting or reduction for holes or screw cut.
9. Galvanization damaged during transportation/ carting will be touch up with cold ZINC paints by tenderer.
10. Materials will be supplied at site of work.

Single cantilever assembly complete with insulator for conventional OHE and inside the tunnel.

1. The price shall cover on a flat rate basis for supply of bracket assembly on a traction mast or Support on drop arm and shall include those on high/low level platform in the vicinity of turnouts over bridges or overlaps and at all locations with reduced encumbrance/ terminating wires as per latest RDSO drawing.
2. The price shall include the cost of supply of all components including galvanized steel tube duly fabricated and Porcelain insulators 1050/1600 mm CD as desired by open line) for polluted Zone (Id. 6000-1, 6030-1) including bolts, nuts etc. if any.
3. The price shall cover supply of all components including registered arm dropper excluding small parts steel work if any.
4. The price shall cover supply of double suspension clamp for anticreep centre.
5. Composite insulators shall be used in polluted Zone and stone pelting areas with prior approval of Dy.CEE/C.
6. The price also covers cost for testing of insulator (ST/BT/9T) with Hydraulic insulator testing machine. Calibrated Insulator testing machine shall be arranged by contractor.
7. All Components shall have complied Latest RDSO/CORE specification. (Note: Forge type fittings shall be used instead of MCI wherever applicable.)

Pull-off arrangement for OHE.

The price shall cover supply of all components required for a pull-off arrangement to pull OHE equipment, including head span mast fittings complete with M.S. angle equalizing

plate assembly steady arm, catenary dropper clip, contact wire swivel clip and fittings, including porcelain 9 ton insulators (1050mm CD) conductors, small jumpers (50 Sq.mm) wire. The price shall cover erection of all components including composite solid core insulators, small jumper wire and conductors.

Guy rod assembly

1. The price shall cover supply of guy rod assembly of various lengths for traction masts/portal upright complete with mast guy rod fittings, guy rod with adjustments and parts to be grouted etc in the anchor block including S.P.S.
2. The price shall not include the cost of supply of dwarf masts.

COMPONENTS REQUIREMENTS

Railway ID No.	Description of components	Qty/unit
3241,3251,2352,3291	Mast Anchor Fitting for all type of structure	1 No
3242 ,3231	Mast guy rod fitting with 4 sets of bolts of 20 mm dia of suitable length with nuts, Locknuts, washers for attachments to mast/S.P.S including appropriate fitting	1 No
3243,3232	Mast fitting with 4 sets of bolts of 20 mm dia of suitable length with nuts, Locknuts, washers for attachments to mast/S.P.S including appropriate fitting	1No.
5001-3	Stud bolts for draft mast (850mm)	2 Nos.
-	Triangular attachment for Dwarf mast	1 No
5002	Guy rod stirrup	1 Set
5004 or 5005 or 5006.1 or 5070-1	Guy rod with nut, washer, split pin	1 Set
5007-1	Anchor 'V' bolt	1 Set

5008	Anchor loop	1 Set
5220-2	Guy rod double strap assembly.	1 Set

Note: All components should be as per latest RDSO Drawing and Specification with Revision (if any).

Regulating equipment complete with all accessories including counter weight assembly and SS wire rope for conventional OHE

The price shall cover supply of counter weight assembly including 9 Tonne adjuster & 9T Porcelain Insulator CD 1050 mm with double strap assembly, and normal/ antitheft guide tube assembly including supply of regulating equipment as per RDSO Specification No. TI/SPC/OHE/ATD/0060 Rev.-1 with A&C Slip No.1 or latest and stainless steel wire rope as per Rly Specification No. TI/SPC/OHE/WR/1060(06/2006) With A & C No.1, 2 & 3 or latest suitable for 3 Pulley ATD required for regulating equipment and small parts steel work, if any. The price shall also cover supply of anti-falling device, anti-climbing (stiffener) Angle on Anchoring, double eye distance rod and mast fittings for all type mast. The price also covers cost for compliance of Latest Technical circular, MI/SMI's, Reliability action plan etc. (if applicable)

GI Structure and other bonds

1. The price shall cover for supply of all materials including GI flat 40 x 6 mm required to provide GI structure bond and other type of bonds to connecting a traction mast or structures to the nearest non track circuited rail, or earth electrode including all fasteners at both ends.

The galvanization shall be done as per RDSO specification No.ETI/OHE/13(4/8) with ACS 1 to 4 ensuring quality of zinc, base metal, surface preparation. The weight of Zinc coating to be adopted is 750g/sqm. If galvanization is damaged due to hole drilling, welding, cutting, handling, erection etc. the rectification shall be done as per clause 8 of RDSO specification No. ETI/OHE/13(4/84) with ACS 1-4 (using zinc based solder/zinc based paints).

2. The price shall include shaping and drilling of the bond.
3. The price shall also include provision of heat shrinkable PVC sleeve & HDPE pipe as per latest guideline for structure bond under track circuited rail.
4. ***Earth electrode assembly as per IS 3043/ RDSO specification***

The price shall cover supply of an earth electrode assembly as per RDSO Specification No. ETI/OHE/P/7021 rev. A or latest with all accessories & fasteners. The price shall cover supply of an earth electrode assembly as per RDSO Specification No. ETI/PSI/222 Rev-A or latest with all accessories & fasteners for switching station of 4.00 mtrs length. The price also covers the provision of a protective concrete box with removable cover.

GI flat for earth (50mmx6mm)

The price shall cover supply per meter length of 50x 6 mm GI strip.

The galvanization shall be done as per RDSO specification No.ETI/OHE/13(4/8) with ACS 1 to 4 and latest ensuring quality of zinc, base metal, surface preparation. The weight of Zinc coating to be adopted is 750g/sqm. If galvanization is damaged due to hole drilling, welding, cutting, handling, erection etc. the rectification shall be done as per clause 8 of RDSO specification No. ETI/OHE/13(4/84) with ACS 1-4 (using zinc based solder/zinc based paints).

The price also cover cost for supply of fasteners required for connecting the flat with earth bus. The price also covers cost for welding where ever required.

Fencing upright

The price shall cover Supply of fabricated fencing uprights painted with two coats of red oxide zinc chromate primer and Finished with two coats of Aluminium paint as per IS:2339. The price shall be on the basis of black weight of the steel section of the approved drawing with no deduction for holes and skew cuts or no increase for weld materials

Fencing panel & gate as per RDSO approved drawing

The prices shall include supply of fencing panels painted with two coats of red oxide zinc chromate primer and finished with two coats of aluminium paint as per IS: 2339. The prices shall not include supply of fencing uprights, anti-climbing devices but shall include the cost of fasteners and the price shall be for a meter length of the panels, measured in the plan view of the approved drawings. The fencing panel should be made with 8 SWG Wire.

Anti monkey climbing device arrangement

The price shall include the supply of anti-monkey climbing device for different size/type of OHE structure as per RDSO instruction TI/MI/0056.

Switch Gear, Insulators & other Elec. Items :

25 KV, Vacuum interrupter

The price shall cover supply of 25kV Vacuum interrupter, complete with operating mechanism, all fittings, and accessories including terminal connectors as per RDSO Spec. No. TI/SPC/PSI/LVCBIN/0121 or latest. The price shall also cover the supply of an enameled number plate and required quantity of Long shackle brass Pad lock (Make - Godrej, Link). The price also covers cost of interlocking arrangement between VCB and concern DPI (as per RDSO guidelines). Price shall also cover the supply of different size of GI/PVC pipe for dressing of all type of cable provide at SP/SSP building cubic. Price shall also cover the supply of different size of MS chequered plate use for cable trench at SSP/SP control building cubical.

25KV double pole isolator with interlocking mechanism.

The price shall cover supply of a 25 KV, 1600A /2000A Double pole isolator complete (as per RDSO specification No.ETI/OHE/16 (1/94) Rev2 (Mar-04) and RDSO's letter No. TI/PSI/25/ISOL /POLICY /99 dt 3.6.99 or latest), with mounting base (including 25 KV pedestal insulators-4 Nos. and operating rod insulators-2 Nos.), operating rod and operating rod guides required for the operation of the isolator.

The price shall also cover supply of Al/Cu strips, Integral lock, a 50 mm Brass pad- lock (Make - Godrej, Link), flexible copper jumper for earthing and an Enameled number plate of approved design for each isolator.

The price also covers cost for 04 no. terminal connector.

25KV single pole isolator without earth contact assembly

1. The price shall cover supply of a 25 KV, 1600 /2000 A for SP/SSP's and OHE's Single pole isolator complete (as per RDSO specification No.ETI/OHE/16 (1/94) Rev2 (Mar-04) and RDSO's letter No. TI/PSI/25/ISOL /POLICY /99 dt 3.6.99 or latest), with mounting base (including 25 KV pedestal insulators-2 Nos. and operating rod insulators-1 Nos.), operating rod and operating rod guides required for the operation of the isolator.
2. The price shall also cover supply of Al/Cu strips, integral lock, a 50 mm Brass pad- lock (Make - Godrej, Link), copper jumper for earthing and an Enameled number plate of approved design for each isolator.
3. The price also covers cost for terminal connector as per RDSO standard for connection of Isolator to Busbar, Busbar to Busbar (splice) and Busbar to 160sqmm jumper (RI no. 6310, 1009 etc.) as required. The price shall also cover the supply of 18mm copper bus bar for use with SPI in OHE.
4. The price also covers supply of Key box for station and Switching station.

25KV single pole isolator with earth contact assembly

1. The price shall cover supply of a single pole isolator 1600/2000 A complete with mounting base (including 25 KV pedestal insulators-2 Nos. and operating rod insulators-1 Nos.), operating rod and operating rod guides required for the operation of the isolator as per RDSO specification no. TI/SPC/PSI/ISOLTR/0130 dated 21.03.13 with latest A&C slip. The price shall also cover supply of Al/Cu strips, integral lock, a 50 mm Brass pad- lock (Make - Godrej, Link), copper jumper for earthing and an Enameled number plate of approved design for each isolator.
2. The price also covers cost for terminal connector as per RDSO standard for connection of Isolator to Busbar, Busbar to Busbar (splice) and Busbar to 160sqmm jumper (RI no. 6310, 1009 etc.) as required.
3. The price shall also cover the supply of 18mm copper bus bar for use with SPI in OHE.
4. The price also covers supply of Key box for station and Switching station. Note:- All isolators shall be manual type with earthing switch.

PTFE short Neutral section

The price shall cover supply of a complete assembly of short neutral section (PTFE) (Phase brake). The price shall also cover end fitting for contact & catenary wire and other material required for erection & smooth operation with earthing arrangement. The short neutral assembly to be as per RDSO specification No. TI/SPC/OHE/SNS/0000 Rev.-1 with A&C Slip No.1or latest. Neutral section should be purchase from RDSO/CORE approved source only. The material is suitable for i.e. 65 sq.mm Catenery and 107 sq.mm contact wires.

Materials for termination of double conductor (including supply of cut-in - insulator) of overhead equipment.

The price shall cover supply of all material necessary for the termination of double conductor of overhead equipment terminating wire on a traction mast or structure including clevis assembly, adjuster, anchor double strap, ending clamp for catenary or contact or terminating wire with fitting and porcelain 9 tonne insulator assembly (for polluted zone) but excluding terminating wire if any, wherever double termination is required. Materials like equalizing /compensating double strap assembly. It includes the all fasteners required for termination.

Supply and Erection of all Aluminum 25 KV feeder/return conductor (Single Spider).

The price shall cover supply and erection of Hard-drawn stranded all Aluminium conductor conforming to IS-398(Pt.I) with ammendment-1 (or latest) and of size 19/3.99 mm (240 Sq.mm.) feeder/return conductor (along or across the tracks). The price shall not include the cost of suspension assembly (which will be paid for under Item-11) and termination (which will be paid for under Item-8.) and small part steel work, complete with bolts and nuts etc, if any. The price shall also cover on a flat rate basis, the cost of supply of splices to the extent required.

Supply and erection of earth wire

The price shall cover supply and erection of earth wire made of 7/4.09 mm steel reinforced aluminium conductor (RACCOON) excluding termination which will be paid for under Item 8 and shall include cost of fittings on structures for supporting the earthwire including bonding of the earth wire to the structure and the structure to earth electrodes or a non-track circuited running rail or impedance bond which will be provided by the Purchaser. The price shall include disc insulators, cut-in-insulator to isolate sections of earth wire which will be paid for under concerned insulator item in Section-5 and the cost of small part steel works complete with bolts and nuts to attach the earth wire mast clamp to masts/structures, if any.

Note for Measurement: i. The prices under Items 7(a) shall not include termination which will be paid for under Item 8. The connection (a) between feeders, or return conductors and (b) of feeders, or return conductors to a bus bar, overhead equipment or isolator switch which will be paid for under Item 15, & cut-in-insulators and suspension insulators which shall be paid for under Item 11. ii. For the purpose of payment against Item 7(a) the length of feeders, return conductors or earth wire shall be measured from the center lines of the mast/structure at which the two ends of each length of feeder or conductor run are anchored, by adding actual spans. In case of feeders/return conductors crossing a track, the length shall be measured between the faces of traction masts/structures at which the two ends of the cross feeder or return conductors are anchored, as indicated in the as erected structure erection drawings for traction masts/structures. No payment will be made for the extra length of the conductor/s on account of sag or scrap. iii. For purposes of progress payment reference to "As Approved" drawings shall be made. However, the price under this Item shall be adjusted according to the final length of OHE indicated in the "As Erected" layout plan/drawings

Supply and Manual Erection of All Aluminium 25 kV Feeder/Return (Single Spider).

The work is to be executed manually instead of with wiring trains.

Supply & Erection of aerial earth conductor (AEC) with necessary accessories, fittings and fasteners on OHE mast/Portals.

The price shall cover the cost of supply and Erection of Aerial Earth Conductor (AEC) of 12.24 mm dia ACSR RACCOON conductor complete with all accessories, fittings and fasteners on mast/ portals required as per RDSO Drawing and Technical Specification/Instruction mentioned in Annexure-I. The price shall also cover the cost of erection of SPS required for fixing arrangement of AEC if any, however supply cost of SPS will be paid under item 3(c) of Section-3. The price of the anchoring/ termination arrangement as and where required shall be covered under separate items.

Supply and Erection of Buried Earth Conductor (BEC) with necessary accessories fittings and fasteners.

The price shall cover the cost of Supply and Erection of 20 mm dia galvanized steel **Buried Earth Conductor (BEC)** as per RDSO Drawing and Technical Specification/Instruction mentioned in Annexure-I. BEC of 20 mm dia. (cross section 238.64 sq. mm), galvanized steel conductor should be laid underground along the UP and DN track separately, 300 mm below ground surface and approximately one meter away (or as per site conditions) from the OHE foundation towards the opposite direction of track. The price shall also cover the cost of Supply and Erection of Tee Connector and Lug for connection of BEC to each OHE mast/Portal and Feeder mast by the same conductor as per RDSO Drawing (Latest). The price shall also cover the cost of Supply and erection/laying of BEC required to run on the side wall of Platform (platform coping)/Bridges with suitable clamp & bolt grouted in the coping. However the adequacy and efficacy of this earthing and bonding system should be verified by the simulation studies/measurements of the touch and step potential of the rail in normal load and short circuit condition for compliance with EN 50122-1 and IEC 62128-1 (2013) (or latest).

Supply without Insulator and erection of materials for termination of all Aluminum 25 kV feeder/return conductor (single SPIDER).

The price shall cover supply of all materials required for the termination of an All Aluminium 25 kV feeder/return conductor (SPIDER), including appropriate mast anchor fittings adjuster, strain clamp end fitting including 9-tonne insulator assembly. However, the price shall cover erection of all materials including the 9 tonne insulator assembly.

Supply without Insulator and erection of materials for termination of an earth wire .

The price shall cover supply and erection of all materials required for the termination of an earth wire including appropriate mast anchor fittings, adjuster, terminal clamp and fittings.

Termination of AEC incl. all fittings & accessories i.e. Strain Clamp, adjuster etc.

The price shall cover the cost of Supply& Erection of all materials required for the termination of an AEC (Aerial Earth Conductor), including appropriate mast anchor fittings, adjuster, strain clamp, end fitting etc. required for termination.

Materials for termination of Single conductor including supply of 9T insulator.

The price shall cover supply of all material necessary for the termination of Single conductor of overhead equipment terminating wire on a traction mast or structure

including clevis assembly, adjuster, anchor double strap, ending clamp for catenary or contact or terminating wire with fitting and porcelain 9 tonne insulator assembly (for polluted zone) but excluding terminating wire if any, wherever double termination if required. Materials like equalizing /compensating double strap assembly. It includes the all fasteners required for termination.

Section insulator assembly including core and cut-in insulator

The price shall cover supply of all components required for a standard section insulator assembly on conventional OHE including section insulator assembly (Five parts), also provide 2 nos., stiffener (contact bar) & other materials as per details given below: All material shall be with latest specifications.

Railway ID No.	Description of component	Qty per unit
RI-1120	Catenary ending clamp	2 Nos.
RI-1190	Catenary dropper clip assembly	As required
RI-6170	Parallel clamp for double contact wire.	12 Nos.
RI-6110	Dropper assembly for Section Insulator.	As required
RI-6100-1	Porcelain section insulator along cree-page.	01 No.
RI-6020-1	Porcelain 9 tonne insulator	01 No
RI-6181-2	Double straps for section insulator.	02 Nos.

25KV solid core cut-in insulator.

The price shall cover cost for supply of complete 25 KV solid core long creepage Porcelain cut-in-insulator including Double strap, Catenary wire or contact wire ending cone etc. as per latest RDSO/CORE specification.

25KV solid core suspension insulator

The price shall cover cost for supply of complete 25 KV solid core long creepage Porcelain suspension insulator assembly including Double strap, single eye clevis, suspension clamp etc. as per latest RDSO/CORE specification and drawings.

25KV Post/Support insulator.

The price shall cover cost for supply of 25KV Post Insulator with fasteners and saddles as per RDSO specification No. - TI/SPC/OHE/INS/0070 (04/2007) with A & C slip no. 1 & 2 or latest.

10 KVA Change over panel as per RDSO spec.

The price shall cover cost for supply of 10 KVA Change over panel as per RDSO specification No. TI/SPC/PSI/CLS/0020(12/02) (with A&C slip No. 1 to 4) or latest and suitable for 10 KVA AT Supply. The price also covers cost of Type one junction box and its drawing required to approval of Dy.CEE/CN. The price also cover cost of MCB, any relay, fittings, Glands, fasteners, Lugs etc. for commissioning of panel and smooth working.

Change over panel (CLS) as per RDSO spec. suitable for 25 KVA AT supply.

The price shall cover cost for supply of 150A Change over panel as per RDSO specification No. TI/SPC/PSI/CLS/0020(12/02) (with A&C slip No. 1 to 4) or latest and suitable for 25 KVA AT Supply. The price also covers cost of Type one junction box and its drawing required to approval of Dy.CEE/CN. The price also cover cost of MCB, any relay, fittings, Glands, fasteners, Lugs etc. for commissioning of panel and smooth working.

Terminal board in control cubicle

The price shall cover cost for supply of terminal board for 230V AC supply to Interrupters in switching post control cubicle as per RDSO/CORE latest drawings and specifications.

110V DC distribution board.

The price shall cover cost for supply of 110V DC distribution board in switching post control cubicle suitable for respective section and as per RDSO/CORE latest drawings and specifications.

230V AC distribution board.

The price shall cover cost for supply of 230V AC distribution board in switching post control cubicle suitable for respective section and as per RDSO/CORE latest drawings and specifications.

Supply of PT Type- I

The price shall cover cost for supply of 27.5 kV/100V potential transformer Type-I (as per RDSO specification no. TI/SPC/PSI/PTS/0990(09/99) with A&C slip No. 1 to 5 or latest) complete with all fittings and accessories including terminal connectors. The price also cover cost for supply of an enameled number plate and material for any Modification required for comply Latest TC, SMI/MI or local arrangement by open line. The price shall also cover for supply and modification of PT DO Fuse in SSP/SP post.

110V battery charger (200AH).

The price shall cover supply of a battery charger for 110V, 200Ah low maintenance lead acid battery complete with stand and accessories as per RDSO specification No. ETI/PSI/1(6/81) or latest. The price shall also cover for cost of suitable size of cable to connect between battery charger and battery including lugs and connectors. The price shall

also cover for cost of Tools for battery like thermometer, hydrometer, voltmeter etc. with proper tool stand (hydrometer stand), White board for marking of pilot cell and its voltage and specific gravity, Board showing specific gravity.

Auxiliary Transformer 25 kV/230 V, 5 KVA & 10 KVA with DO fuse assembly, LV box & Anti climbing device

The price shall cover cost for supply of Auxiliary Transformer 25 kV/230 V, 5 KVA & 10 KVA as per RDSO specification No. ETI/PSI/15 (8 /03) or latest, with 25 KV DO fuse complete assembly including insulators as per RDSO Specification No. ETI/ PSI/14(1/86) Rev 1 (Apr-87), LV box (including MCB) for AT & Anti climbing device complete including barbed wires etc. the price also cover cost for Clamps, lugs, Name Plate, split arcing horn etc.

Lightning arrester for 25 KV OHE.

The Price shall cover cost for supply of 42 KV Metal oxide gapless type Lightening Arrester as per RDSO specification No. TI/SPC/PSI/MOGTLA/0101 (02/ 2015) or latest including surge monitor (including suitable length of 35 sqmm cu. cable & clamps) and dis-connector assembly and an enameled number plate with fasteners and clamps.

RTU for Switching post.

The Price shall cover cost for supply of Remote terminal unit (RTU) for switching post as per RDSO specification No. TI/SPC/RCC/SCADA/0133 or latest and same shall support existing SCADA system at RCC.

50/39 mm aluminium bus bar

The price shall cover cost for supply of 50/39 mm Al. bus bars procured from CORE approved sources in standard length. Bus bar shall be made of aluminium alloy grade63401 (WP condition to IS:5082-1981 or latest. The tolerance on diameter & thickness shall be as per Class-I of IS:2673-1979 or latest. The bus bar shall be clean, smooth, mechanically sound and free from surface and other defects. The open end of bus-bar shall be covered by suitable tube cap. No splicing normally be allowed in the tubular bus-bars, unless the bus-bars exceeds 6M.

All types of aluminium bus bar terminal assembly, Splice assembly and various types of connectors for 50 mm bus bar

The price shall cover cost for supply aluminium bus bar terminal assembly, splice assembly and various types of connectors for 50 mm bus bar as per requirement. The price also covers supply of fasteners and bimetallic strip (if applicable). The material shall be procured with latest RDSO specifications and approved source only.

Copper items and PVC cables) :

Overhead equipment including Supply of Catenary & Contact wire. Scope includes supply of number plates & various types of caution & other boards including shock treatment chart, anti-creep assembly etc.

The price shall cover supply of all components i.e. Contact wire (107 Sqmm), catenary wire (65 Sqmm), anticreep wire, Large span wire (130 Sqmm), 150 sqmm feeder wire different type of PG clamps, 5/7 mm Dropper wire, Current carrying flexible dropper (CCFD) contact and catenary wire dropper clip, catenary and contact wire ending clamp, catenary and contact wire splices, double straps, Retro-reflective/ enameled Number plate & all various type of caution & other boards and poster required at Stations and LC gates for public and staff awareness regarding electrification, shock treatment chart, anti-creep anchor including 9T insulator and fittings, Material required for providing contact wire in place of catenary wire under FOB, ROB and over line structure etc. (As per latest guide lines) with SPS for attachment on mast / structure, Jumper wires of suitable size with PG clamps for 'G, jumper(160sqmm), potential equalizing jumper, anti-theft jumper, X-feeder drop jumper, Isolator Jumpers and any other jumpers (where their use is approved), terminating wires etc.

S. No.	Description of Items
1.	Contact wire (107 Sqmm), catenary wire (65 Sqmm), anticreep wire, Large span wire (130 Sqmm), 150 sqmm feeder wire
2.	Different types Parallel grooved clamps
3.	5/7 mm Copper Droppers. Current carrying flexible dropper CCFD (7.5 mm dia 25Sqmm and current carrying dropper assembly)
4.	Contact and catenary clips assembly.
5.	Contact and Catenary ending clamp assembly.
6.	Catenary & Contact Splice
7.	Retro-reflective/ Enamel Number Plates with SPS and fastener, Caution boards, Danger Boards, Power block working limit boards, Unwired OHE/ Turn out, 250M, 500M, DJ close, DJ open, switching post name board, photography probated board, all other boards and poster required at Stations and LC gates for public and staff awareness regarding electrification must for commissioning for OHE.
8.	Different type of Copper Jumpers i.e. 'G'(160 sqmm), Potential equalizing,

	Anti-theft, X-feeder, Drop, Isolator Jumpers etc.
--	---

9.	Any extra fittings required for Turn-out, X-over, Diamond X-ing.
10.	Anchor Double straps, Cut-in-insulators (9T) assembly for IOL's, compensating plate/equalizing plate.
11.	If tramway OHE is required to be erected then it will be paid in OHE erection only for erection of contact wire including supply & erection of Bridle wire, PGclamp etc.
12.	Anti-creep complete assembly. Supply required for whole section.
13.	The price shall also cover the cost of different size of Rail Jumper, Hand Globes and Tape required for working in the electrified section by the Engineering gang in the section. Supply required for the whole section.
14.	The price shall also cover cost of Hand Globes and Bamboo required for LCgate mans and Station master in the section, required for commissioning. Supply required for the whole section.
15.	The price shall also cover the cost of key box required at Switching station and Railway station and wall mounted desk with drawer in the section, different size of MS chequres plate required for SSP/SP control building cubical required for commissioning. Supply required for the whole section.

Catenary wire splice suitable for 65 sq mm catenary wire

The price shall cover cost for supply of Catenary Splice suitable for 65sq mm catenary wire, over and above the requirement for item no. D1, as per Drawing No. ETI/OHE/P/1090 or latest.

Contact wire splice suitable for 107 sq mm

The price shall cover cost for supply of Contact wire splice (toothed type) suitable for 107sq mm contact wire, over and above the requirement for item no. D1, as per Drawing No. ETI/OHE/P/1081-1Rev-C or latest.

10 x 2.5 Sq.mm PVC insulated stranded copper cable for control and indication of Interrupters.

The price shall cover cost for supply, installation and testing of 10 core x 2.5 sq mm PVC insulated, PVC sheathed, Copper conductor, Un armoured Electric Control cable for working voltage up to and including 1100 volts as per specification No. IS:1554/ Pt-I/ 1988 or latest.

2x2.5 Sq.mm PVC insulated stranded copper cable for catenary indication.

The price shall cover cost for supply, installation and testing of 2 core x 2.5sq mm PVC insulated, PVC sheathed, Copper conductor, Un armoured Electric Control cable for working voltage up to and including 1100 volts as per specification No. IS:1554/ Pt-I/ 1988 or latest.

2x4 Sq.mm PVC insulated stranded copper cable for heater supply.

The price shall cover cost for supply, installation and testing of 2 core x 4.0 sq mm PVC insulated, PVC sheathed, Copper conductor, Un armoured Electric Control cable for working voltage up to and including 1100 volts as per specification No. IS:1554/ Pt-I/ 1988 or latest.

Copper strip for earthing. (25 x 3mm)

The price shall cover cost for supply of 25 x 3.0 sq mm and confirming IS 191/1981 & IS:613/ 1984 or latest, or as desired by railway administration.

Preparation all drawing and design for overhead equipment including preparation of pre pegging, pegging and OHE layout plan:

The price shall be covered for preparation of Pre pegging and Pegging Plan of OHE LOP, CSD, SED, SWR, LSD for the OHE work and supply of 6 sets hard copy. The price also cover cost for supply of AED of LOP, SED, SWR, LSD with minimum 6 sets of Hard copy with Soft copy. The price also cover cost for preparation of digitalized sectioning and power supply diagram and supply of minimum 6 sets of hard copy with soft copy. The price also covers cost for soil testing or any other requirement to complete the above schedule item. Railway will be supplied soft copy of ESP yard plans only. All electrical (TRD) related drawings shall be prepared by successful tenderer. The price also covers cost for retracing existing drawings on new drawings. Preparation of Power supply diagram and sectioning diagram also included in item for complete section as related to respective section.

Preparation of design and drawing of switching stations.

The price shall cover on a flat rate basis per switching station in the section, survey, investigation of soil bearing pressure and soil resistivity, Preparation of cross section drawings, preparation of general arrangement drawings, detailed layout of equipment, bus-bar connections and insulators, layout of cable trenches outdoor and inside the control room, layout of earthing system and earth connection, layout of earth screen wire, design of supporting structures for 25 KV equipment's, detailed drawings for steel work and structural support and drawings/ designs for equipment's, components,, fitting and materials supplied by the contractor. The price shall include supply of requisite number of copies of all drawings including completion drawings to the purchaser. The contractor shall prepare and furnish all relevant drawings in 6 copies at no extra cost for approval by the employer before commencing fabrication/manufacture of the equipment and before carrying out any work at site. The drawing shall be prepared in Auto Cad. Such drawings shall be coordinated with all agencies executing civil works etc.

2x70 Sq.mm/ 2*150Sqmm PVC insulated stranded Alluminium Cable from AT to DB

The price shall cover cost of supply, erection, testing & commissioning of per meter length of 2x70/150 sqmm AT cable as specified. Lcable for working voltage up to and including 1100 volts as per specification No. IS:1554/ Pt-I/ 1988 or latest. The price also covers cost

for transportation of cables including Long, un Long and handling. The price also cover cost for supply & erection of cu/AL lugs, lacing and cable identification labels made of AL. The price also cover cost for Cable Route marker at every 25 mtrs and at every corners on cable trench. The price shall also cover cost of insulation resistance measurement. Megger shall be arranged by contractor. Method of erection shall be as per Rly Guidelines.

Digging of Cable trench 450mm wide and 900mm depth

The price shall cover erection of digging of Cable trench 450mm wide and 900mm depth for laying of different size cable. The price also cover cost for preparation of a detail plan for method of laying of cable and get approval of Dy.CEE/C before start the work.

Layings of bricks and sand in cable trench for protection of cable

The price shall cover Supply and layings of bricks and sand in cable trench for protection of cable. The price also cover cost for preparation of a detail plan for laying of cable and showing method of laying of cable with bricks and sand shall be prepared and get approval of Dy.CEE/C before start the work.

Transfer of OHE from one support to another and adjustment of droppers/slewing of OHE as required for connecting from existing OHE

The price shall cover transfer of overhead equipment to a bracket assembly on a new mast or support and dismantling of the erected bracket assembly from the old mast or support and consequent adjustment to overhead equipment required such as re spacing of droppers.

Providing (Supply with erection) of anticlimbing device for SSP/SP.

The price shall cover supply with erection of an anti-climbing device consisting of steel fixtures and galvanized barbed wire mounted on the fencing panels as per approved drawings. The price shall be per meter length of the panel. The price shall include painting of the fixtures with two coats of red oxide zinc chromate primer and finished with two coats of Aluminum paint as per IS: 2339.

Dismantling & removal of OHE complete with cantilever, droppers, contact & catenary wire etc as required for connecting from existing OHE

The price shall cover cost for dismantle of complete OHE including contact and catenary wire, droppers, jumpers, insulators & other fitting if any. The price also cover cost for cutting of catenary wire, contact wire and other materials for DS-8 purpose (if required) and same will be handed over to concern SSE/C, Railways scrap depot for DS-8 or as desired by SSE/TRD/C. Transportation charges will be given relevant item of transportation.

Dismantling& removal of Auxiliary transformer with DO fuse as required for connecting from existing OHE

The price shall cover cost for dismantle of Auxiliary transformer including DO fuse assembly, Jumper wire, PG clamps, LT fuse box, anticlimbing device, Earth connection etc. Transportation charges will be given relevant item of transportation.

Dismantling & removal of Isolator complete as required for connecting from existing OHE

The price shall cover cost for dismantle of complete isolator including terminal connectors, jumper wire, PG clamps operating rod and support insulators, operating handle and SPS. Transportation charges will be given relevant item of transportation.

Dismantling & removal of Mast, portal, TTC & other small part steel as required for connecting from existing OHE

1. *The price shall cover the dismantling of OHE mast, portal upright with boom, TTC and other small part steel by gas cutting and handing over to the railway at nominated place.*
2. *The price shall exclude the transportation charges and the same will be paid for against relevant item*
3. *Crane will be given by Railway for dismantle of Portal boom only.*
4. *The price shall also cover cost of cutting in suitable size pieces for scraping the material (i.e. 2.0M to 3.0M or as accepted by railway scrap depot).*

Breaking of concrete foundation of Masts, portals & TTC as required for connecting from existing OHE

The price shall cover cost of breaking the foundation of Mast, Portal TTC etc. upto 0.8 M below rail level. The price also covers cost for removal of debris outside track.

Dismantling & removal of Guy rod assembly as required for connecting from existing OHE

The price shall cover to dismantle the Guy rods with Anchor fitting, Guy rod fittings, double strap, stirrup & Anchor V bolt etc. and same will be handed over to concern SSE/C Railways scrap depot for DS-8 or as desired by SSE/TRD/C. Transportation charges will be given relevant item of transportation.

Dismantling of feeder wire as required for connecting from existing OHE

The price shall cover to Dismantling of feeder wire assemble (160sqmm copper/ Aluminum feeder wire) with along feeder, cross feeder, anchor assemble like 9 tone insulator, adjuster, clevis etc. and same will be handed over to concern SSE/C Railways scrap depot for DS-8 or as desired by SSE/TRD/C. Transportation charges will be given relevant item of transportation.

Providing (Supply & erection) of layout board for switching posts.

The price shall cover cost for providing (Supply with erection) of lay-out board for switching post. The board shall be framed with Aluminium section in suitable size. Before supply the board necessary approval should be got from Concern Dy. CEE.

Providing (Supply & erection) of SWR/Sectioning diagram board at Station/TPC room.

The price shall cover cost for providing (Supply with erection) of Sectioning diagram at Stations. The board shall be framed with Aluminium section in suitable size. Before supply the board necessary approval should be got from Concern Dy. CEE.

Supply of firefighting equipment.

The price shall cover cost for Providing (supply with erection) of fire extinguisher confirming to IS:2171 or latest. The firefighting equipment shall be suitable to take care of B & C class of fire. The extinguisher shall have 10 Kg. Capacity of dry chemical powder. The price also cover cost for hanging arrangement / suitable clamps. The price also covers cost fire Bucket with stand for switching station.

Supply of First aid BOX with Stretcher etc.

The price shall cover supply with erection of standard first Aid box and stretcher with hanging arrangement of GI Sheet with pad lock as approved by the Employer. The list of items containing min the first aid box shall be obtained from employer/engineer.

Modification, Upgradation, testing, wiring & commissioning in existing RTU at Site in the section and standard SCADA software at RCC equipments for configuration, integration/ hooking up of additional RTUs of section & adjacent section with master station as per RDSO Spec. No. TI/RCC/SCADA/ 0133/Rev-2) with latest A&C slip with amendments or latest

The price shall cover Modification, Upgradation, testing, wiring & commissioning in existing RTU at Site in the section and standard SCADA software at RCC equipments for configuration, integration/ hooking up of additional RTUs of section & adjacent section with master station as per RDSO Spec. No. TI/RCC/SCADA/ 0130/Rev-2) with latest A&C slip with amendments or latest.

Drilling of horizontal bore below track by pushing method for laying of HDPE pipe of various size upto 450 mm dia.

This item covers drilling of horizontal bore by pushing method or any suitable means in all types of soil 1.5 meter below ground level or 2.1 meter below track level for laying of HDDE pipes 150 mm to 450 mm dia by pushing method in presence of Railway representative taking necessary safety precautions of track and movement of trains.

Temporary Lighting Arrangment (during TWO)

(1) The contractor shall have Supply, transportation and providing portable type 2 to 5 KVA, 240 volt, 50 HZ, DG Set on hiring basis complete with fuel, oil, accessories, and all material for temporary lighting during TWO/NI at different Locations as per site requirements.

(2) At each location contractor should lay cables / wires from supply point to Gumty/ point & crossing -600 Mtrsapprox , switch Board consisting of One No 40 A , 230 V change over switch , 32 A DP MCB-1 No, lamp holder - 1 No , 6A socket with switch & top-6 Nos , 6/16A socket with switch & top complete - 1 No with wiring, tripod stand - 6 Nos , Pendent lamp holder, LED lamp -15 W-2 Nos , focus type LED 45 W fitting-6 Nos, pedestal fan- 1 No etc. Material procurement, Long / UnLong, transportation of all material and man power provided by contractor, Rechargeable Emergency light with backup-1 No, Ensure earthing at each Gumty. Provision of fittings may be change as per site conditions.

(3) No charges will be paid for preliminary work of Laying cables, provide stands, fans & luminaries etcor after completion of TWO disentrailing work. period count on

Hourly basis and operation of Guntiesworking . If TWO operationalized hourly basis than fraction/ part of 24 hrs calculate for the purpose of Payment.

(4) The contractor shall procure/purchase all Electrical items and kept ready in safe custody for operation.

(5) Long / Unlong and transportation of all material arrange by contractor at every location as suggested by site Engineer. Also arrange staff/Manpower staying/availability arrangement at remote locations.

(6) Providing manpower of one Electrician per Gumty / location per day round the clock at site by contractor during TWO / NI for handling of DG set operation, filling of fuel oil and maintaining of lighting arrangement.

(7) Daily consumable wiring wires, LED lamps, Fittings, kerosene, petrol, Diesel, lube oil, tools, PVC tape Roll etc. will be arranged by contractor on his cost for maintain proper lighting arrangements & power supply. Adopt all safety measure during rainy season to ensure uninterrupted power supply.

(8) Normally gumty will be operated by Railway power supply, portable DG Set will be operated at the time of failure power supply. If near by power supply not available than DG set will be operate round the clock.

(9) DG should be operated daily on load for one hour, so that there should be no complaint/ inconvenience in train operation at the time of supply failure.

(10) During TWO/NI contractor should provide utility /jeep /vehicle at site round the clock to reach different location to attend any failure/inspection/ patrolling.

(11) If any Location DG set failed during working hours, No charges will be paid and token penalty of Rs.1000/- (Rs.one thousand) per DG set per day per location will be deducted from the bill.

(12) The contractor shall provide the lighting arrangement at nominated places as per instructions of site engineer. Normally intimation will be given 24 Hrs before commencing of TWO/NI or depend on site circumstances.

(13) The lighting arrangement is to be provided at different locations at various stations in the jurisdiction of Dy.Chief Electrical Engineer, Construction, CCG of western Railway.

(14) Transportation and handling of lighting arrangement material for providing at different locations of various stations is to be arranged by contractor at his own cost.

(15) The contractor shall keep sufficient spare DG set, fuel, wires, LED light fittings, stands, tape roll, lamp and field staff for daily maintenance.

(16) After completion of TWO/NI period of every station/location all material to be removed from site and kept away in their godown/store in his safe custody.

TECHNICAL ASSISTANT -

He shall be responsible for construction supervision, checking and all other field related activities of his respective section.

Designation	Minimum required educational qualifications and /or experience,
-------------	---

Site Engineer (Electrical-TRD/General Services)	<p>(i) Degree/ Diploma in Electrical/ Electronic Engineering/ITI (Electrician/Wireman /Fitter Electrical) or 10+2 (Science)</p> <p>OR</p> <p>(ii) A combination of any sub stream of basic Streams of Electrical/ Electronic Engineering from a recognized University/ Institution 2 years for Degree/ 5 years Diploma or 10 years for ITI / 10+2 (Science)</p>
	<p><u>Experience:</u></p> <p>At least 3 years for Diploma, ITI / 2 years for degree holder, experience of Electrical (TRD/General Services) works as Supervisor or in higher capacity in Railways.</p> <p>OR</p> <p>At least 3 years for Diploma, ITI/ 2 years for degree holder, experience of Electrical (TRD/General Service) works in any PSU.</p>

*The person to be engaged should normally be not older than 67 years.

Providing vehicle for supervision of work & Providing utility van for tower wagon crew, shifting of man and material for the work.

Supply of Spare Store Items-

This complete schedule i.e. T&P items, require prior approval from Dy.CEE(C) CCG before supply. If make and model not specified.

Preparation of Design, Drawing, line diagram etc.

The price also cover cost for preparation of digitalized diagram and supply of minimum 6 sets of hard copy with soft copy. The list of drawings to be submitted is as below,

i) Single line wiring diagram from GEB to main supply panel at station.

ii) Earthing layout of Station.

iii) LT , HT and EHT crossings for Entire Section showing clearance of transmission line tower and angle of crossing.

Preparation documents, SWR, App G, Display notice boards, key box for EIG& CRS.:

The price shall be covered for preparation of documents for SWR, Appendix G, EIG papers & CRS / PCEE sanctioned for the OHE work and supply of 3 sets hard copy with Soft copy. The price also covers cost for preparation of App G for all stations, make necessary correction till finalization and signed by authority concern. Collect all details

for EIG and process up to finalized and submit minimum 3 sets of Hard copy with Soft copy. The price also cover cost for preparation of CRS/ PCEE sanction papers and supply of minimum 3 sets of hard copy with soft copy. The price also covers cost for retracing of existing drawings on new drawings.

Price shall cover Provision of boards as below;

SWR display board Designing, high resolution printing, pasted on 5 transparent acrylic sheet, fixed with ss studs Size 8ft x 4 ft for all stations: 1 board/Station to be erected in Station master Room.

Staff caution board, public caution board Designing, high resolution printing, pasted on Transparent acrylic sheet, fixed with ss studs Size 3 ft x 2 ft for all stations: 12 No Per Station and 2 No per LC

Display board for don't climb on roof Designing, high resolution printing, pasted on Aluminum composite panel Size 3 ft x 2 ft for all stations: 4 No Per Station.

Display board for shock treatment designing, high resolution printing, pasted on aluminum composite panel size 3ft x 4 ft at all station buildings: 2 no per Station, 1 no per LC. Caution board for precaution to work on 25000 volt line designing, high resolution printing, pasted on aluminum composite panel size 5 ft x 16 inches: 2 no per Station

Boards for LC gate designing, high resolution printing, pasted on aluminum composite panel 1.25 ft x 1.25 ft: 1 no per LC

Key box made from WPC sheet size 1.5 ft x 1.5 ft for stations

Stationary Kit for each station including 1 no Ablong Register, 2 no pens, 1 pencil, 1 sharpner, 1 rubber, 1 pocket size notebook to be provided at each station.

Tree Trimming for OHE section.

Clearance of OHE from any trees along the section should be maintained at least 4 mtr. Trees infringing the OHE should be trimmed. The price covers tree trimming irrespective of tree height. It will be paid per tree. Decision for trees to be trimmed should be as per railway supervisor deputed at site.

Accommodation facilities for Officers-

The contractor shall arrange suitable standard accommodation facilities for officers at site or nearby during inspection, TWO/NI/ CRS / PCEE inspection or whenever required with all necessary daily routine facilities.

Accommodation facilities for Site Engineer-

The contractor shall arrange suitable standard accommodation facilities for site engineer/ his representative at site or nearby during block working, inspection, TWO/NI/ CRS / PCEE inspection or whenever required with all necessary daily routine facilities.

Groves, Helmet, safety items for operating and electrical staff.

For all the operating and electrical staff in the Section 1 no helmet, 1 gloves set (rating 25KV above), 1 no bamboo stick should be provided per person. These items should be handed over to the list of staff approved from Dy.CEE/C/CCG one month prior to CRS/ PCEE inspection.

PART-II: For Electrical (General services) works:

TECHNICAL SPECIFICATION:

1. The contractor shall carry out the electrical work as per IE Rules & Regulation, specification and shall be in work like manner. Relevant I S specifications wherever applicable shall be followed.
2. The work includes supply of materials, erection, installation, laying, terminating, connecting, testing, & commissioning of electrical assets as mentioned in the schedule of approximate quantity and rates and specification as enclosed in tender documents.
3. The contractor has to supply & provide ancillary materials required for the work even if they are not mentioned in the tender schedule for which no extra payment shall be made.
4. All the materials used in the work shall be of the make as per enclosed list and shall be got approved from Consignee /Railway Engineer /Dy.CEE(C) CCG before its installation. Contractor shall have to arrange inspection at manufacturer's premises for LT panels DB, etc. by Railway representative. Material should be kept in safe custody by contractor. After entire completion of work the contractor shall have to deposit balance material to Sr.SE/Elect. CCG.
5. The contractor if damage other installation / structure for the purpose of executing electrical works shall do reconditioning of floors, walls and ceilings to their original level of workmanship.
6. All required tools and instruments shall be arranged by the contractor.
7. The unit rate in the rate schedule includes supply, installation, testing, & commissioning including all contingent material like hard ware, bushes, PVC flexible pipe, seamless pipe down rods, chain, clamps, connecting wires etc. even if not specified in the rates schedule. All hardware like Nuts, bolts, washers, clamps etc should be of GI.
8. Electrical works shall be carried out by the contractor in supervision of the railway Engineers and contractor shall inform the railway representative before starting the work. All the hidden work i.e. laying of cables, foundation etc. shall be carried out in the presence of railway supervisor / representative.
9. Any conflict/dispute/modification in specification given will be finalized by Dy.CEE (C) CCG and contractor has to accept the decision of Dy.CEE (C) CCG.
10. The contractor will be responsible for any damage / theft for part of the work completed & paid in running bills till entire work is completed and taken over by the Railway.

11.The electrical contractor having valid electrical contractor's license shall carryout the work under the tender.

12.The contractor should have to carry Railway supervisors and engineers to the place of work for inspection and providing the required tools and equipments etc., inspection is the responsibility of the contractor for which no additional payment is to be made.

13.The vehicle and equipment of the contractor can be the drafted by Railway administration in case of accident / natural calamities involving human lives.

14.If the IS No. of any material in the tender is modified or amended, the latest shall be accepted.

15.Railway may ask copies of challans, bills of Supplier/Manufacturer to verify genuineness of supplied material including taxes paid to government like **applicable GST and Cess on GST (if any)** etc.

16.Lamp of the luminaries shall be of OEM make or if OEM used other reputed make lamps than it shall be accepted by Rly on production of OEM certificate by the contractor. If complete fitting catalogue no comprising with different assemblies catalogue nos., then such type of certificate shall be issued by OEM and submitted by the contractor to Rly. As per catalogue IP no. should be marked on the luminary or if it is not mentioned then, OEM certificate in this regard should be submitted by the contractor.

17.The work done by the contractor shall be of aesthetic look.

18.All switches, sockets, ceiling rose, lamp holders, switch boards should have engrave ISI marked in concave/convex manner.

19.Before starting of work contractor should carry out joint survey with Railway Engineer of all work site & prepare drawing /design/layout of wiring, cabling, panels, DB and other electrical items to be provided at site & submitted to Dy.CEE/C/CCG for approval.

20.ACB/MCCB/MCB/RCCB/RCBO should be IS/IEC marked.

21.List of Approved makes shall be applicable for all concern schedule items.

22.LED Luminaries as per WR specification No. WR /CCG/ SPECIFICATION /P / 001 (Rev.01)-2018 or Latest.

STANDARDS –

The following standards of latest/Revision edition and Indian Electricity Rules/Fire Insurance Regulations and rules shall be applicable:

IS No.	Items
--------	-------

IS : 1646/1997	Code of practice for fire safety of buildings General) Electrical installation
IS : 9537 (Part - 3)/1983	Rigid non-metallic conduits for electrical wiring.
IS : 4648/1968	Guide for electrical layout in residential buildings.
IS 4615/1968	Switch socket out lets
IS 3419/1988	PVC Conduit accessories
IS 694:1990	Cables-LT PVC insulated multi-stranded single & multi-core
IS 3854/1997	Switches
IS 1293/2005	Plugs & sockets
IS 371/1999	ceiling rose
IS 1258/2005	Pendent holder, batten holder
IS 8828/1996	MCB

IS 13947-2/1993	MCCB
IS 12640 (Pt.I) 2000	RCCB
IS 732/1989	Code of practice for electrical wiring installation
IS 3043/1987	Earthing
IS 13032:1991	AC MCB board for voltage not exceeding 1000V- specification.
IS 13779 ISI marked clause-1 /1999	Electronic energy meter

Article II.

1.General remarks for wiring.

i.Relevant code of practice for electrical wiring as per IS: 732/1989 or latest to be followed along with the following.

ii.All lamps shall be hung at a height of not less than 2.5 m above the floor level.

iii.Switch boards shall be provided at 1.5 mtrs above the ground level.

iv.Live wires of the points (half/phase) must be controlled by switches.

v.Wiring shall be done by looping system. Phase/live conductors shall be looped at the switch box. For point wiring neutral/earth first looping shall be done in switchboard and subsequent loop shall be made at each point outlet. No joints shall be allowed in the wiring inside the PVC conduit/casing.

vi.The contractor shall have to maintain the standard colour code for circuit such as phase– red, neutral- black, earth - green /gray. For 3-phase colour coding shall be Red, Yellow & Blue for Phases, Black for neutral and green/grey for earth.

ViiWiring shall be suitable for 240V AC between phase & neutral and 415 V AC between two phases.

viii.All wiring shall be free from short - circuit/earth fault and shall be tested for these defects prior to being connected to the circuit.

ix.There shall be a spacing of at least 125 mm between live parts and the mounting plane of the fixture.

x.The clearance between the bottom most point of the ceiling fan and the floor shall be not less than 2.4 m. The minimum clearance between the ceiling and the plane of the blades shall be not less than 300 mm.

xi.Light & Fan may be wired on common circuit. Such sub circuit shall not have more than a total of ten points of light, fan and 5A socket outlets. The load of such circuit shall be restricted to 800 watts.

xii.6/16Amp socket outlets shall be installed at the following positions, unless otherwise specified.

a)Non-residential building- 23cm above floor level.

b)Kitchen - 23cm above working platform and away from the likely position of stove and sink.

c)Bathroom - no socket outlet is permitted for connecting portable appliances, thereto. MCB/IC switch may be provided 2m from fixed appliances, and at least 1m away from shower.

d)Rooms in residence – 23 cm above floor level or any other level in special cases with the approval of site engineer.

xiv.Connection for electrical fitting shall be done with 3 core flexible copper wire ISI mark to from ceiling rose. Provided Chrome plated screw, nut, bolts, washer shall be used for electrical connection.

xv. Wires used for wiring shall be multi-strand single core FRLS-PVC insulated 1.1kv grade Copper conductor with ISI mark. If any manufacturer discontinued FRLS wires, in such circumstances higher version FRLSH wires can be accepted. Make- As per List enclosed and shall be got approved from Dy.CEE (C) CCG before supply. All wires should be of one make.

xvi. PVC casing capping and accessories shall be as per IS14927 of minimum thickness of 1.2 mm, Casing capping/PVC conduit pipe shall be of MMS IS : 9537 (Part - 3)/1983 and of Ivory/white colour only, Wall crossing of wiring should be done through PVC Conduit pipe, make- As per List enclosed and shall be got approved from Dy.CEE (C) CCG before supply.

xvii. Hardware, nut, bolts, washers, clamps etc. used for fixing shall be of G.I.

xviii. As far as possible modular Switch, modular Socket and other accessories shall be of ISI mark.

2. TESTING OF INSTALLATION

Before a completed installation is put into service, the following tests shall be complied with

i. INSULATION RESISTANCE

The insulation resistance shall be measured by applying 500 volt megger with all fuses in places, circuit breaker and all switches closed.

The insulation resistance in mega-ohms of an installation, measured shall not be less than 50 mega-ohms divided by the number of points on the circuit.

Article III. Article IV. The insulation resistance shall be measured between

EARTH TO PHASE

Section 4.01 EARTH TO NEUTRAL

PHASE TO NEURAL

PHASE TO PHASE.

(ii) EARTH CONTINUITY PATH

The earth continuity conductors shall be tested for electrical continuity and the electrical resistance of the same along with the earthing lead but excluding any added resistance or earth leakage circuit-breaker, measured from the connection, with the earth electrode to any point in the earth continuity conductor in the completed installation and shall not exceed one ohm.

ii. POLARITY OF SINGLE POLE SWITCHES

A test shall be made to verify that every single pole switch is connected to one of the phase of the supply system.

iii. COMPLETION CERTIFICATES

All the above tests shall be carried out in presence of Dy.CEE(C) CCG's representative and the results shall be recorded in prescribed forms. Any default during the testing shall be immediately rectified and that section of the installation shall be re tested. The completed test result form shall be submitted to the client for approval.

On completion of an electric installation a certificate shall be furnished by the contractor, countersigned by the certified supervisor under whose direct supervision the installation was carried out. This certificate shall be in a prescribed form as required by the local electric supply authority.

SPECIFICATION FOR LT PANELS

All LT panels shall be design, supply, test and commission as per guidelines of WR vide CESE/WR letter No EL 111/3 dtd 29.10.2025 or latest and the same got approved by consignee or representative of Dy. Chief Electrical Engineer (Constn) W-Rly, Churchgate before fabrication.

SPECIFICATION FOR SUB LT PANEL BOARD-250 Amp

The contractor shall have to design, supply, install, test and commission LT panel fabricated by 2mm thick MS sheet, standard angles, channels etc. as required in design. The drawing, design switch gears with make and model of the LT panel shall be submitted by the contractor & got approved by Dy. Chief Electrical Engineer (Constn) W-Rly, CCG before fabrication.

ØThe panel shall be fabricated by CPRI / ISO approved manufacturer. Contractor should submit the copy of CPRI / ISO certificate issued to panel manufacturer.

ØThe LT panel shall be indoor rectangular cubicle type, dust and vermin proof suitable for 3 phase, 4-wire, 415V, 50Hz AC supply system.

ØBus bar for main circuit and neutral shall have uniform cross section electrolytic tinned copper with color coded heat shrinkable PVC insulated and current density of

1.6 Amp/mm² cross sectional area.

ØKnock out / gland plates as applicable shall be provided. Gland plates of suitable size shall be designed for terminating cables in a straight and easy manner.

ØAll power connections from the bus bar shall be made such a manner that there is a clear metal to metal clearance at the tapping is available. Both spring washer and flat washer shall be used with stud/ nuts/to ensure proper contact pressure.

ØThe LT panel shall have metal locks & operated by a common key. All covers & doors to be provided with neoprene gasket & Hinges.

ØThe sheet steel enclosure / angle / channel used in the fabrication of panel shall be provided with double coating of red oxide and final coating of Siemens grey powder coated paint.

ØThe LT panel shall be supplied complete with C-channel base plate of 75mm, louver on sides, four lifting hooks and feeder nameplates completely wired and ready for commissioning.

ØCaution board in Hindi, Marathi & English of metallic type shall be provided on panel.

ØMinimum two earth terminals shall be provided in the LT panel all sheet steel section shall be electrically connected with a separate G.I. earth strip of 50x6 mm size across the panel at bottom.

ØVoltmeter of suitable capacity with selector switch on each incoming feeder. Make as per List enclosed and shall be got approved from Dy.CEE (C) CCG before supply.

ØAll CT shall be 10 VA burden, class 1.0 accuracy. CT shall confirming to IS:2705.

ØAmmeter of suitable capacity (According to MCCB Rating) with selector switch & CT shall be provided on each phase of outgoing feeder having 63A or more capacity. The meters shall be confirmed as per relevant IS.

ØMulti LED type indication lamp confirming to relevant IS having colour code Red, Yellow & blue with control fuses on each incoming & outgoing feeder shall be provided. LT panel shall be mounted on the fabricated MS Angle on floor and the contractor shall prepare cemented trench for incoming and outgoing cables.

ØThe MCCB shall be as per IS 13947-2/1993 or IEC.

ØMCCB shall be as per List enclosed and shall be got approved from Dy.CEE (C) CCG before supply only.

ØThe breaking capacity of MCCBs should not be less than 35 KA with $I_{cs}=I_{cu}$ and should have variable setting type with thermal magnetic release & Rotary handle.

ØThe contractor shall submit three sets of drawing and wiring diagram of LT panel along with panel at the time of supply.

The LT panel shall be comprised with following switch gears—

Incoming circuit - 2 x250A MCCB 4-pole adjustable type with thermal magnetic release with rotary handle.

Outgoing circuit -4 x125 A MCCB 4-pole adjustable type with thermal magnetic release with rotary handle.

4 x 63 A MCCB 4-pole adjustable type with thermal magnetic release with rotary handle.

Note:-*The contractor shall have to arrange inspection of the LT PANEL at the manufacturer's premises at his own cost.*

MAIN DISTRIBUTION BOARD 125 A

ØThe contractor shall have to design, supply, install, test and commission DB fabricated by 2mm thick MS sheet, standard angles, channels etc. as required in design. The drawing, design switch gears with make and model of the MDB shall be submitted by the

contractor & got approved by Dy. Chief Electrical Engineer (Constn) W-Rly, CCG before fabrication.

Ø The DB shall be indoor cubicle type, rectangular size wall mounted dust and vermin proof suitable for 3 phase, 4-wire, 415V, 50Hz AC supply system.

Ø All power connections from the Copper bus bar shall be made such that there is a clear metal to metal aerial contact at the tapping. The nuts and bolts used for connections to the bus bar shall be of GI/ Crom plated. Both spring washer and plate washer shall be used with stud/ nuts/to ensure proper contact pressure.

Ø The sheet steel enclosure / angle / channel used in the fabrication of distribution board shall be provided with double coating of red oxide and final coating of light grey powder coated paint.

Ø The MDB shall be fabricated by CPRI approved manufacturer.

Ø LT panel shall be provide one common volt meter with selector switch.

Ø Multi LED type indication lamp having colour code Red, Yellow & blue with control fuses on incoming feeder shall be provided. Make as per List enclosed.

Ø Minimum two earth terminals shall be provided in the DB. All sheet steel section shall be electrically connected with earth.

Ø DB shall be mounted on wall/pillars.

Ø The breaking capacity of MCCBs should not be less than 35KA with $I_{cs}=I_{cu}$ and should have variable setting type with thermal magnetic release.

Ø The MCB & MCCB shall be of make as per List enclosed and shall be got approved from Dy.CEE (C) CCG before supply.

Ø The breaking capacity of MCBs should not be less than 10KA & 'C' curve

The MDB shall be comprised with following switch gears—Incoming circuit - 1x125 A MCCB 4-pole 35 KA adjustable type with thermal magnetic release. Outgoing circuit - 2 x 63 A 4-pole MCB & 10 KA Breaking Capacity of C-curve. 2 x 40 A DP MCB & 10 KA Breaking Capacity of C-curve. 10 x 16 A DP MCB & 10 KA Breaking Capacity of C-curve.

Note:- The contractor shall have to arrange inspection of the MDB at the manufacturer's premises at his own cost.

Phase selector switch 200A

The contractor shall have to design, supply, install, test and commission the minimum capacity of 200 Amp, 4-pole, Rotary type phase selector switch fabricated by 2mm thick MS sheet, standard angles, channels etc as required in design. The drawing & design of the panel shall be submitted by the contractor & got approved by Dy chief Electrical

Engineer (Constn) W-Rly, CCG before fabrication. The Phase selector switch shall be fabricated by CPRI approved manufacturer

The box should be Siemens grey powder coated paint and with locking arrangement. Rotary type phase selector switch shall be provided in such a way that the operating knob/handle remain outside the box.

The Rotary type phase selector switch shall be used for the changeover of the supply from any three phases to single phase.

The rotary type phase selector switch shall be of such a design that changeover is possible from one phase to second and then to the third phase manually. The neutrals shall be continuous in each position. The four position of the rotary switch shall be of 1, 2, 3 & off.

The rotary type phase selector switch box shall be provided with the three numbers of multi LED indication lamps with control fuse (3 Nos. for 3 phase) for indication of main supply. The indication lamp and rotary selector switch shall be of make as per List enclosed and shall be got approved by consignee or representative of Dy chief Electrical Engineer (Constn) W-Rly, CCG before supply.

The change over box shall also be provided with MCCBs as under:-

1 No. I/C MCCB 1x 125 A FP MCCB, 35 KA Breaking Capacity. Icu=Ics 1 No. O/G MCCB 1x 125 A DP MCCB, 35 KA Breaking Capacity,

The connection to the changeover switch terminals shall be given through PVC insulated flexible multi-strength single core copper conductor of suitable size through the MCCBs. The MCCBs shall be of make as per List enclosed and shall be got approved from Dy.CEE (C) CCG before supply.

Note: -The contractor shall have to submit CPRI test report and OEM test reports

FEEDER PILLAR 250 A

ØThe contractor shall have to design, supply, install, test and commission feeder pillar fabricated by 2mm thick MS sheet, standard angles, channels etc. as required in design. The drawing, design switch gears with make and model of the feeder pillar shall be submitted by the contractor & got approved by Dy. Chief Electrical Engineer (Constn) W-Rly, CCG before fabrication.

ØThe feeder pillar shall be fabricated by CPRI approved manufacturer.

Ø The feeder pillar shall be indoor rectangular cubicle type, dust and vermin proof suitable for 3 phase, 4-wire, 415V, 50Hz AC supply system.

Ø Bus bar for main circuit and neutral shall have uniform cross section electrolytic tinned copper with color coded heat shrinkable PVC insulated and current density of 1.6 Amp/mm² cross sectional area.

Ø Knock out / gland plates as applicable shall be provided. Gland plates of suitable size shall be designed for terminating cables in a straight and easy manner.

Ø All power connections from the bus bar shall be made such a manner that there is a clear metal to metal clearance at the tapping is available. Both spring washer and plate washer shall be used with stud/ nuts/to ensure proper contact pressure.

Ø The feeder pillar shall have metal locks & operated by a common key. All covers & doors to be provided with neoprene gasket. Hinged doors shall be provided on both sides.

Ø The sheet steel enclosure / angle / channel used in the fabrication of panel shall be provided with double coating of red oxide and final coating of light grey powder coated paint.

Ø Caution board in Hindi, Marathi & English of metallic type shall be provided on feeder pillar.

Ø Minimum two earth terminals shall be provided in the feeder pillar all sheet steel section shall be electrically connected with a separate G.I. earth strip of 50x6 mm size across the panel at bottom.

Ø Feeder pillar shall be mounted on the fabricated MS Angle (Size 50x50x6mm) on floor and cemented trench for incoming and outgoing cables shall be prepared by the contractor.

Ø The MCCB shall be of make as per List enclosed and shall be got approved from Dy.CEE (C) CCG before supply.

Ø The breaking capacity of MCCBs should not be less than 35KA with $I_{cs}=I_{cu}$ and should have variable setting type with thermal magnetic release & Rotary handle.

Ø Approx size- 1000mm height, 600mm width and 500mm depth The feeder pillar shall be comprised with following switch gears—

Incoming circuit - 1 x 250 A, MCCB 4-pole, 35 KA adjustable type with thermal magnetic release with rotary handle.

Outgoing circuit – Distribution copper bus bar of 500mm length with 250 Amp Capacity.

NOTE:-The contractor shall have to submit CPRI test report and OEM test reports

SPECIFICATION FOR FEEDER PILLAR 400 A

ØThe contractor shall have to design, supply, install, test and commission feeder pillar fabricated by 2mm thick MS sheet, standard angles, channels etc. as required in design. The drawing, design switch gears with make and model of the feeder pillar shall be submitted by the contractor & got approved by Consignee/ Railway representative or Dy. Chief Electrical Engineer (Constn) W-Rly, CCG before fabrication.

Ø The feeder pillar shall be fabricated by CPRI approved manufacturer.

Ø The feeder pillar shall be indoor rectangular cubicle type, dust and vermin proof suitable for 3 phase, 4-wire, 415V, 50Hz AC supply system.

Ø Bus bar for main circuit and neutral shall have uniform cross section electrolytic tinned copper with color coded heat shrinkable PVC insulated and current density of

1.6 Amp/mm² cross sectional area.

Ø Knock out / gland plates as applicable shall be provided. Gland plates of suitable size shall be designed for terminating cables in a straight and easy manner.

Ø All power connections from the bus bar shall be made such a manner that there is a clear metal to metal clearance at the tapping is available. Both spring washer and plate washer shall be used with stud/ nuts/to ensure proper contact pressure.

Ø The feeder pillar shall have metal locks & operated by a common key. All covers & doors to be provided with neoprene gasket. Hinged doors shall be provided on both sides.

Ø The sheet steel enclosure / angle / channel used in the fabrication of panel shall be provided with double coating of red oxide and final coating of light grey powder coated paint.

Ø Caution board in Hindi, Marathi & English of metallic type shall be provided on feeder pillar.

Ø Minimum two earth terminals shall be provided in the feeder pillar all sheet steel section shall be electrically connected with a separate G.I. earth strip of 50x6 mm size across the panel at bottom.

Ø Feeder pillar shall be mounted on the fabricated MS Angle (Size 50x50x6mm) on floor and cemented trench for incoming and outgoing cables shall be prepared by the contractor.

Ø The MCB & MCCB shall be of make as per List enclosed and shall be got approved from Dy.CEE (C) CCG before supply

Ø The breaking capacity of MCCBs should not be less than 35KA with $I_{cs}=I_{cu}$ and should have variable setting type with thermal magnetic release & Rotary handle.

Ø Approx size- 1000mm height, 600mm width and 500mm depth The feeder pillar shall be comprised with following switch gears—

Incoming circuit - 1 x 400 A, MCCB 4-pole adjustable type with thermal magnetic release with rotary handle.

Outgoing circuit – Distribution copper bus bar of 500mm length.

NOTE- The contractor shall have to submit CPRI test report and OEM test reports

SUB DISTRIBUTION BOARD 63 A

Ø Distribution Board (DB) shall be pre-wired in sheet steel enclosure, double door with DIN channel, neutral bus-bar. The box and cover shall be properly pretreated, phosphatized with powder coated finish and surface mounted type.

Ø Detachable plate with Knock out holes shall be provided at the top/bottom of board. Complete board shall be factory fabricated and pre-wired in factory ready for installation at site.

ØThe DB shall be indoor cubicle type, wall mounted dust and vermin proof suitable for 3 phase, 4-wire, 415V, 50Hz AC supply system.

ØThe sheet steel enclosure / angle / channel used in the fabrication of distribution board shall be provided with double coating of red oxide and final coating of light grey powder coated paint.

ØMinimum two earth terminals shall be provided in the DB. All sheet steel section shall be electrically connected with earth.

ØDB shall be mounted on wall/ pillar.

ØThe MCBs shall be of make as per List enclosed and shall be got approved from Dy.CEE (C) CCG before supply.

ØThe breaking capacity of MCBs should not be less than 10KA & 'C' curve

The SDB shall be comprised with following switch gears—Incoming circuit – 2 x 63 A 4-pole MCB & 10 KA Breaking Capacity of C-curve Outgoing circuit - 10 x 16- 20 A DP MCB & 10 KA Breaking Capacity of C-curve.

SUB DISTRIBUTION BOARD-32 Amp

The contractor shall have to supply; erection, testing & commissioning of Distribution Board (DB) shall be pre-wired in sheet steel enclosure, double door with DIN channel, neutral bus-bar. The box and cover shall be properly pre-treated, phosphatized with powder coated finish and surface mounted type.

Detachable plate with Knock out holes shall be provided at the top/bottom of board. Complete board shall be factory fabricated and pre-wired in factory ready for installation at site. Following switchgears shall be provided. :-

Incoming- 1 x 32 Amps MCB, DP, 10KA ,C Curve . Outgoing - 6 x16 Amps MCB, SP, 10KA,C Curve.

Distribution Board & MCB shall be of make as per list enclosed and shall be got approved from Consignee / Railway representative or Dy.CEE (C) CCG before supply.

SUB DISTRIBUTION BOARD FOR STREET LIGHT

1. The contractor shall have to design, supply, install, test and commission DB fabricated by 2mm thick MS sheet, outdoor type with rain shed, standard angles, channels etc. as required in design or company made. The drawing, design switch gears with make and model of the DB shall be submitted by the contractor & got approved by Railayrepresentative / consignee of Dy. Chief Electrical Engineer (Constn) W-Rly, CCG before fabrication.

2. The panel shall be fabricated by CPRI / ISO approved manufacturer. Contractor should submit the copy of CPRI / ISO certificate issued to panel manufacturer.

3. The DB shall be indoor cubicle type, wall mounted dust and vermin proof suitable for 3 phase, 4-wire, 415V, 50Hz AC supply system.

4. All power connections from the bus bar shall be made such that there is a clear metal to metal aerial contact at the tapping. The nuts and bolts used for connections to the bus bar shall be of Aluminium alloy. Both spring washer and plate washer shall be used with stud/ nuts/to ensure proper contact pressure.

5. The sheet steel enclosure / angle / channel used in the fabrication of distribution board shall be provided with double coating of red oxide and final coating of light grey powder coated paint.

6. Minimum two earth terminals shall be provided in the DB. All sheet steel section shall be electrically connected with earth.

7. DB shall be mounted on wall/ pillar/mast.

8. The MCBs, contactor, time switch shall be of approved make as per list enclosed. The breaking capacity of MCBs should not be less than 10KA & 'c' curve

The DB shall be comprised with following-

- 1) 63 A 4-Pole MCB- 1 No
- 2) Analog type time switch- 1 No
- 3) Contactor 3 Phase, 40 Amp-1 No
- 4) Auto/ manual switch- 1 No
- 5) Connection terminals 60 Amp – 24 Nos

Note: - The contractor shall have to submit CPRI test report and OEM test reports

DIGGING OF TRENCH & LAYING OF CABLE

(i) DIGGING & RE-FILLING OF CABLE TRENCH: -

A trench of 450 mm in width and 1000 mm depth from the normal ground level in normal soil shall be made by the contractor and while laying the cable a layer of riddle soil shall be provided below and above the cable. After doing this the trench can be filled up with soil available thereby. If any damage done, contractor will make good the cost of damage as decide by railway. If any infringement comes in the digging route then contractor should remove the same. If any hard /stony soil, Contractor should adopt new technology method as per scope of work.

(ii) DIGGING & RE-FILLING OF CABLE TRENCH IN PCC/RCC/HARD SOIL:

=

A trench of 450 mm in width and 1000 mm depth from the normal ground level in PCC/RCC/Hard soil shall be made by the contractor by using breaker and while laying the cable a layer of riddle soil shall be provided below and above the cable. After doing this the trench can be filled up with soil available thereby. If any damage done, contractor will make good the cost of damage as decide by railway. If any hard /stony soil, Contractor should adopt new technology method as per scope of work.

S.I.T.C. OF LT CABLES: -

The contractor shall have to Supply. Installation,testing and Commissioning of 4x10 sqmm to 4x300 sq mm cables as per conditions/ Load. LT cable for working voltage up to and including 1100 volts as per specification No. IS:1554/ Pt-I/ 1988 or latest. LT cable inspection will be carried by RITES. Contractor shall lay the cable in existing trench, pipe & on Wall/ structure.

Before laying the cable in the ground / Pipes or on the wall/pillars/cable tray cable should be secured properly by providing saddling/clamping arrangement of proper size at suitable interval.

Before and after laying the cable, the IR value should be checked and the contractor shall arrange all the testing instruments. In case of any failure contractor will again re- lay the cable at his own cost.

Armoring of the cable shall be earthed at both end of the cable.

Cable route marker shall be provided on the turning points and in straight portion. The cable marker shall be approved design and should be got approved before providing.

Wherever the cable comes out of the ground at least one loop of sufficient rCCGus should be provided under the ground.

While laying the cable and while digging the trench it should be ensured that no obstruction should come in way of drainage line, power cables, telecommunication cables etc.

If any damage done, contractor will make good the cost of damage as decided by railway.

LT/HT CABLE ROUTE MARKERS:

The contractor shall supply, installation and commissioning cable route markers on route of cable at each turning point and suitable distance in straight portion as guided by Railway representative.

The cable route marker shall be casted of C.I. with description as given in this office drawing No. Dy. CEE/C/CCG/608/2011 After fabrication the complete marker assembly, it shall be hot dip galvanized to make it anti corrosive and got approved from Rly before bulk supply.

HALF ROUND RCC PIPE 100 & 150 MM

The contractor shall supply half Round RCC pipes of 100 & 150mm inner dia. and 1.0 Mtr in length as per given description. The internal surface shall have a smooth finish without any bulge or projections to avoid damage to the cable.

Internal dia.	External dia.	Thickness	Approx. Weight	Approx.Steel Weight
100mm	125mm	25mm	11.5 Kg	190 gm
150mm	184 mm	25 mm	14.5 kg	240 gm

LAYING OF PIPES:-

Half round pipes shall be laid above cables for mechanical protection on laid cables in the existing trench. After doing this the trench can be filled up with soil available thereby. If any damage done, contractor will make good the cost of damage as decide by railway.

SUPPLY OF HDPE PIPE 110 MM

The contractor shall supply, installation and commissioning of HDPE (High Density Polyethylene) pipe of 110 mm nominal dia. as per IS 4984-1995 With accessories required for laying such as coupler, bend etc. Make-Tijaria, Himalyan, Koncept, Poddar, Unique OR similar and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply.

Material grade and class	Description	Nominal diameter (mm)	Wall thickness of pipes (mm)	
			Minimum	Maximum
PE-80 & PN-6	HDPE (High Density Polyethylene) pipe	110	6.3	7.1

The contractor shall lay the HDPE pipes in the ground under the tracks/Road by push through method or by open excavation method (digging of trench) at a depth indicated in drawing supplied by Rly below the formation level. The term “formation” level means the earth surface just below the bedding of the ballast. If any hard /stony soil, Contractor should adopt new technology/mechanised method in push through method or digging of trench.

Each length of the pipes shall be joined together properly using proper size of socket and aligned in a straight line, keeping an inclination to facilitate the draining of water.

Note- For push through & digging of trench rates will be given separately in schedule item.

LAYING OF HDPE/GI PIPES BY PUSH THROUGH METHOD:-

The contractor shall lay the HDPE/GI pipes in the ground under the tracks/Road by push through method at a depth indicated in drawing supplied by Rly below the formation level. The term “formation” level means the earth surface just below the bedding of the ballast. If any hard /stony soil, Contractor should adopt new technology method in push through method.

Each length of the pipes shall be joined together properly using proper size of socket and aligned in a straight line, keeping an inclination to facilitate the draining of water.

HIGH MAST 20 Mtrs HEIGHT for GOODS PF

The contractor shall have to supply, install, test and commission the 20 meter high mast including all accessories like electrical control panel for hoist motor etc. shall be done by original equipment manufacturer (OEM)/Authorized representative only in section as per manufacturer's design and drawings. Certificate to this effect may be put in record. Structure and foundation design shall be done for providing minimum twelve Nos. of flood light fittings on it and considering area wind pressure. Contractor should submit the manufacturer design and drawings before execution of work.

Applicable standards

Sr. No.	Code No.	Title
1.	IS:875(part-III)-1987	Code and practice for wind loads
2.	ILE TR-7, Latest addition	Specification of mast
3.	BS-5649, Part-7	Structure design
4.	BSEN 100025/100027 BS:4360	Mast section
5.	IS:2062	Base plate, Top plate and Accessories.
6.	BS-5135 or 9595	Welding
7.	BS-729 / IS-2629	Galvanizing
8.	IS-367	Foundation

STRUCTURE

The high mast shall be of continuously tapered, polygon cross section, at least 20 sides, presenting a good and pleasing appearance and shall be based on proven in-tension design confirming to IS: 875 (Part III)/1987 to give an assured performance and reliable service. The mast shall be of Bajaj, Philips, BPP or Crompton Greavesmake only.

CONSTRUCTION

The mast shall be fabricated from special steel plates Mast and 04mm thick for bottom, 03mm thick for top section, confirming to BS-EN 10025, cut and folded to form a polygonal section as stated above and mast shall be in two sections. The welding shall be in accordance with BS: 5135. There shall be only one longitudinal seam weld per section. Each mast section shall have only two sections and shall be jointed together by slip stressed fit method at site. No site welding or bolted joint shall be done on the mast.

The detailed parameters are as under

Height	Bottom dia. in mm A/F i.e. outer to outer)	Top dia. in mm (A/Foutet o outer)	Bottom section Plate thickness in mm	Top section Plate thickness in mm	PCD in mm	Foundati on bolt in mm	Luminary capacity at 55m/s (Nos)
20mtrs.	460	150	4	3	590	M30/850 x8	12

The base flange shall be provided with supplementary gussets between the bolt holes to ensure elimination of helical stress concentration. For the environmental protection of the mast, the entire fabricated mast shall be hot dip galvanized, internally and externally having a uniform thickness of 85/65 microns for the bottom and top sections respectively.

DYNAMIC Long FOR THE MAST

The mast structure shall be capable to withstand the wind load as per IS 875 as these masts will be provided in the section and 12 Nos. 400W HM fitting shall be mounted on the high mast. Wind excited oscillations shall be damped by the method of construction and adequate allowance shall be made for the related stress.

DOOR OPENING

An adequate door opening shall be provided at the base of the mast and the opening shall be such that it permits clear access to equipment like winches, cables, plug and socket etc. and also facilitate easy removal of the winch. The door opening shall be complete with a close fitting, vandal resistant, weatherproof door provided with a heavy-duty double internal lock with special paddle key.

The door opening shall be carefully designed and reinforced with welded steel section, so that the mast section at the base shall be unaffected and undue buckling of the cut portion is prevented.

LANTERN CARRIAGE

A fabricated lantern carriage shall be provided for fixing and holding the flood light fittings and control gears. The lantern carriage shall be of special design and shall be of steel tube construction, the tubes acting as conduits for wires, with holes fully protected by grommets. The lantern carriage shall be so designed and fabricated to hold the required number of flood light fittings and the control gearboxes and also to have a perfect self-balance. The lantern carriage shall be fabricated in two halves and jointed by bolted flanges with stainless steel bolts and plastic lock type stainless steel nuts to enable easy installation or removal from the erected mast.

The inner lining of the carriage shall be provided with PVC arrangement so that no damage is caused to the surface of the mast during the raising and lowering operation of the carriage. The entire lantern carriage shall be hot dip galvanized after fabrication.

JUNCTION BOX

Weather proof junction box, made of cast aluminum shall be provided on the carriage assembly as required from which the inter-connections to the designed number of the flood light luminaries and associated control gears fixed on the carriage shall be made.

RAISING AND LOWERING MECHANISM WINCH

The winch shall be of completely self-sustaining type with raising and lowering arrangement, without the need for brake or clutches. Each driving spindle of the winch shall be positively locked when not in use, gravity activated pawls. Individual drum also should be operated for fine adjustment of lantern carriage. The capacity, operating speed, safe working load and the recommended lubrication and serial number of the winch shall be clearly marked on each winch. The minimum-working load shall be not less than 750Kg. The winch shall be self-lubricating type by means of an oil bath and the oil shall be rely available grades of reputed producers.

HEAD FRAME

The head frame, which is to be designed, as a capping unit of the mast shall be of welded steel construction, galvanized both internally and externally after assembly.

The top pulley shall be of appropriate diameter, large enough to accommodate to stainless steel wire ropes and the multi-core electric cables. Self-lubricating bearings stainless steel shaft shall be provided to facilitate smooth and maintenance free operation for a long period. The pulley assembly shall be fully protected by a canopy galvanized internally and externally.

Close fitting guides and sleeves shall be provided to ensure that the ropes and cables do not dislodge from their respective position in the grooves.

STAINLESS STEEL WIRE ROPE

The suspension system shall essentially be without any intermediate joints and shall consist of only non-corroding stainless steel of AISI 316 or better grade.

The stainless steel wire ropes shall be of 7/19 constructions, the central core being of the same material. The overall diameter of the rope shall not be less than 6mm.

ELECTRICAL SYSTEM, CABLE AND CABLE CONNECTIONS

The electrical connections shall be made with at least 5 (five) core flexible round sheath power cables using copper conductor of appropriate rating. A suitable terminal box shall be provided at part of contract at the base compartment of the high mast for terminating the incomer cable. The system shall have inbuilt facilities for testing the luminaries while in lowered position. Also suitable provision shall be made at the base compartment of the mast to facilitate the operation of externally mounted, electrically operated power tool for raising and lowering of the lantern carriage assembly. The trailing cables of the lantern carriage rings shall be terminated by means of metal clad plug and socket provided in the base compartment to enable easy disconnection when required.

POWER TOOL FOR THE WINCH

A suitable, high powered, electrically driven, internally mounted power tool, with manual over ride, shall be supplied for the raising and lowering of the lantern carriage for maintenance purpose.

The speed of the power tool shall be single speed, provided with motor of the required rating. The power tool shall be supplied complete with suitable control. The capacity and speed of the electrical motor used in power tool shall be suitable for the lifting of the design load installed on the lantern carriage.

The power tool mounting shall be so designed that it will be not only self-supporting but also aligns the power tool perfectly with respect to the winch spindle during the operations. Also a handle for the manual operation of the winches in case of problems with the electrically operated tool shall be provided and shall incorporate a torque-limiting device.

LIGHTNING FINIAL

One number heavy duty hot dip galvanized lightning finial shall be provided for each mast. The lightning finial shall be minimum 1.2 mtr in length and shall be provided at the center of the head frame. It shall be bolted solidly to the head frame to get direct conducting path the earth through mast. The lightning finial shall not be provided on the lantern carriage under any circumstances in view of safety of the system.

AVIATION OBSTRUCTION LIGHTS

Suitable aviation obstruction lights of reliable design and reputed manufacturer shall be provided on the top of the mast.

FEEDER PILLAR:-

Each mast shall be provided with a feeder pillar fabricated out of 14 SWG CRCA sheet and finished with two coats of red oxide primer and grey enamel paint. The feeder pillar shall comprise of incoming 63 amp TPN MCB, Copper wiring, outgoing terminals and contactors for reversing the motor. One time switch for ON/OFF also to be provided with feeder pillar.

Note-Feeder pillar shall have to design & supply by high mast OEM only.

EARTHING TERMINALS

Suitable earthing terminal using 12 mm diameter stainless steel bolts shall be provided at a convenient location on the base of the mast for lightning and electrical earthing of the mast.

***Note:** - The contractor shall have to arrange inspection of the high mast at the manufacturer's premises at his own cost.*

FOUNDATION FOR FL MAST

The drawing of foundation shall be submitted before casting the foundation as per manufacturer's design.

Contractor shall have to supply the materials including hardware items and cast the foundation suitable for 20 mtrs high mast. The foundation design shall be done by considering soil condition, dynamic Long on the mast as per ILE TR-7 and IS: 875 and static Long of the total mast structure. The mast will be provided at section. The ratio of cement, sand and metal shall be 1:2:4. The contractor shall supply all accessories and

water required for casting the foundation. Foundation will be casted in the presence of railway representative.

Contractor shall also to be provided the sturdy fencing of rails/pipes/angles around the foundation of size 3x3mtrs of 1.5mtr height from ground level. The fencing shall be made the eight Nos. of 50x50x5mm angles/rails/pipes and barbed wire to safe guards it against damage from moving vehicles as well as to prevent unauthorized persons in its close proximity. Confirmation to this effect may be put on record. The Rails/pipes/angles shall be buried by providing suitable RCC foundation.

FLOOD LIGHT LED LIGHT FITTING 200 W FOR HIGH MAST

The contractor shall have to supply, erection, testing & commissioning of minimum System Watt 200 or more, high bay LED Flood light fitting complete with driver and all other accessories for FL mast as per WR specification No. WR /CCG/ SPECIFICATION /P /001 (Rev.01)-2018 (Specification enclosed with tender documents). Input operating voltage 230V, 50 Hz, IP-66, Housing-Pressure dia cast aluminum & complete with Glass. Mounting arrangement in on wall/ pole /cover shed including hardware shall be provided by the contractor. The connection of the light fitting shall be done by flexible, 3-core, multistrand copper conductor, PVC insulated & sheathed wires.

Note:- The make & model of fitting along with manufacturer's catalog shall be submitted by the contractor & got approved by Consignee / Railway representative of Dy. Chief Electrical Engineer (Constn) W-Rly, CCG before supply at site. Inspection of fitting at manufacture premises as per above spec.

OCTAGONAL GALVANISED STEEL POLE-5 Mtr

The contractor has to supply and erect Octagonal galvanized steel pole 5 mtrs long on cement concrete foundation complete with foundation bolt etc. Make- Bajaj, Philips, Crompton or as per list enclosed and shall be got approved from consignee / Railway representative of Dy.CEE (C) CCG before supply.

DESIGN OF POLE:-

The Octagonal Poles shall be designed to withstand the maximum wind speed as per IS 875 as these poles. The top long i.e. area and the weight of fixtures are to be considered to calculate maximum deflection of the pole. The pole shall be **octagonal** cross section and shall be continuously tapered with **single longitudinal welding without** any circumferential welding. The bottom dia shall be 130mm (Across Face) and top dia shall be 70mm (Across Face) made up of 03mm thick plate. The base plate shall be of size not less than 200x200x12mm. The hot dip galvanization shall be not less than 65 micron and shall be uniform and smooth finish. No minus side variation in dimensions is allowed.

The octagonal Poles shall have door opening of approximate 500 mm length at the elevation of 500 mm from the Base plate. The door shall be vandal resistance and shall be weather proof to ensure safety of inside connections. The door shall be flush with the exterior surface and shall have suitable locking arrangement. There shall also be suitable arrangement for the purpose of earthing. The pole shall be adequately strengthened at the location of the door to compensate for the loss in section. Bakelite sheet with stud terminal & fuse shall be provided inside the opening for the purpose of termination of cables /wires.

The contractor shall also have to provide suitable bracket on the top of the pole for mounting one/two Nos. Street light fitting. Supply price shall include poles, Suitable bracket, terminal strip & OEM name plate.

DESIGN OF FOUNDATION.

The RCC foundation shall be of 500x500 square and 1000 mm long. The foundation shall be 200mm above the ground level. The foundation shall have 04 Nos. M 16x 600 long 'J'

type GI bolts along with template and suitable reinforcement. Cement concrete shall be of the ratio 1:3:4. The contractor shall arrange cement, sand, concrete & water on their own cost.

Connection to the street light fittings shall be given through inside the pole with flexible, 3-core, multistrand copper conductor, PVC insulated & sheathed wire. Erection of pole means RCC foundation, J bolt, wiring, testing & commissioning etc.

Note:- The octagonal pole, bracket and foundation bolt shall be supplied by OEM only. The inspection of poles shall be offered by contractor at the approved make manufacturer's premises at his own cost before supply at site. the concerned OEM test report to be submitted.

LED 45 SYSTEM WATT STREET LIGHT LED FITTING -

The contractor shall have to supply, erection, testing & commissioning of minimum 45 System Watt, surface mounted LED street light fitting complete with driver and all other accessories as per WR specification No. WR /CCG/ SPECIFICATION /P /001 (Rev.01)-2018 (Specification enclosed with tender documents).

LED street light fitting should be mounted on wall/pole/gantry with mounting arrangement. Contractor shall provide suitable bracket of suitable size for the fixing of fitting. The connection of the light fitting shall be done by flexible, 3-core, multi strand copper conductor, PVC insulated & sheathed wires

Note:-The make & model of fitting with manufacturer's certificate shall be submitted by the contractor & got approved by Consignee / Railway representative of Dy. Chief Electrical Engineer (Constn) W-Rly, CCG before supply at site.

SURFACE WIRING

LIGHT /FAN/CALL BELL & 6AMP MODULAR PLUG POINT

The contractor shall have to supply, installation, testing and commissioning of Light, fan, call bell & 6 amp plug point with modular switch & plug and carry out wiring from switch board to load/ ceiling rose point in PVC casing / capping of minimum 25 mm size or more size wherever required in PVC casing / capping or PVC pipe (MMS). For light, fan, call bell point & 6 A plug point 1.5sqmm multi-strand single core FRLS-PVC insulated 1.1kv grade Copper conductor wire for phase & neutral and 1.5sqmm multi-strand single core FRLS -PVC insulated 1.1kv grade copper conductor wire with ISI mark for internal earthing in the same casing / capping.

The contractor shall have to supply and provide modular type Molded Poly Propylene switch boards for points and plug-socket etc.

Rate of the point wiring shall include supply, erection and commissioning of standard size board box, modular switches with all accessories as specified, lamp holders / ceiling rose, adopter / lamps etc. with matching colour. There shall be sufficient space on switchboard to provide modular fan regulator & modular plug socket.

The modular switch board, modular switches, modular sockets & modular bell switch: Make- As per List enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply.

16/6 A MODULAR PLUG POINT

The contractor shall have to supply, installation, testing and commissioning of modular type plug point with material and provide 16/6A modular plug socket & 16A modular switch with modular type Molded Poly Propylene board in surface manner with 4.0 sq mm FRLS-PVC insulated multi strand copper wire for phase and neutral and internal earthing in 25 mm size PVC casing / capping or PVC pipe (MMS). Contractor should supply modular plug socket and modular switch separately after that erected on board. Measurement of wiring up to 16/6 Amp plug point shall be given separately from 4.0 Sq mm sub main item.

The modular switches & modular sockets- Make- As per List enclosed and shall be got approved from consignee / Railway representative of Dy.CEE (C) CCG before supply.

MAIN-SUB MAIN 2.5 SQMM

The contractor shall have to supply, installation, testing and commissioning of main & sub- main circuit for phase, neutral and internal earthing from SDB to switch board & switch board to switch board shall be carried out in PVC casing / capping or PVC pipe (MMS) with 2.5 sqmm (as given in schedule) multi-strand, FRLS-PVC insulated 1.1 KV grade single core copper conductor wire.

Make- as per List enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply. NABL report should be submitted.

MAIN-SUB MAIN 4.0 SQMM

The contractor shall have to supply, installation, testing and commissioning of main & sub- main circuit for phase, neutral and internal earthing from SDB to switch board & switch board to switch board shall be carried out in PVC casing / casing or PVC pipe (MMS) with 4.0 sqmm (as given in schedule) multi-strand, FRLS-PVC insulated 1.1 KV grade single core copper conductor wire.

Make- As per List enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply.

MAIN-SUB MAIN 6.0 SQMM

The contractor shall have to supply, installation, testing and commissioning of main & sub- main circuit for phase, neutral and internal earthing from SDB to switch board & switch board to switch board shall be carried out in PVC casing / casing or PVC pipe (MMS) with 6.0 sqmm (as given in schedule) multi-strand, FRLS-PVC insulated 1.1 KV grade single core copper conductor wire.

Make- As per List enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply.

WIRING OF 2-WAY LIGHT POINT

The contractor shall supply the material and carry out 2 way wiring from switch board to load/ ceiling rose point in PVC conduit pipe/ casing capping of minimum 25 mm size or more size wherever required. For light point 1.5sqmm multi-strand single core FRLS-PVC insulated 1.1kv grade Copper conductor wire for phase & neutral and 1.5sqmm

multi-strand single core FRLS -PVC insulated 1.1kv grade copper conductor wire for internal earthing in the same conduit pipe/ casing.

The contractor shall have to supply and provide modular type Molded Poly Propylene switch boards for points and plug-socket etc.

Rate of the 2 way point wiring shall include supply, erection and commissioning of standard size switch board, front plate required for multi-point switches with all accessories as specified, lamp holders / ceiling rose, adopter / lamps etc. with matching colour.

The 2 way modular switches : Make- As per List enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply.

CALL BELL

The contractor shall have to supply and provide an Electronic call bell. Make as per List enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply.

CEILING FAN

The Contractor shall have to supply, installation, testing and commissioning of 1200 mm Ceiling Fan with BLDC Motor complete with all accessories for Staff qtrs. & 1400 mm Ceiling Fan with BLDC Motor complete with all accessories mm for Service building, without regulator, white colour confirming to IS 374 and provide the ceiling fan at different locations as decided by Railway site Engineer. Necessary arrangement for anchoring with suitable length of down rod of 20 mm dia seam less MS pipe or as received with fan if length is suitable, with nut, bolt & split pin to be provided by the contractor to maintain height of ceiling fan not less than 2.4mtr from the room floor.

The connection of the ceiling fan in buildings shall be done by flexible, 3-core, multi-strand copper conductor from catenary/ ceiling rose/Mains.

Note:-The make & model of Ceiling Fan as per approved list shall be submitted by the contractor & got approved by Consignee / Railway representative of Dy. Chief Electrical Engineer (Constn) W-Rly, CCG before supply at site.

FAN REGULATOR

The contractor shall have to supply, installation, testing and commissioning of modular step type hum-free fan regulator of 100W on existing switchboard.

The modular fan regulator- Make- As per List enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply.

LED 20 W SYSTEM WATT BULK HEAD LIGHT FITTING -

The contractor shall have to supply, erection, testing & commissioning of minimum 20 W System Watt LED type Bulkhead light fitting complete with driver and all other accessories. Input operating voltage range of driver shall be **230 V**, 50 Hz. Luminaire should have lumen output of minimum 60 lumens/ Watt. Optical cover should be of high quality Opal Polycarbonate. For proper heat dissipation housing should be made of High Pressure die cast aluminium / polycarbonate. HPL MODEL No-HLPLEDBH20 or similar

makes as per list enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply.

LED light fitting should be mounted on wall / toilet/stairs with mounting arrangement. The connection of the light fitting shall be done by flexible, 3-core, multi strand copper conductor, PVC insulated & sheathed wires.

CONCEALED WIRING

CONCEALED WIRING OF LIGHT /FAN/CALL BELL & 6 AMP PLUG POINT

The contractor shall supply the material and carry out wiring from switch board to load/ ceiling rose point in PVC conduit pipe of minimum 25 mm size or more size wherever required in **concealed manner**. For light, fan, call bell point & 6 A plug point

1.5sqmm multi-strand single core FRLS-PVC insulated 1.1kv grade Copper conductor wire for phase & neutral and 1.5sqmm multi-strand single core FRLS -PVC insulated

1.1 1 kv grade copper conductor wire for internal earthing in the same conduit pipe.

The contractor shall have to supply and provide **concealed** MS metal box duly GI/chromium-plated for points and plug-socket etc. The concealed switchboard of **modular type** to be provided by the contractor with suitable front plates and all required modular accessories.

Rate of the point wiring shall include supply, erection and commissioning of standard size concealed metal box, front plate required for multi-point switches / single switches piano switches with all accessories as specified, lamp holders / ceiling rose, adopter / lamps etc. with matching colour. There shall be sufficient space on switchboard to provide fan regulator & 3 pin (1 phase 1 neutral & 1 earth) plug socket.

The switches, sockets & bell switch: Make- As per List enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply. There shall be sufficient space on switch board to provide fan regulator.

CONCEALED WIRING OF 16/6 A PLUG POINT

The contractor shall have to supply of material and provide modular type 16/6A socket with 16A switch with suitable metal box, front plate with accessories in concealed manner with 4.0 sq mm FRLS-PVC insulated multi strand copper wire for phase and neutral and internal earthing in 25 mm size PVC conduit pipe. Measurement of wiring up to 16/6 Amp plug point shall be given separately from 4.0 Sq mm sub mains.

The switches & sockets- Make- As per List enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply.

CONCEALED WIRING OF MAIN-SUB MAIN 2.5 SQMM

The wiring for the main & sub- main circuit for phase, neutral and internal earthing from SDB to switch board & switch board to switch board shall be carried out in concealed manner with 2.5 sqmm (as given in schedule) multi-strand, FRLS-PVC insulated 1.1 KV grade single core copper conductor wire in minimum 25 mm or more size PVC conduit

pipe. Make- As per List enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply.

CONCEALED WIRING OF MAIN-SUB MAIN 4.0 SQMM

The wiring for the main & sub- main circuit for phase, neutral and internal earthing from SDB to switch board & switch board to switch board shall be carried out in concealed manner with 4.0 sqmm (as given in schedule) multi-strand, FRLS-PVC insulated 1.1 KV grade single core copper conductor wire in minimum 25 mm or more size PVC conduit pipe. Make- As per List enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply.

CONCEALED WIRING OF MAIN-SUB MAIN 6.0 SQMM

The wiring for the main & sub- main circuit for phase, neutral and internal earthing from SDB to switch board & switch board to switch board shall be carried out in concealed manner with 6.0 sqmm (as given in schedule) multi-strand, FRLS-PVC insulated 1.1 KV grade single core copper conductor wire in minimum 32 mm or more size PVC conduit pipe. Make- As per List enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply.

CONCEALED WIRING OF MAIN-SUB MAIN 10.0 SQMM

The wiring for the mains for each three phase, neutral & earth wire (total five wires) from main DB to SDB shall be carried out in concealed manner with 10.0 sqmm (as given in schedule) multi-strand, FRLS-PVC insulated 1.1 KV grade single core copper conductor wire with in minimum 32 mm or more size PVC conduit pipe. Make- As per List enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply.

FAN REGULATOR MODULAR TYPE

The contactor shall have to supply and fix the modular step type 100 w, hum-free fan regulators on existing concealed metal box switchboard with plates and accessories.

The fan regulator- Make- As per List enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply.

EXHAUST FAN

Contractor shall have to supply, install test and commission the 300 mm sweep, heavy duty metal body exhaust fan with Louvers. Make- As per List enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply. Contractor should provide Wire mesh on outside of exhaust fan as safety measure.

The connection of the exhaust fan shall be done by flexible, 3-core, multistrand copper conductor, PVC insulated & sheathed wires.

1x (18- 20) W LED TUBE LIGHT FITTING –

The contractor shall have to supply, erection, testing & commissioning of minimum (18-20) System Watt, surface mounted LED tube light fitting, CRCA made complete with driver and all other accessories as per WR specification No. WR /CCG/ SPECIFICATION /P /001 (Rev.01)-2018 (Specification enclosed with tender documents).

Mounting arrangement including hardware shall be provided by the contractor. The connection of the light fitting shall be done by flexible, 3-core, multistrand copper conductor, PVC insulated & sheathed wires.

The make & model of fitting got approved by consignee/representative of Dy. Chief Electrical Engineer (Constn) W-Rly before supply at site. Test reports for LED & fitting (LM 79 & LM 80 from NABL lab) to be submitted by contractor

RECESS MOUNTED 36-38 W (2'X2' Sq feet) LED FITTING -

The contractor shall have to supply, erection, testing & commissioning of 36-38 System Watt, 2'x2' sq feet LED type recess indoor mounted LED fitting complete with driver and all other accessories as per WR specification No. WR /CCG/

SPECIFICATION /P /001 (Rev.01)-2018 (Specification enclosed with tender documents).

Mounting arrangement including hardware shall be provided by the contractor. The connection of the light fitting shall be done by flexible, 3-core, multistrand copper conductor, PVC insulated & sheathed wires.

The make & model of fitting got approved by consignee/representative of Dy. Chief Electrical Engineer (Constn) W-Rly before supply at site. Test reports for LED & fitting (LM 79 & LM 80 from NABL lab) to be submitted by contractor

CAPSULE TYPE 2 x (18-20) W LED TUBE LIGHT FITTING -

The contractor shall have to supply, erection, testing & commissioning of minimum 2 x (18-20) System Watt, corrosion proof, suspended, surface mounted LED tube light fitting complete with driver and all other accessories as per WR specification No. WR /CCG/ SPECIFICATION /P /001 (Rev.01)-2018 (Specification enclosed with tender documents).

Mounting arrangement including hardware shall be provided by the contractor. The connection of the light fitting shall be done by flexible, 3-core, multistrand copper conductor, PVC insulated & sheathed wires. Fittings shall be provided in cover shed.

The make & model of fitting got approved by consignee/representative of Dy. Chief Electrical Engineer (Constn) W-Rly before supply at site. Test reports for LED & fitting (LM 79 & LM 80 from NABL lab) to be submitted by contractor

MAINS 4.0 SQ MM FOR WIRING :-

Contractor has to Supply of material and wiring of mains for fittings and fas by 3 wire x 04 sq mm multi-strand, FRLS -PVC insulated 1.1 KV grade single core copper conductor wire in minimum 25 mm size PVC hard rigid conduit pipe or more size wherever required or existing pipes. Mains will be loop from light point to light point & provide connectors for tapping supply of bulk head fittings.

Makes as per list enclosed and shall be got approved from Consignee / Railway representative of Dy. CEE (C) CCG before supply. **NABL lab test report should be submitted by the contractor.**

PIPE EARTHING & EARTH WIRE PIPE EARTHING-

The earthing shall be provided as per IS -3043 (latest) according to the drawing mentioned in IS. Tenderer shall supply the material and provide pipe earthing at different locations as required. If any hard /stony soil, Contractor should adopt new technology method to dig earth pit as per drawing/ mentioned in IS.

The GI pipe for the earthing electrode shall be 50 mm nominal bore dia. Medium class as per IS :1239 & 3.0 m in length and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply. Proper connecting arrangement with clamp, G.I. nut and bolts shall be provided at the top end of the pipe-earthing electrode, by the tenderer.

The earthing wire shall laid from end terminations to earthing electrode through G.I. pipe along with the cables. Properly supported and clamped. The earthing electrode pipe shall not protrude more than 250 mm above ground level. The end sealing G.I .cap shall be provided at the top of the pipe-earthing electrode. An earthing chamber as per drawing shall be provided at the each earthing electrodes. Earth resistance of each and every earth station shall be recorded with date in presence of Railway representative and painted on the earth chamber. Details of earth resistance recorded should be submitted jointly signed by contractor and Railway representative. Earth resistance and testing date shall be written / painting at each Earthing location.

The contractor shall supply and connect the earth electrode by earth wire of 2 Nos. 8 SWG with PVC sleeve insulated & connect G.I. wire between each point to be earthed and individual earthing station. The G.I. earthing wire ends shall be clamped between two G.I. washers of sufficient size and properly tightened with G.I. nuts and bolts. Earth wire should be drawn through the pipe laid for cable protection.

G.I. PIPES 50 MM DIA. (Item No. 45 & 46)

The contractor shall supply G.I. pipes of 50 & 32 mm nominal bore dia, 'B' class, Medium with coupling, elbow, tee etc. for protecting the cable. The upright/ under ground cable shall be encased in G.I, pipes for mechanical protection. The pipe shall be clamped with flat MS clamp at each location on upright cable length.

Note:- Make- as per list enclosed and shall be got approved from Dy.CEE (C) CCG before supply.

LAYING OF G.I. PIPES:

The contractor shall lay the G.I. pipes in the ground/Road & under the track by digging open trench method or on wall/ pole/structure with proper saddling/clamps for cable

protection. Each length of the pipes shall be joined together using proper size of G.I. coupler properly and aligned in a straight line, keeping an inclination to facilitate the draining of water.

LED SIGNAGE BOARDS

The contractor shall Supply, installation, testing and commissioning of new LED glow sign board. The price shall cover for Supply, Fixing, Testing & Commissioning of

LED Glow Sign Boards made out of 0.5 mm panaflex sheet duly stretched. The detail specification is as under:

The LED Glow Sign Board shall be of 2'x2' size with suitable width & shall be visible from both sides and well supported and the structure should be prepared to bear wind pressure and also self weight. Before manufacturing, the structural design should be got approved from competent authority. The board shall be made from 18 SWG G.I. sheet. The panaflex sheet shall be fixed between duly fabricated M.S square section and from the top it should be supported by S.S angle of size 25mmx25mm and will be fixed by screw.

The flex should be illuminated from inside by LED of clear cool white color 5.00 mm LED's of uniform intensity and luminosity shall be used for excellent visibility. The intensity of the illumination is such that it shall be possible to read the information clearly from a distance of 20 meters or higher. LED module shall be Philips/Techno LED/Wipro/Bajaj/Osram /GE /MIC make with electronic starter/driver. The Board shall be provided with a heavy duty connector strip of bakelite material of 16 amp capacity duly fixed on the board. All power supply units supplied are switch mode power supply type (SMPS) operated from AC sources ranging from 80V to 270 Volts, 50 Hz AC, Single phase. All power units are tested at 50% load of maximum working capacity.

Provision shall also be made for 01 No. earth terminal & suitable no's of louvers on both sides shall be provided for proper heat dissipation. A wire mesh shall also be provided to prevent entry of lizard & other insects. The matter, size of letter & language of signage board to be digitally printed on the flex shall be given by the concerned Field Supervisor.

The board shall be fixed/hanged using a suitable size of clamp made from GI flat in the platform cover shed as per site condition and connection given by a 3 core PVC insulated copper flexible cable of 24/0.20 mm size through a PVC flexible pipe from the existing catenary/Light point.

The color code for signage boards shall be as given below:-

Type of Signage	Colour of background	Colour of signage matter
Signage for services ch as ASM office, RPF booth, Booking office etc.,	Yellow	Black
Signage for utilitiesSuch as Parking, Toilet, Platform no., Drinking water, FOB (Water cooler) etc.	Blue	White

However, Railway reserves the right to choose any other colour also.

The sample of boards and matters of all boards shall have to be got approved from Dy.CEE/C/CCG.

EXCAVATION OF SOIL

A pit/trench of required size of width and depth from the normal ground level in soil (except Rock) shall be made by the contractor for the purpose of cable laying by push through method. After laying the cable refill the same by riddle soil in the pit/trench.

After doing this the pit/trench can be filled up with soil available thereby. If any damage done, contractor will make good the cost of damage as decided by railway. If any hard /stony soil, Contractor should adopt new technology method as per scope of work. Qty will be measured in Cubic meter.

DIGGING & RE-FILLING OF CABLE TRENCH IN PCC/RCC/HARD SOIL: -

A pit/trench of required size of width and depth from the normal ground level in all type of hard soil (Stone/Rock/RCC/PCC etc) shall be made by the contractor for the purpose of cable laying by push through method. After laying the cable, refill the same by riddle soil in the pit/trench. After doing this the pit/trench can be filled up with soil available thereby and resurface the same. If any damage done, contractor will make good the cost of damage, as decided by railway. If any hard /stony soil, Contractor should adopt new technology method as per scope of work. Qty will be measured in Cubic meter.

UPS 2 KVA

The contractor shall have to Supply, install, test and commission **2 KVA**, ON Line, single phase input and single phase output UPS suitable for 120-minute backup with maintenance free battery set as per RDSO specifications No. **RDSO/PE/SPEC/PS/0023 - (Rev.0) 2001 with Amendment No.1** (Copy of the specification is available in the office of the Dy.CEE/C/CCG. Same can be purchased by the tenderer). If any doubt / dispute arises between the RDSO specifications & manufacturers specifications the decision given by the Dy.CEE/C/CCG shall be considered as final.

The contractor shall have to submit the guarantee card for the period of **60 months**. The Manufacturer shall be required to guarantee the performance of the equipment against unsatisfactory performance / break down. Installation of equipment or any part there of found defective within guarantee period shall be replaced by the manufacturer free of charge. The guarantee shall also cover quality, strength and performance of material and equipment used.

The contractor shall have to arrange factory inspection of UPS by Railway Engineer at his own cost. During factory inspection all the parameters of UPS testing will have to be tabulated in a report form and signed by firm and Railway Engineer.

Note:-Make & Model shall be got approved from Dy.CEE (C) CCG before supply.

AUTO CHANGE OVER PANEL-40 AMP SINGLE PHASE

The contractor shall have to design, supply, install, test and commission the minimum capacity of 40 Amp, 2-pole, auto change over panel fabricated by 2mm thick MS sheet, standard angles, channels etc as required in design.

The box should be Siemens grey powder coated paint and with locking arrangement.

The auto change over panel shall be used for the changeover of the supply from any three sources to select one source.

The auto change over panel shall be provided with the three numbers of multi LED indication lamps with control fuse (3 Nos. for 3 supply) for indication of main supply.

Incoming supply (1) DG Set (2) LOCAL (3) Traction supply (ATS). Out going supply used for UTS (unserved ticketing system).

Normally used Local supply, If local supply fails than select DG supply and if local & DG both fails than select ATS supply. When Local supply restored than automatically switch over to Local supply.

The change over box shall be consisting as under:-

3 No. I/C MCB 3 x 40 A DP MCB, 10 KA Breaking Capacity. 1 No. O/G MCB 1x 40 A DP MCB, 10 KA Breaking Capacity, 40 Amp Contactor & relay as required for complete the sytem.

The MCB shall be of make as per List enclosed and shall be got approved from Dy.CEE(C) CCG before supply.

Laminated Circuit diagram shall be pasted on inside panel cover.

The connection to the changeover switch terminals shall be given through PVC insulated FRLS flexible multi-strength single core copper conductor of suitable size through the MCBs. The drawing & design of the panel shall be submitted by the contractor & got approved by Dy chief Electrical Engineer (Constn) W-Rly,CCG before fabrication

Note:-Make & Model shall be got approved from consignee/representative of Dy.CEE (C) CCG before supply. OEM test reports to be submitted by contractor

Inverter type Split A/C units of 1.5 ton Capacity

GENERAL SPECIFICATION:

1. The rates shall be inclusive of the supply of AC units as per the technical specifications, transportation, installation, commissioning and testing.
2. Air conditioners shall be provided at site by the contractor. No any extra payment will be made for indoor unit bracket, outdoor stand, drain pipe and other required accessories for erection of air conditioner the same will be supplied and erected by the contractor at his own cost.
3. All AC units shall be earthed properly.
4. Contractor shall take care to the installation so as not to cause any damage to Railway property. Any damage to the installation as well as to the Railway property would be recovered from the contractor.

5. All the decision taken by Dy.Chief Electrical Engineer, Construction, CCG should be binding to both parties in respect of any dispute arising during the tenure of this work.

6. Carpentry works and masonry work for packing of gaps developed after providing AC units will be of superior quality and to be done completely by contractor on his own cost.

Technical Specification

ØThe contractor shall have to supply, installation, testing & commissioning of new 1.5 Ton inverter type Split Air Conditioner units complete with installation of indoor and outdoor unit. The AC units, originally shall be supplied with manufacturer's test certificate as per the parameter given in IS 1391 part II/1992.).

Accepted make of Split AC: Hitachi, LG, Samsung, Voltas, Blue star, Carrier, Fedders Lloyd, Videocon, Godrej, Onida, Toshiba, Panasonic, Haier, O General, Daikin only.

1.5 Ton inverter type split AC conforming to IS 1391 part II/1992.).	
Star Rating	5
ISEER	4.7 or More
Supply	230V +/- 10% 50 HZ, single-phase AC supply
Connecting pipe	Cu-Cu (1/2" & 1/4")
Condenser coil	Copper/PFC
Refrigerant Gas	R410A/ R32/ R290

The AC units originally shall be supplied with manufacturer's test certificate/ challan. Drainage pipe will be provided by contractor up to toilet or other suitable location.

Note:-The make & model of AC unit with manufacturer's certificate shall be submitted by the contractor & got approved by consignee/representative of Dy. Chief Electrical Engineer (Constn) W-Rly, CCG before supply at site.

20A PLUG & SOCKET with Metal Enclosure :-

The contractor shall have to installation, testing and commissioning of 20 A plug point with material and provide 20A metal clad plug socket with top and 20A DP MCB, 10 KA with metal box & 4 sq mm FRLS-PVC insulated multi strand copper wire for phase and neutral and 4.0 sq mm PVC insulated multi strand copper wire for internal earthing in 32 mm or more size PVC casing / capping. Measurement of wiring up to 20 Amp plug point shall be given separately from 4.0 Sq mm sub main item. This point used for Geyser & Air conditioner.

The 20A Plug socket, 20 A DP, 10KA MCB with metal box shall be of make as per list enclosed and shall be got approved from consignee / Railway representative of Dy.CEE (C) CCG before supply. Socket shall be suitable for Air conditioners, Geyser & water coolers etc.

Time Switch 3 A.C. Controller

The contractor shall have to Supply installation testing & commissioning of three phase auto controller with time switch and smart logic features timer with temperature based load for 3 Nos Air conditioner as per Tech specification. As per following details-

- 1] Latest Hi -Tech Micro Controller Based Technology
 - 2] LCD Display 16 Character And 2 Line With Backlit .
 - 3]It Has Unique Controlling Programme Based On Real Time, To Set Ac Controller On/Off Auto As Per The Desired Time, Onsite Programmable .All Set Point Programmable From 4 Keypad.
 - 4]Sequencing Of Ac Equal Run Hours Min. 5 Minute To 12 Hrs. 5] Room Temperature Setting 10 *C To 60 *C.
 - 6]Hysteresis Programmable 1 * C To 5 *C.
 - 7]Room High Temperature And Low Temperature Alarm Facility .
 - 8]Temperature Calibration Facility Onsite.
 - 9]Automatic Override Facility To Second Ac To 3rd Ac .If Running Ac Goes Fail
 - 10]It Controls 3 Air Conditioners 30–30-30 Amps. 3nos Separate Heavy Duty Relay Output For 3 Ac.
 - 11]Balance Time Show On Display.
 - 12]Separate Phase Supply For Each A/C.
 - 13]Direct Display Accurate Temperature Sensing By Precise Temperature Sensor.
 - 14] Time Sharing For Compressors To Share Load Equally.
 - 15] Separate Alarm Relay Contacts For Room High Temperature And Low Temperature.
 - 16] Display Of All The A/C Parameters Continuously On Display.
 - 17] Various Set Points Are Settable Through Function Mode Categories. 18] It Has Password Protection.
 - 19]Delay Time Option,
 - 20]Auto / Manual Facility For All Ac's.
 - 21]06 Months Warranty. TECHNICAL SPECIFICATIONS: -
 - 1]Supply Voltage:-415 Volt, 3 phase incoming i.e. 230 V Ac, 50 Hz \pm 15% Separate For Each A/C.
 - 2]Contact Rating: 30 A At 230 V Ac For Compressor Or Ac .Outputs 3] 5 A At 250 V Ac For Alarm Potential Free Outputs (C, N/O).
 - 4] Temperature Sensor: Thermistor Sensor Ntc 10k@25°C 5] Size: 235 Mm (H) X 190 Mm (W) X 63 Mm (D)
 - 6] Metal Body With Wall Mounting. 7] Sensor Cable Length: 1.5 Meters.
- Make : Dynamic Micro Tech /Logic Technology /tya /T-Mech or similar.

LED STATION NAME BOARDS

The contractor shall provide fabricated new board of 22 SWG G.I. sheet and ACP sheet of 4 mm. of white colour of EVA, VIVA or TIMEX make.

-The back portion of board shall be GI sheet painted with two coats with white oil paint of Nerolec/Asian make, front and outer sides of the board box shall be of ACP sheet.

-Inner side structure of suitable strength shall be fabricated with 25x25 mm of 18 SWG square MS pipe.

-The board box shall be of suitable length to accommodate 400 mm height letter for English and 450 mm for Hindi and Marathi(The height of letters shall not be less than 400 mm for English and 450 mm for Hindi and Marathi)

-It shall not be less than 4000 mm x 700 mm x 200 mm for Station names between sections as advice by site Engineer for English, Hindi and Marathi

-The contractor shall provide the suitable mounting arrangements of station name boards with 35 x 35 x 5 mm. MS angle, necessary hardware such as nut bolts, GI clamps and two coats painted with black oil paint. The masonry work shall be done if required. The board should be water, dust and vermin proof suitable for single- Phase, 230V, 50 Hz AC supply system and properly earthed with 14 SWG copper wire. Power connection to board should be made with 3x2.5 sq mm PVC insulated copper wire in PVC pipes(mms).

The contractor shall provide the mounting arrangement to signboards as per site requirement with necessary hardware such as GI pipe, GI clamp, nut-bolt etc. of suitable size. Colour of LED: RED.

The board should require to be get approved by consignee / Railway representative DyCEE/C/CCG before installation.

Provide Lettering in English, Hindi and Marathi languages by emboss (box type) work in RED color 2mm (Approx) acrylic sheets of GSFC make or make approved by DyCEE/C/CCG.

The letters should properly cover at back side by 4 mm (approx) foam sheet for vermin and dust proofing.

The letters should illuminated with uniform brightness by providing LEDs of low heat having red color 2 LED modules which should water proof, shock proof and connected with proper polarity. LED modules should be of tetra max model of GE or equivalent model of Philips/ wipro or make as per list enclosed.

LED modules are fixed on 4 mm foam sheet by VHB TM industrial-grade mounting tape for convenience and savings.

Inner side LED wiring of letter should be done by 1 sq.mm FRLS wire and out side between letters by 1.5 sq.mm FRLS wires.

The Ready letters should be fixed with aluminium rivet or screw on 4 mm. sheet by using not less than 25 x 25 x 2 mm. aluminium angle.

Power supply should be GEPS12-60U of GE or equivalent of Philips/Wipro make only. One no power supply should be used for maximum 135 nos. modules only.

Proper arrangement for power supply to safe guard from rain and dust should be done.

Note : The Name board station letters, Design and size of the board shall be got approved from Consignee / Railway representative of DyCEE/C/CCG before fabrication of boards

HT CABLE END TERMINATION BOXES (Indoor type)

The contractor shall supply the heat shrinkable type indoor end termination kits for 3-core 185 sq.mm, aluminium conductor, XLPE insulated 11 KV (E) grade cable, of 3M, Denson or Reychem make.

The individual cores of the cables shall be properly identified to avoid cross connections of the core while jumpering them to the corresponding wire of the overhead lines.

The contractor shall engage skilled cable jointer for making the end termination and it should be provided only in presence of Railway representative after taking proper shut down. For termination of cable, proper size of cable gland and lugs to be provided.

DISMANTLING OF RAIL/TUBULAR POLES AND OVERHEAD LINES

The contractor shall have to dismantle existing rail/ tubular poles with cables and overhead lines at various locations. All the dismantled materials shall be stacked at suitable location near site and shall be handed over to Sr.SE/Electrical (S&C) CCG.

The dismantling of span including its main conductors and guarding net shall be carried out by contractor and same shall be deposited at Sr.SE/Electrical (S&C) CCG. If required to shift dismantled pole than Long& unLong has to be arranged by the contractor. Transportation charge will be paid separately as per schedule items.

TRANSPORTATION OF RELEASE MATERIAL :-

The contractor shall have to transportation of released rails, tubular pole, high mast, tube fitting, fans etc. with vehicle, labour including long /unlong of released scrap material from any location of section to Mumbai scrap depot. All the dismantled materials shall be deposited for disposal at Mumbai scrap(X) store, CCG.

Long / Short, cutting if required & transportation from site to scrape depot at Mumbai have to be arranged by the contractor for the purpose of disposal.

Necessary crane, truck & manpower to be arranged by contractor. During Long

/ Shor & transportation all safety measure should be considered by contractor. The payment will be made after disposal of dismantled material at Mumbai scrape depot as per schedule items.

SUBMERSIBLE PUMP SET

Contractor shall have to supply new submersible pump set with motor and complete with all accessories. The pump shall be suitable to deliver more than 650 LPM. of water at a total head of 150 mtrs. The Pump-set shall be 30 HP model no. LMKS - 300 of Lubimake or its equivalent model of Kirloskar, Crompton, Siemens, NGEF, KSB, Taxmo, ABB, Jhonson, Jyoti, Shakti, Beacon, Calama, Amrut, Shriram, Lubi, KDS. Electrically driven submersible pump sets should be as per following specifications-

The all pumps components should be of: -

1.Pump casing and components of closed grain cast iron Impellers of stainless steel (s.s.) and shall be either totally enclosed or semi enclosed type and shall be dynamically balanced.

2. Pump and motor shaft, shaft sleeves, pump and motor couplings pivot and thrust pad should be stainless steel.

3.Water lubricating bearings of bronze.

4. Motor casing of stainless steel tube, stator and casing protected against corrosion by a firmly adhesive coating of rust preventive paint.

5.Stator winding of copper with weatherproof non-hygroscopic, non-aging insulating material (PVC insulated/ polypropylene insulated).

6.Copper Rotor dynamically balanced with a coating of rust preventive paint applied on it.

7.Suction case with strainer.

8.Couplings.

9.Pressure compensation device and rubber device for filling water.

The electrical driven submersible motor, continuously, rated suitable for operation on AC 3 phase, 415 Volts, 50 Hz. should be squirrel cage induction type with winding of WET type and should conform strictly to latest IS.

The motor should be of adequate capacity to provide the pump discharge within the range of (-) 25% and (+) 10% of specified head. The motor should be supplied with suitable capacity of cable- 5 mtrs.

Pump shall be supplied complete with the following accessories, suitable for pump as specified in item of work.

1	Non return valve of suitable size of referred pump with flange and gasket conforming to IS-5312 or latest, with nuts & bolts	1 No.
2	Supporting clamps of suitable size for column pipe complete with nuts and bolts	2No.
3	Heavy-duty 90-degree bend with coupling at one end and flange at other end.	1No
4	A 450mm long nipple made up from MS heavy-duty pipe, having 11 TPI threads at both end.	1 No
	450 mm long nipple made up from MS heavy-duty pipe, having 11 TPI threads at both end with 11 TPI MS coupling.	1 No

Note: The pump set to be tested in company/manufacturer factory in the presence of Railway authority for which contractor has to make arrangements at his own cost.

The make & model of pump with manufacturer's certificate shall be submitted by the contractor & got approved by consignee/representative of Dy. Chief Electrical Engineer (Constn) W-Rly, CCG before supply at site. OEM test report also to be submitted by contractor

Supply and installation of Automatic control panel (ATS)

Contractor shall have to supply, installation, testing and commissioning of Automatic Control panel [ATS]. Motor Control Panel wall mounted type, made-up from 16 SWG

CRCA sheet steel totally enclosed, dust and vermin proof, water resistant duly painted with 2 coats of primer red oxide and two coats of finish gray enamel paint. (This includes degreasing and phosphating process both in and outside). The pump control panel board shall be for three phase, four wire, 50 Hz. AC supply and shall consist the following:-

1	MCCB- 100 Amps , 3 pole, 25 KA braking capacity of make as per List of Approved Makes given below.	1No.
2	ATS starter of suitable up to 50 HP capacity for pump motor conforming to IS : 8554 or latest complete with over-load and under voltage releases. (The contactors of capacities 95A, 70A & 63A shall be used.). Contractors and relays shall be of L&T/ Siemens/Indoasian make only. If the contractors used of L&T make, than only MN series shall be used.).	One-set.
3	Single relay Unit providing protection against overload, unbalance, reverse and single phasing, dry run of make GELCO "PUMPPRO".or equivalent of Minilec.	1No.
4	LED Indication lamp for 3 phase with rewirable fuses.(make Essen / Vaishno/ L&T/ Siemens/ C&S/ Teknik)	1 set
5	LED type Indication lamps for water 'YES' or 'NO'	1 set
6	LED type Indication lamps for 'START' and 'RUN' position of pump motor	1 set
7	Toggle switches of Kaycee/Jainson make for water level guard and SPP.	1
8	3 phase, 4 wire of suitable capacity energy meter (Electronic type) make L&T/ Siemens/ Jaipur/ Meco/ Enercon/ Udaipur/ Havells/ HPL/ Bentec.	1
9	Digital type Ampere meter and Volt meter of AE/ IMP/ Motwani/ Meco/ Trinity/ Toshniwal/ Jaipurmeter/ Simco/ Macco/ Ruttonsha/ Simpson/ Hitachi/ L&T/ Baroda meter/ Havells make.	1 Set
10	Counter to indicate hours for which pump has run of L&T(GIC)/Kaycee.	1
11	Power factor improvement capacitor 12 KVAR capacity with automatic discharging devices, make SIEMENS/YESHA / NGEF / KHATAU JHANKAR / ASIAN/ Meher/ ABB/ BHEL/L&T/EPCOS	1
12	Earthing terminals with nuts and bolts.	2
13	Bilingual Caution boards.	1

14	Cable glands of required size.	LS
15	Lugs including crimping as per site condition.	LS
16	Internal wiring with required size of PVC cable having copper conductor of marked.	LS
17	Time switch of Hager model EH 111 or equivalent of L&T/SIEMENS/Schneider/ Indoasian make only	1

ISI NOTE:-

- i. The pump should function automatically with electronic timer.
- ii. The panel should be earthed with 8 SWG GI wire with sleeve.
- iii. Contractor shall supply one spare contact kit of contacts for each of the contactors provided in the panel.

Supply and installation of 80 MM dia. UPVC column pipe with required accessories-

The contractor shall have to supply and install UPVC column pipes of 80 mm. dia (3'' Inch) in 3 meter length, white colour, HEAVY Class having Outer dia of 88 mm and inner dia of 80 mm with both end male square threaded. One end of UPVC column pipes should be joined with coupler with internal threads and locked with SS wire.

The working pressure of pipe shall be of 26 kgf/cm² suitable rubber seals should be present in the coupler joints so that there is no leakage of water. Information regarding OD, ND and working pressure shall be printed on the pipe. Pipe shall be tested as per tests stated below:

S.L. NO.	REQUIREMENT	SPECIFICATION LIMIT	TEST METHODS
1	WIRE LOCK SYSTEM	PIPE SHOULD BE LOCKED TO ONE END OF THE COUPLER WITH SQUARE THREADS AND SS WIRELOCK SYSTEM WITH INTERNAL "O" RING SYSTEM FOR PREVENTION OF ANY LEAKAGE	-
2	VISUAL APPEARANCE	THE COLOUR OF THE PIPES SHALL BE WHITE SLITE VARIATION IN APPEARANCE OF THE COLOUR ARE PERMITTED. THE INTERNAL &	-

		EXTERNAL SURFACES OF THE PIPES SHALL BE SMOOTH. CLEAN & FREE OF ANY DEFECTS. THE ENDS SHALL BE CLEAN & SQUARE WITH THE AXIS OF THE PIPES.	
3	COLOUR	WHITE	-
	DIMENSION	A) OUTSIDE DIAMETER : 87.5 TO 88.20MM	IS – 4985:2000 IS – 12235 (PART-1)
		B) END THICKNESS 9.80 TO 11.90 MM	IS – 4985:2000 IS – 12235 (PART-1)
		C) BARREL THICKNESS 7.30 TO 9.00	IS – 4985:2000 IS – 12235 (PART-1)
		D) LENGTH OF PIPE WITHOUT COUPLER 3000+10 MM	IS – 4985:2000 IS – 12235 (PART-1)
		E) LENGTH OF THICK PORTION ON MALE THREAD SIDE 150 MM MINIMUM	-
		F) LENGTH OF THICK PORTION ON COUPLER WIRE LOCK SIDE 250 MM MINIMUM.	-
5	SPECIFIC GRAVITY	1.44 Gm/CC Max.	IS – 4985:2000 IS – 12235 (PART- 14)
6	TENSILE STRENGTH	49 Mpa (MIN)	ANNEXURE “A” OF IS – 12818-92
7	JOINT LEAKAGE TEST	26 KGF/ CM2 TEST DURATION-1HR	IS-12235(PART-8/SEC-1) IS-12235(PART-8/SEC -4)
	HYDRO-STATIC PRESSURE TEST	65.00 KGF / CM2 TEST DURATION-1HR BURST TEST- 78 KGF/CM2 MINIMUM	IS – 4985:1988 IS – 12235 (PART- 8/SEC-1)

8			IS-12235(PART-8/SEC -4)
9	RESISTANCE TO EXTERNAL BLOW	3000 GMS FROM 2000 MM + 10 MM	IS – 4985-2000
10	THREAD FITMENT Test		INTERCHANGEABILITY

Required accessories for UPVC column pipes of 3” dia.

TOP adaptors: Material-SS, to be able to sustain a pressure of 35 kgf/cm² (for a testing duration of 1 hour.)

Bottom Adaptors: material-SS, to be able to sustain a pressure of 35 kgf/cm² (for a testing duration of 1 hour.) and free from blow holes.

Flange for pump guard fitment: Material mild steel, the flanges shall have powder coated surface.

M12 stud rod: The M12 stud rod is of SS.

PVC small Piece: The overall length of small PVC piece shall be 35 mm.

3x25sqmm PVC flat copper flexible cable

The contractor shall have to supply and provide of submersible PVC flat 3 core copper flexible cables of 25 Sq. mm of "ISI marked" PVC insulated & PVC sheathed suitable for used in submersible pump confirming to IS:694 or latest.

The successful tenderer will have to submit the manufacturer's test certificate as well as along with the cable supplied by him.

The contractor should submit the copy of challan or bill for the cable supplied from the manufacturer/ authorized dealer issued on the name of contractor.

HORIZONTAL MONO BLOCK 3 PHASE , 5 HP SUBMERSIBLE PUMP

The contractor shall have to supply, install, test and commission Horizontal mono block submersible pump set complete with all accessories suitable for sump. The pump set shall be 5.0 HP, 415V, 3 phases; 50Hz AC. Suction and delivery size shall be of 50mm x 50 mm dia. Pump head & delivery will be decided after getting data from Enggdeptt. All reducer & coupling etc. shall be arranged by contractor. Delivery pipe connection shall be done by contractor.

Note- Pump shall be of make as per list enclosed and shall be got approved from from consignee/representative of Dy.CEE(C) CCG before supply. OEM test report with Sr No of pump to be submitted by contractor

HORIZONTAL MONO BLOCK 3 PHASE, 5 HP SUBMERSIBLE PUMP (Spare)

The contractor shall have to supply Horizontal mono block submersible pump set complete with all accessories suitable for sump. The pump set shall be 5.0 HP, 415 V, 3 phase; 50Hz AC. Suction and delivery size shall be of 50mm x 50 mm dia. Pump head & delivery will be decided after getting data from Enggdeptt. All reducer & coupling etc. shall be arranged by contractor as spare supply.

Pump shall be of make as per list enclosed and shall be got approved from consignee/representative of Dy.CEE(C) CCG before supply. OEM test report with Sr No of pump to be submitted by contractor

STARTER FOR SUB. 3 PHASE, 5 HP PUMP

The contractor shall have to supply, erect, test and commission Pump starter, DOL, 3 Phase, for 5.0 HP capacity pump motor, 415V, 50 Hz with Ammeter, voltmeter, SPP and overload protection **or** OEM of pump.

Note- Starter shall be of make as per pump make or L&T ,kirloskar, GE, Siemens, CG, GELCO, OCLEG, ABB, Minilec or similar Make- as per list enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply.

SPECIFICATION FOR BLACK HOT M.S. COLUMN PIPE-50 MM

The Contractor has to supply 50 mm nominal bore dia column pipe 'C' class heavy duty black hot finished conforming to IS 1239 or latest. Length of pipe shall be of 3 mtr. The pipe shall threaded with 8 TPI on both end with heavy duty coupling fixed and tap welded at one end. The pipe should of TATA/ Survyra/ Swastic/Jindal/Asian make or similar as per list enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply.

SUBMERSIBLE FLAT CABLE-3x4.0 SqMM

The contractor has to supply 3x 4.0 sqmm submersible flat cable for the pumps. The cable shall be finolex, Polycab, Avocab, Havell's make or similar as per list enclosed and shall be got approved from Consignee / Railway representative of Dy.CEE (C) CCG before supply. This cable shall be suitably connected to pump motor and starter panel and suitably bonded with the delivery pipe of the pump.

SPECIFICATION FOR 200 A CHARGING RECTIFIER

1.The main component of the battery charging rectifier set shall be confirm to the following IS specification (latest edition) which shall be supply in the manner already amended by this specification. The Indian electricity rules shall also be applicable wherever necessary.

(a)	Rectifier transformer to ISS	2026 with class 'B' insulation.
-----	------------------------------	---------------------------------

(b)	Silicon Rectifier to ISS	3895
(c)	Electrical Indicating instruments (Heavy duty) to ISS	1248
	Rotary switches to ISS	1567

2.Rating & other particulars:-

Rectifier shall be design for the following ratings and other particulars-

(a)	Input supply	415V, 3 phase. 50 HZ A.C. supply + variation as per IE rules
(b)	Output switch	30 KW, 200A. 110/150 V DC supply by means of rotary selector switch.
(c)	Bridge connected wave silicon rectifier	No. of DC circuits and cut outs: 2x200A HRC fuse & 1 No. 200A, 10 KA MCCB.
(d)	Rating	Continuous.

3 Service Conditions:-

1	Maximum humidity	100%
2	Maximum ambient temperature	50oC
3	Atmospheric condition	Dirty/Polluted

4. Type of construction, mounting:-

4.1 Enclosure:-

The unit shall be suitable for both indoor & outdoor duty, suitable for pole mounting, weather proof where there is heavy rainfall and surrounding are prone to water splashing. It shall be possible to open the unit from 2 sides. The meter shall be water tight suitably

protected by acrylic sheet and metallic foil for mechanical protection. The rectifier set shall be erected in cubical of MS sheet of not less than 2 mm thick.

The cubical shall be robust in construction to prevent damage due to vibration encountered during handling and transit in service. The angle iron of the framework shall be liberal sizes and provided with suitable bracings to prevent bending or buckling. The heavy transformer shall be strongly supported and bolted so that its supports do not buckle or bend during transit. The bottom shall have angles to withstand the handling and also the entire bottom portion of the battery charger assembly shall be provided with perforated MS plate and wire mesh to avoid entry to lizards but provide adequate air for cooling.

The steel sheet panels and frame work shall be under got to special treatment such as degreasing or rust removal. It shall be given a phosphate coating and primer coating to withstand the industrial environments. The final finishing shall be smooth with attractive standard, yellow/green enamel paint or hammer finish.

The rectifier set shall be mounted on four cast iron wheels of adequate strength and internal connections shall be with crimped sockets and multi strand copper shall neatly encored and numbered for identification. All the nuts and bolts shall be zinc plated / passivated.

4.2 Ventilation:-

Ventilation of adequate size and capacity shall be provided with automatic switch “ON/OFF” arrangement with the operation of rectifier set. A separate switch for fan shall be provided with fuse protection.

5 Components of the rectifier set.

5.1 Main transformer:-

The transformer shall be double wound with copper conductor air cooled fully insulated with class “B” insulation, continuous rating with OFF load tap changing links to compensate with supply voltage variation. The transformer shall be delta- star connected with primary tap changing arrangement to get out put 110 to 150V DC. The fine control may be taken from the primary of the transformer. The transformer shall be vacuum impregnated, flash tested with 2500V for one minute. The transformer shall be confirming to IS 2026 (Latest) and have overload capacity of 15% for 30 minutes

5.2 Rectifier:

The rectifier shall be suitable for indoor as well as outdoor duty in covered shed. The rectifier shall consist of high power silicon diodes with liberal cooling fans, connection holes, storage switching voltage surges upto 500V. Over load capacity shall also be catered to withstand short circuit in DC conductors. Suitable surge suppressor with capacitor, resistance network shall be provided for long life of diodes. The diodes shall be rated for taking 50% overload for a period of 4 to 5 hours. The temperature rise of the diodes and its junction at full load shall be well within its rated value under extreme ambient conditions. The rectifier diodes shall of the reputed makes acceptable i.e. Hind rectifiers, Ruttonshaw, Automatic Electric, Keltron only. Each diode shall be provided with resistance capacitor circuit for diode protection against voltage surge. HRC fuse of adequate capacity shall be provided in DC output circuit. The protection arrangement shall function satisfactorily in case of repeated short circuit in battery charging lines. 3 numbers indication lamps shall be provided to indicate the availability of the power supply.

5.3Choke:

A ballast choke of adequate capacity shall be provided in AC side to minimize variation in charging current due to input voltage fluctuation and to limit / abort fluctuation in battery charging line. The choke shall be wound with copper conductor. It shall be vacuum impregnated and comply with ISS 2026

5.4 **Bus-Bar:-**All DC bus-bars shall be made of copper for minimum 200A capacity and shall be insulated with PVC sleeve with proper identification of positive and negative.

5.5 1 No. 63 Amp 10 KA MCCB with neutral link shall be provided for incoming AC supply and 63 A HRC fuses shall be provided in each feeder.

5.6Voltage and current control:

The unit shall be provided with 2 Nos. heavy duty rotary switches of adequate capacity and of reputed make for current control. These 2 Nos. four position control

switches shall provide for allowing the output voltage to be varied between 110 to 150 volts DC. Rotary switches shall be robust in construction and compact with current breaking capacity preferably one step higher than necessary and confirming to ISS 1567/60 or latest. The capacity of rotary switches shall be of 40

A. The rotary switches shall be of Kaycee/Thakoor/Switchcon make. 'ON' and 'OFF'

pilot lamp indicator shall be provided.

5.7DC side control and protections:-

Two complete set of outgoing DC terminal with 200A HRC fuse and 200 A MCCB on DC output circuit complete with nuts, check nuts, spring washer including crimping sockets suitable for PVC heavy duty aluminium armoured cable.

6. Meters and indicating lamps:

Ammeter voltmeter shall be industrial grade, flush pattern, robust in construction for high stability under the most severe and vibrating conditions shall be provided on DC side of range 300A with suitable and reliable shunt. Meters shall be only of MECO/AF/NIPPON makes and shall confirm to relevant ISS.

One set of indication lamps (Neon type) for 3 phases shall be provided.

7.Bushes shall be provided at the cable entries. .

8.The contractor shall have to provide metallic name plate on the front body cover engraved with details of battery charger such as primary supply voltage, secondary supply voltage, Sr. No., make and manufacture's address.

Make of battery charger- As per List enclosed and shall be got approved from Dy.CEE (C) CCG before supply.

Note:- The contractor should offer inspection & testing of battery charger at manufacturer's premises at his own cost.

110 V BATTERY CHARGING TERMINALS (EFT)

The contractor shall have to supply, fix and connect 110V battery charging terminals and design shall be as per sample available in this office. Only two cables shall be taped from the outgoing of the battery charger and contractor shall go on looping the charging terminals comes in alignment. The looping shall take place at the charging terminals. Cables shall be terminated / looped at the charging terminals with crimping socket, nuts, bolts etc.

The battery charging terminals shall be securely mounted on pillar / wall. The 110V charging terminals shall be painted with yellow enamel paint. The cable shall be properly clamped with wall. On EFT, write “110V DC” and mark symbol ‘+’ & ‘-’ for identification of polarity.

63A & 16/20A PLUG & SOCKET BOX

The contractor has to supply, install, test and commission of 16/20A & 63A plug socket with TOP enclosed in metal Box. Metal box shall be made of 2mm thick MS sheet, powder coated, dust and vermin proof comprising as following

(i) Three phase, 5-pin 415V, 63A capacity plug socket shall be heavy duty metal body type, spring loaded butt type contacts, self-aligned and self-wiping type confirming to IEC:60309 or latest. The plug socket shall be controlled by 63A, 4-pole MCCB shall be of 35 KA, rupturing capacity with $I_{cs}=I_{cu}$, The MCCB shall be as per IS 13947-2/1993. **MCCB make L&T, GE, Siemens** or similar as per List enclosed and shall be got approved from Dy.CEE (C) CCG before supply only.

(ii) Single phase, 230V, 16/20 A capacity 3-pin plug socket shall be heavy duty metal body type. The 16/20A Plug socket (make-L&T, GE, Schneider, BCH) shall be controlled by C-curve type DP MCB of 20A capacity. **MCB make L&T, GE, Siemens, Indo-Asian** or similar as per List enclosed and shall be got approved from Dy.CEE (C) CCG before supply only. The rupturing capacity of MCBs shall be 10 KA, C curve.

The box shall be internally wired by PVC insulated, single core flexible copper cable of suitable size with copper crimping lugs. Terminal strips shall be provided for loop in loop out connections of cables. The door of the box shall have locking arrangement. The box shall be securely mounted on wall with necessary MS clamps, nuts, bolts etc.

Note:-The drawing, design plug socket, switch gears with make and model of the box shall be submitted by the contractor & got approved by Dy. Chief Electrical Engineer (Constn) W-Rly, CCG. Contractor shall have to arrange the inspection of plug socket box at manufacturer’s premises before supply at side at his own cost.

ERECTION OF 2/3 MTR LONG RAIL POLES

The contractor shall have to erect the 2 Mtrs long rail poles to mount the EFT / 63A pre-cooling Box between the tracks. The foundation shall be provided by 1:3:4 ratio concrete of 300 mm dia& the contractor shall arrange cement, sand, concrete & water. Poles shall be provided with double coating of aluminium paint.

Note:-Second hand rail will be supplied by the Railway within the periphery of 50 Kms. Cutting and transportation shall be carried out by the contractor.

ROLLING IN EXAMINATION LIGHT HOUSING

The contractor shall Supply Rolling Examination Housing cabinet for inspection of running trains and provide 3 Nos, 25-30 W LED focus light fitting complete with driver and all other accessories as per **WR specification No. WR /CCG/ SPECIFICATION /P/001 (Rev.01)-2018 (Specification enclosed with tender documents).**

The fitting housing shall be Die-cast aluminium housing with heat resistant toughened glass and electrochemically brightened, anodized aluminium reflector with IP 65 protection.

The fitting shall be housed in 2mm thick metal sheet enclosure duly powder coated paint suitable for outdoor application. Provide 20 A DP MCB on enclosure for ON & OFF operation. The whole enclosure shall be mounted on MS angle of size 50x50x6mm stand duly grouted in cement concrete foundation of ratio 1:2:4. The front side shall be covered with toughened glass cover and protected by steel mesh. The height shall not be less than 500 mm from the ground level. Mounting arrangement and connecting arrangement shall be arranged by the contractor.

The connection of the light fitting shall be done by flexible, 3-core, multi-strand copper conductor, PVC insulated & sheathed wires

DISMANTLING OF HIGH MAST

The contractor shall have to dismantle existing high Masts / lattice type lighting tower. All the dismantled materials shall be deposited for disposal at Mumbai (X) store, CCG or other places as advised by site Engineer.

The dismantling of existing high Mast / lattice type lighting tower including light fitting shall be carried out by contractor. High Mast / lattice type lighting tower Long / unLong & transportation from site to scrape depot at Mumbai have to be arranged by the contractor for the purpose of disposal. Necessary crane, truck & manpower shall be arranged by contractor. The payment will be made after disposal of dismantled mast at Mumbai scrape depot.

HORIZONTAL MONO BLOCK 3 PHASE , 15 HP SUBMERSIBLE PUMP

The contractor shall have to supply, install, test and commission Horizontal mono block submersible pump set complete with all accessories suitable for sump. The pump set shall be 15.0 HP, 415V, 3 phases; 50Hz AC. Suction and delivery size shall be of 50mm x 50 mm dia. Pump head & delivery will be decided after getting data from Enggdeptt. All reducer & coupling etc. shall be arranged by contractor. Delivery pipe connection shall be done by contractor.

Note- Pump shall be of make as per list enclosed and shall be got approved from consignee/representative of Dy.CEE(C) CCG before supply. OEM test reports with Sr No to be submitted by contractor

vS

STARTER FOR SUB. PUMP CONTROL PANEL-15 HP

The contractor has to supply, erect, test and commission fully automatic motor control panel with angle iron support for free standing. The panel shall be made from 16 SWG CRCA sheet steel totally enclosed dust and vermin proof, water resistant duly painted with two coats of primer Red Oxide and two coats of finish Grey enamel paint. The

painting shall be on both inside and outside. This includes de greasing and phosphating process both in and outside.

PANEL FOR PUMPS AS IN SCHEDULES SHALL CONSISTS THE FOLLOWING:-

1	125 A MCCB, 4-pole, 25KA, Ics=Icu for incoming supply	1No.
2	Star-delta starter of suitable capacity for pump motor confirming to IS –1902 or latest complete with contactor, overload and under voltage relay & single phase protection .	1 set.
3	Ammeter range 0 to 60 A capacity with CTs and selector switch.	1 set.
4	Voltmeter 0 to 500V capacity with selector switch .	1 set.
5	Multi-LED type indication lamp for 3 phase (R,Y,B)	1 set.
6	Multi-LED type indication lamp for ‘Start’ and ‘Run’ position of pump motor.	1 set
7	L&T / GIC Make time switch type TSQ –100 for (daily dial).	1 set.
8	Counter to indicate hours for which pump has run.	1 No.
9	Earthing terminals with nut & bolt.	2 Nos.
10	Caution boards.	2 Nos.
11	Suitable connecting terminals & Cable gland of required sizes.	1 lot.
12	Internal wiring with required size of PVC cable having copper conductor.	1 lot.

Note:-The contractor shall have to arrange inspection of the starter panel at the manufacturer’s premises at his own cost.

SPECIFICATION FOR BLACK HOT M.S. COLUMN PIPE-100 MM

The Contractor has to supply 100 mm nominal bore dia column pipe ‘C’ class heavy duty black hot finished confirming to IS 1239 or latest. Length of pipe shall be of 3 mtr. The pipe shall threaded with 8 TPI on both end with heavy duty coupling fixed and tap welded at one end. The pipe should of TATA/ Survyra/ Swastic/Jindal/Asian make or similar as per list enclosed and shall be got approved from Consignee / representative of Dy.CEE/C/CCG before supply at site.

RUBBER MATTING:-

Contractor has to supply and provide ISI mark rubber matting sheet suitable for 11KV, Class-B in panel room for the insulation above the ground. As per IS 15652/2006 with latest amendment , Max use voltage-11 KV, AC proff voltage -22 KV, Dielectric strength- 45 KVA, Leakage current-Max 10 Micro Ampere, Width-1.0 Mtr& thickness -

2.5 mm. Rubber matting Sheet will be supplied with Test certificate for routine test as per relevant ISS & got approved By RLY before supply at site as per IS – 5424 or latest.

PORTABLE HAND DRILL MACHINE

The contractor shall to supply hand operated light duty drilling machine, 230V rating 15 minutes ON & 15 minutes OFF complete with connecting cord and suitable 3 pin top for drill bit of sizes up to 10mm. This also includes the supply of one set of drill bits of sizes 1mm to 13mm in the steps of 0.5mm (25nos. total drill bits).

The make and model of table shall be got approved by Consignee / representative of Dy.CEE/C/CCG before supply at site.

PORTABLE HAND DRILL MACHINE

The contractor shall to supply hand operated light duty drilling machine, 230V rating 15 minutes ON & 15 minutes OFF complete with connecting cord and suitable 3 pin top for drill bit of sizes up to 10mm. This also includes the supply of one set of drill bits of sizes 1mm to 13mm in the steps of 0.5mm (25nos. total drill bits).

The make and model of table shall be got approved by Consignee / representative of Dy.CEE/C/CCG before supply at site.

CABLE TRAY SUPPLY & ERECTION

(a)The contractor shall have to fabricate supply and fix the MS angle iron tray on side of pit line & between platforms for cable laying.

1.The fixing arrangement shall be robust and the fixing shall have to be done by fabricating of MS clamp, nut, bolt or welding along with rail pieces on pitline / water hydrant line between P/

2.Cable tray shall be 200 mm wide and both the outer sides MS angle shall not be less than 40 x 40 x 6 mm. In case non-availability of the required size next higher size can be used.

3.The cable tray shall be provided with MS flat of size 30mm x 6mm in between the MS angle by welding. The space in between the MS flats shall not be more than 15 cm.

4.The cable tray shall be firmly fixed /supported on the rail pieces on pit line / water hydrant line between P/F through MS angle iron clamps of higher size than the section of the angle of the tray. Erection of rail pieces is schedule item & paid separately.

5.The design& fixing arrangement shall have to be approved by Railway before fabrication and installation.

6.The cable tray shall be painted with one coat of Red Oxide and two coats of aluminium paint.

7.Provide proper clamping arrangement for cables laid on it.

LT STRAIGHT THROUGHJOINTS

Section 4.02 The contractor shall supply & provide heat shrinkable straight through jointing kits for 1.1KV grade suitable to 3.5/4 core up to 70 & 120 sqmm LT aluminum cable, manpower & transportation to carry out the repairing of faulty LT cable. The

straight through joints shall be of M-seal (3M), Dension or Raychem or similar as per List enclosed and shall be got approved from Consignee / representative of Dy.CEE (C) CCG before supply.

All the materials and man power for repairing work along with transportation shall be arranged by the contractor. Digging of pit for cable repair and refilling shall also be done by the contractor.

RCBO for Staff Qtrs

The contractor shall have to supply and provide RCBO as per following specification-Material :

i)Metal Distribution Board (DB) shall be pre-wired and surface mounted type. Complete board shall be factory fabricated and pre-wired in factory ready for installation at site. The box and cover shall be properly pretreated, phosphatised with powder coated finish with following switchgears.

ii)RCBO (Single Phase RCCB of sensitivity 30mA combined with 32 A DP MCB) OR compact single phase RCBO of 32Amp, sensitivity 30mA with overload, short circuit and earth leakage protection.

The RCBO shall be of make as per List enclosed and shall be got approved from Consignee / representative of Dy.CEE (C) CCG before supply.

DP SWITCH-32 Amp

The contractor shall have to supply, erection, testing & commissioning of 32A DP Switch with NEON indication. Provide on wooden board nearby Energy meter.

Make as per list enclosed and shall be got approved from Consignee / representative of Dy.CEE (C) CCG before supply.

Note- Contractor shall provide big common wooden board for Energy meter & DP switch if required in multi-story buildings ground floor.

GEYSER

Contractor shall have to supply and provide 15 ltrs. Capacity Geyser with ISI mark. The 16 amp Top, flexible piping connection from water tap to geyser shall be supplied and provided by the contractor and make ready to use.

The connection of the geyser shall be done by flexible, 3-core, multistrand copper conductor, PVC insulated & sheathed wire of required size &PVC flexible conduit shall be used if required.

Note:- Make & Model- as per list enclosed and shall be got approved from Consignee / representative of Dy.CEE (C) CCG before supply.

WATER COOLER-150 Ltrs

The Contractor shall have to supply, installation, testing and commissioning Self Contained Drinking water cooler with (Non CFC Refrigerant) Energy Efficient Compressor. Cooling Capacity-Ltrs/Hr-150, IS: 1475 latest, Type-Storage, Storage

Capacity- ltrs-150, stainless steel body. Provide the same at different locations as decided by Railway site Engineer. Necessary mounting arrangement, flexible pipe and accessories of water cooler done by contractor

Make– Voltas, Blue star, Usha, Fedders Lloyd as per list enclosed.

Note:-The make & model of water cooler shall be submitted by the contractor & got approved by Consignee / representative of Dy. Chief Electrical Engineer (Constn) W-Rly, CCG before supply at site.

LOCKER STEEL CUP BOARD

Contractor has to supply 8 locker steel cup board made of 18 SWG CRCA sheet having individual locker/s inbuilt locking Arrangement, size -6.5 feet x 3.0 feet x 19 inch & siemens gray colour and got approved By Rly before supply it at site.

Make-Heera or HOF or Ambica or Godrej or approved by Rly.

The make and model of 8-locker shall be got approved by Consignee / representative of Dy.CEE/C/CCG before supply at site.

ALMIRAH STEEL

Contractor has to supply steel Almirah made of 18 SWG CRCA sheet. Having 5 shelves, inbuilt locking Arrangement, size –78” x 36” x 19” & Siemens graycolour. Make- Heera or HOF or Ambica or Godrej or approved by Rly .

The make and model of almirah shall be got approved by Consignee / representative of Dy.CEE/C/CCG before supply at site.

VISITORS CHAIR

The contractor shall have to supply visitors chair. Visitors chair shall be made A-type powder coated MS pipe & cushion type seat and back. The chair shall be made A type MS pipe & cushion type seat and back of Heera model No. VC -13 or HOF model no SVA-101 or Ambica model no-360 or approved by Rly.

The make and model of chair shall be got approved by Consignee / representative of Dy.CEE/C/CCG before supply at site.

STEEL TABLE

The contractor shall have to supply steel table made from powder coated MS round pipe with top size 54” x 30” x 30” with 3-drawers and locker with shelf. Table shall be of back closed type. Make- Heera or HOF or Ambica or Godrej or approved by Rly.

The make and model of table shall be got approved by Consignee / representative of Dy.CEE/C/CCG before supply at site.

DIGITAL CLIP-ON METER (TONG TESTER)

Contractor has to supply digital clip-on meter MECO model No.3600 OR KUSAM MECO Model No-9999 or similar approved by railway complete with testing leads, Battery, Manual & Carrying case.

DIGITAL EARTH TESTER WITH TESTING KIT

Contractor has to supply digital type earth tester with LCD digital display complete with external probe & battery operated of KUSAM MECO model No. KM 1520 OR Motwane model no-DET20 with accessories or Agrawal Electronics model no WACO-DERT for Earth tester with AGRRONIC-KIT for testing kit complete with testing leads, spikes, hammer etc.

DIGITAL INSULATION TESTER

Contractor has to supply digital insulation tester of KUSAM MECO make model No. KM 370 OR Agrawal Electronics model no AGRONIC-IT2V complete with testing leads.

SELF SUPPORTING LADDER -8 Feet

Contractor has to Supply Aluminium self-supporting ladder witch flat step Size 8 feet height & made of 12 Gauge Aluminium C section. Make:-Heera model No. HI 154 or Balaad or Stackers & Movers India or similar as per List enclosed and shall be got approved from Consignee / representative of Dy.CEE (C) CCG before supply only.

Note:- Inspection of ladder shall be offered by contractor at the manufacturer's premises at his own cost before supply at site.

SELF SUPPORTING LADDER-15 Feet

Contractor has to Supply Aluminium self-supporting ladder witch flat step Size 15 feet height & made of 12 Gauge Aluminium C section. Make:-Heera model No. HI 154 or Balaad or Stackers & Movers India or similar as per List enclosed and shall be got approved from Consignee / representative of Dy.CEE (C) CCG before supply only.

Note:- Inspection of ladder shall be offered by contractor at the manufacturer's premises at his own cost before supply at site.

LIST OF APPROVED MAKES

1)Transformer:-AREVA, ABB, EMCO, Crompton, BHEL, Voltamp, Kirloskar, Bharat Bijlee, NGEF, Voltas, GEC, Tesla, Siemens, Western Electric, IMP, Vivekanand, RTS, National.

2)DG Set Silent: Cummins, Kirlosker Green, Caterpillar, Greves Cotton, Ashok Leyland, Mahindra, TATA, Panta-Volvo.

3)A.C. Unit (Window/Split Type) - Hitachi, LG, Samsung, Voltas, Blue star, Carrier, Fedders Lloyd, Videocon, Godrej, Onida, Toshiba, Panasonic, Haier, O General, Daikin.

4. **All type of Fans**—Crompton, Usha, GEC, Almonard, Khaitan, Bajaj, Havells, Orient, Anchor, Polar, Alfa, Inova, Unique.

5) Water Heater/ Geyser- Venus, Bajaj, Recold, Voltas, Ditz, Crompton, Usha, Havells, Spherehot.

6) Water Cooler- Voltas, Blue star, Usha, Fedders Lloyd.

7) Motor & Pump sets- Kirloskar, Crompton, Siemens, NGEF, KSB, Taxmo, ABB, Jhonson, Jyoti, Shakti, Beacon, Calama, Amrut, Shriram, Lubi, KDS.

8) Electrical Switch Gear and Relays- L & T, GE, Siemens, Indo Asian, Havells, ABB, Crompton, Schneider, C&S, HPL, Beicco Lawrie, Voltas, BHEL, Areva, Legrand, BCH, Standard, Bentec, MEI, Jyoti.

9) G.I. Octagonal Pole/ High Mast- Bajaj, Philips, Crompton, BPP, Utkarsh, Transrail.

10) LED LUMINAIRES- As per CEE/WR Spec. WR/CCG/Specification/P/001 (Rev-01) 2018 or Latest. (Ref-RDSO Specification No-RDSO/PE/SPEC/PS/0123 (Rev-0)-2009 with Amendment-1 .

11) Lead Acid battery- Amar Raja, Excide, CSB, Hitachi, Okaya, Panasonic, Luminous, Amron.

12) Modular Switches/ Fan Regulator/ Socket and Accessories- Anchor/Roma, Cona, Leader, Crabtree, Legrand, C&S, HPL, Indo Asian, Havells, Standard, Bentec, Elleys, Precision.

13) LT/HT Joints and End Termination- Raychem, Denson, M-Seal, 3M, CCI, Mahendra&Mahendra.

14) Copper Wire / PVC Casing Caping / PVC Conduit-ISI mark Confirming to relevant IS with Approval of Officer incharge.

Note- For all other items Not included specifically in above list, Contractor shall supply material as per relevant standard as indicated in the tender with Approval of Officer incharge.

WESTERN RAILWAY

पश्चिमरेलवे GOVERNMENT OF INDIA MINISTRY OF RAILWAYS

भारतसरकाररेलमंत्रालय

SPECIFICATION FOR ENERGY EFFICIENT LED BASED LUMINAIRE FOR OUTDOOR & INDOOR APPLICATION (GENERAL SERVICES)

SPECIFICATION NO. WR/CCG/SPECIFICATION/P/001(REV-01) – 2018**1. FOREWORD :**

At present conventional type luminaries are being provided for Indoor lighting offices, street lights & platform lighting. By introduction of white high power lights emitting diode, LED having more than 50,000 working hours. It is possible to use LED lamps in place of existing fluorescent T-8/T-5/HVSV/Metal halide. LED lights are almost maintenance free and as a result total power saving is expecting to be more than 50% keeping in view energy conservation, increased life and recurring savings on account of maintenance, use of environment friendly energy efficient LED base luminaire is being considered for indoor & outdoor lighting.

2. DETAILS OF EXISTING & PROPOSED FITTINGS –

A	For Outdoor: Street light, High Mast & Platform open area.
iv)	Platform Lighting : (for cover sheds)
B	For Indoor : Offices, Service Buildings etc.

3. SCOPE

The scope includes design, development, manufacturing, testing and supply of energy efficient luminaire complete with all accessories, LED lamps with suitable current control driver circuit including mounting arrangement for street light, platform light, recessed type & ceiling mounting arrangements etc. The luminaire

shall be suitable for rugged service under the operational and environmental conditions. Each type of luminaire shall be supplied with associated driver circuit and required optics.

The application of Energy Efficient LED based Luminaires are as under

(i)For outdoor : Street light, High Mast & platform open area

(ii)Platform Lighting

(iii)For Indoor: offices, service buildings etc.

4. CONSTRUCTION :

a) All the luminaire shall be finalized based on the performance requirement. The detailed calculation for lux level as per clause no. 7.8 with uniform distribution including the lux distribution curve/ graph/ spatial distribution shall be submitted in support of the dimensions selected and variation thereof. Housing shall be made of 1.6mm or more thick sheet Steel conforming to IS: 513 (Grade O) or aluminum die cast having high conductivity preferably to grade 5000 or similar to high conductivity heat sink material for outdoor fittings and 1 mm or more thick sheet Steel conforming to IS: 513 (Grade O)

for indoor fittings. Efforts shall be made to keep the overall outer dimensions as minimum as possible.

All out door light fittings shall be provided with toughened glass of sufficient strength under the LED chamber to protect the LED and luminaries.

(b) Suitable number of LED lamps shall be used in the luminaries. LED lamps of NICHIA/ CREE/ OSRAM/ SEOUL/ PHILIPS LUMILEDS/ LEDNIUM/ AVAGO

make shall be used for the purpose. The manufacturer shall submit the proof of procurement of LED from above OEMs at the time of testing.

(c) Suitable reflector / lenses may also be provided to increase the illumination angle

(d) Supplier will be solely responsible for testing and performance of the luminaries after installation and shall also ensure the specified and uniform illumination and comfort level on the street/platform for outdoor and work desk/floor for indoor lighting.

(e) Design of the thermal management shall be done in such a way that it shall not affect the properties of the diffuser.

4.1 High power and high lumen efficient LEDs suitable for following features shall be used:

- a) The efficiency of the LED lamps at 110°C junction temperature shall be more than 80%.
- b) The working life of the lamp at junction temperature of 110°C for 350mA current shall be more than 50,000 hours of accumulative operation and shall be suitable for continuous operation of 24 hours per day these features shall be supported with datasheet.
- c) Adequate heat sink with proper thermal management shall be provided.
- d) Colour temperature of the proposed white colour LED shall be between 5700 – 6500K.
- e) Minimum view angle of the LED shall not be less than 120 degree
- f) The output of LED shall be more than 100 lumens per watt at minimal operating current and shall ensure guaranteed operation life of 50,000 burning hours with controlled junction temperature of 110°C.
- g) Efficiency of driver electronics shall be more than 85%.
- h) Power factor of complete fitting shall be more than 0.95.
- i) The driver card shall withstand 440V & 1.5 KV \pm 3% surge protection and shall resume normal working when nominal voltage is applied again.
- j) Thermal management shall be in such a way that LED junction temperature shall not go beyond 80 degree centigrade.
- k) Lumen maintenance report as per LM 80 standards for the LEDs used & LM 79 standards for efficacy of fixtures shall be submitted along with the offer or at the time of prototype test.
- l) The LED luminaire shall be free of glare.
- m) Color rendering index CRI \geq 75

4.2 Specification for LED Driver :

- a) Input voltage Range within 180Vrms to 270Vrms.

b) Operating input voltage 240Vrms.

c) No load power consumption $\leq 500\text{mW}$

d) Maximum output voltage 105V DC $\pm 3\%$.

e) Output voltage ripple should be within 3%.

f) Output over voltage protection 125V DC

g) Power factor 0.95.

h) Full Load Efficiency $\geq 85\%$.

i) THD $\leq 10\%$.

j) Hot swapping.

k) Current waveform should meet EN 61000-3-2

l) LED Driver shall withstand, withstand voltage of 440V for 2 hours and restore normal working when normal voltage is applied.

m) Maximum Temperature rise $\leq 10^{\circ}\text{C}$ @ 55°C Tamb with safety margin of 10°C

n) The driver should comply to CISPR 15 for limits and methods of measurement of RCCGo Disturbance Characteristics.

o) The equipment should comply to IEC 61547 for EMC immunity requirements.

p) The control gear should be compliant to IEC 61347-2-13, IEC 62031 and IEC 62384 as per the requirements.

4.3 The equipment should be compliant to IEC 60598-1, IEC 62031 and IEC/PAS 62612 depending on the type of luminaire.

5.0 REFERRED STANDARDS

5.1A For Indoor Lighting :

IS : 513	Cold rolled low carbon steel sheets and strips
IEC 60529	Classification of degree of protections provided by enclosures.
EN 55015, CISPR 15	Limits and methods of measurement of rCCGo disturbance characteristic of electrical lighting and similar equipment.
IEC 62031	LED modules for general lighting - Safety requirements

EN 61547	Equipment for general lighting purposes – EMC immunity requirement.
IEC 60929 EN	Performance, AC supplied electronics ballast for tubular fluorescent lamps performance requirement.
IEC 60598-2*1	Fixed general purpose luminaries.
IEC 60598-1	Luminaries – General requirement and tests.
IEC 61000-3-2	Electro Magnetic compatibility (EMC) Limits for Harmonic current emission – (equipment input current \leq 16 Amps per phase.
IEC 60068-2-38	Environmental Testing - Test Z-AD : composite temperature / humidity cyclic test.
IEC 61347-2-13	Lamp control gear: particular requirements for DC or AC supplied electronic control gear for LED modules
IS 10322	Specification for the luminaries.
IS 4905	Method for random sampling.
LM 79	LED luminaire photometry measurement.
LM 80	Lumen Maintenance.
IEC 62384	DC or AC supplied electronic control gear for LED modules performance requirements.
IEC/PAS 62612	Self ballasted LED lamps for general lighting services – Performance requirements.

5.2For Outdoor Lighting :

IS : 513	Cold rolled low carbon steel sheets.
IEC 60529	Classification of degree of protections provided by enclosures.
EN 55015	RFI < 30MHZ
EN 55022	RFI > 30MHZ
EN 61000-3-2	Harmonics.
EN 61547	Immunity
EN 60929	Performance
IEC 60598-2-1	Fixed General purpose luminaries.
IEC 60598-1	General requirement and tests.
IEC 61000-3-2	Limits for Harmonic current emission–THD< 10%.
IEC 60068-2-38	Specification for Permitted Humidity Test
IS 10322	Specification for the luminaries
IS 4905	Method for random sampling.

6.0SERVICE CONDITIONS :

Street light/Indoor light on pipe/Recess mounting type light unit complete with luminaries and mounting accessories shall be suitable for street, office complex railway platforms (covered and open) and residential colonies of Indian Railways under the following environmental conditions:-

6.1Environmental conditions –

Maximum ambient air temperature : 55°C (For outdoor application) & 45°C (For indoor application)
 Minimum ambient air temperature : -5°C
 Max. Relative humidity : 100%

Atmosphere : Extremely dusty and desert weather and desert terrain in certain areas.
The dust contents in air may reach as high values as 1.6 mg/m³

Coastal area : The equipment shall be designed to work in coastal area in humid, salt laden and corrosive atmosphere.

6.2 The maximum value of the condition in the coastal area will be as follows: Max. pH value : 8.5

Sulphate : 7mg/liter

Max. Concentration of chlorine : 6 mg/liter

Max. Conductivity : 130 micro sec./cm

Annual rainfall : Ranging between 1750 - 6250 mm with thunder storm

Altitudes : Not exceeding 1200m above sea level.

6.3 The supplier shall provide “In the field service support” during guarantee period.

7.0 TECHNICAL REQUIREMENTS

7.1 The luminaire casing / housing shall be made of 1.6mm or more thick sheet steel conforming to IS:513 (Grade-O) or aluminum die cast having high conductivity preferably to grade 5000 or similar to high conductivity heat sink material for outdoor fittings and 1 mm or more thick sheet Steel conforming to IS: 513 (Grade O) for indoor fittings

7.2 The electronic components used shall be as follows:-

- a) IC (Integrated circuit) shall be of industrial grade or above.
- b) Metallic film/ Paper/ Polyester Capacitor shall be rated for a maximum temperature of 105°C.
- c) The resistors shall be preferably made of metal film of adequate rating. The actual Long versus rating shall be 3.
- d) The junction temperature of the Switching devices such as transistors and MOSFETs etc. shall not exceed 125°C (allowing thermal margin of 25°C).
- e) The conformal coating used on PCBs should be cleared and transparent and should not affect colour code of electronic components or the product code of the company.
- f) The heavy components shall be properly fixed. The solder connection should be with good finish.
- g) The electronics covered for this equipment shall pass all the tests called for in the specification. The tender shall indicate the deviation or compliance otherwise the offer may not be considered for evaluation.
- h) The infrastructure for Quality Assurance facilities as called for in the specification shall be available for the manufacturing of this product. The compliance shall be indicated clearly in the tender itself.

7.3 The connecting wires used inside the luminaire, shall be low smoke halogen free, fire retardant e-beam/ PTFE cable and fuse protection shall be provided in input side.

7.4 Care shall be taken in the design that there is no water stagnation anywhere. The entire housing shall be dust and water proof having IP 65 protection for outdoor application & IP 20 protection for indoor application as per IEC 60529

7.5 The control gear shall be designed in such a way so that temperature rise of heat sink shall not be more than 10°C with respect to ambient temperature.

7.6 For platform lighting, luminaire shall be such that the glare from individual LED is restricted and shall not cause inconvenience to the public.

7.7 All the material used in the luminaire shall be halogen free and fire retardant confirming to UL 94.

7.8 Illumination Level: The fitting shall be so designed that the illumination level shall be evenly distributed and shall be free from glare.

Note:- 1. Variation in illumination level shall be $\pm 2\%$ is allowed in input voltage range from 180V AC to 250V AC.

1. The illumination shall not have infra-red and ultra-violet emission. The test certificate from the NABL approved laboratory shall be submitted.

2. Electronic efficiency shall be more than 85%.

7.8.1 Polar Curves:

Typical distribution of illumination of these luminaires shall be given below:

- a. Street light: (As per document image)
- b. Platform light: (As per document image)

8.0 TESTS for Indoor and Outdoor Lighting

Tests are classified at –

- Type Test
- Acceptance Test
- Routine test

8.1 Type Test :

All the tests mentioned in the specifications should be carried out by NABL accredited lab by the manufacturer and be submitted to the inspecting agency. The inspecting agency should inspect the material based upon the same. However, no test certificate should be more than 3 years old.

8.2 Acceptance Tests:

These tests are carried out by an inspecting authority at the supplier's premises on

sample taken from a lot for the purpose of acceptance of a lot. Acceptance test shall not be carried out from particular size from the lot on which type tests have already been conducted. Recommended sampling plan is given below.

8.2.1 Sample size and criteria for conformity :

The luminaries shall be selected from the lot at random. In order to ensure randomness of selection, procedures given in IS 4905-1968 (Reaffirmed 2001) may be followed.

8.3 Routine Tests:

These tests shall be performed by the manufacturer on each complete unit of the same type and the results shall be submitted to the inspecting agency, prior to offering the lot for acceptance test the firm shall maintain the records with traceability

8.4 Test Scheme :

Sr. No.	Description of Test	Clause No.	Prototype Test (Only for outdoor)	Type Test		Acceptance Test	Routine Test
				Outdoor	Indoor		
1.	Visual and Dimensional check	9(i)	Y	Y	Y	Y	Y
2.	Checking of documents of purchase of LED	9(ii)	Y	Y	Y	Y	Y
3.	Resistance to humidity	9(iii)	Y	Y	Y	--	--
4.	Insulation resistance test	9(iv)	Y	Y	Y	Y	Y

5.	HV test	9(v)	Y	Y	Y	Y	Y
6.	Over-voltage protection	9(vi)	Y	Y	Y	--	--
7.	Surge protection	9(vii)	Y	Y	Y	--	--
8.	Reverse polarity	9(viii)	Y	Y	Y	Y	Y
9.	Temperature rise Test	9(ix)	Y	Y	Y	--	--
10.	Ra(Colour Rendering Index) measurement test	9(x)	Y	Y	Y	--	--
11.	Lux measurement	9(xi)	Y	Y	Y	Y	Y
12.	Fire retardant Test	9(xii)	Y	Y	Y	--	--
13.	Test for IP 65 protection	9(xiii)	Y	Y	Y	--	--
4.	Environmental tests	9(xv)	Y	Y		--	--
5.	Reliability Test	9(xvi)	Y	Y		--	--

9.0 Method of Testing

(i) Visual and Dimensional Check :

The unit shall be checked visually for all dimensions as per approved design and drawing. General workmanship should be good, all the components properly secured and sharp edges shall be rounded off. Check the marking and quality of the workmanship visually. Check the rating and make of electronic / electrical items.

(ii)Checking of documents of purchase of LED

Check Document of purchase of LED lamps of approved sources viz. NICHIA/OSRAM/SEOUL/PHILIPS LUMILEDS/LEDNIUM/AVAGO.

(iii)Resistance to Humidity Test

This is carried out by suspending the painted panels in corrosion chamber maintained at 100% RH and temperature cycle of 42 to 48 deg. C for 7 days and examining it for any sign of deterioration and corrosion of metal surface.

(iv)Insulation Resistance Test

The insulation resistance of the unit between earth and current carrying parts shorted together shall not be less than 2 M Ohms when measured with 500V megger.

(v)HV Test

Immediately after insulation resistance test, an AC voltage of 1.72KV rms ($1500 + 2 \times$ rated voltage) of sine wave form of 50 Hz shall be applied for one minute between the live parts and frame. There shall not be any kind of break down, flashover or tripping of supply.

(vi)Over voltage protection

The outdoor luminaire shall withstand at 415 V AC for two minutes.

(vii)Surge protection :

It shall withstand a surge of $1.5\text{kV} \pm 3\%$ for 50 microsecond's $\pm 20\%$ at the input terminals for all types and shall resume normal working when nominal voltage is applied again. (Tests shall comply with Clause 5.4 of latest IEC 60571-1)

(viii)Reverse polarity

The Luminaire shall withstand polarity reversal. It shall be operated with reverse voltage for 5 minutes at maximum value of voltage range. At the end of this period, the supply shall be made correct polarity and Luminaire shall operate in a normal way.

(ix)Temperature rise Test :

Temperature rise Test shall be conducted at 180V AC for outdoor lighting and 100VAC for indoor lighting with full load. The temperature rise shall be recorded by temperature detectors mounted at the specified reference points on the body of semiconductors, capacitors and other components as agreed between purchaser and manufacturer. The maximum recorded temperature under worst conditions shall be corrected to 55°C and compared with maximum permissible temperature (for power devices at junction). Under Long conditions as specified above, the corrected temperature of the power devices shall have a safety margin of minimum 10°C Temperature at junction shall not exceed 100°C when corrected to 55°C. The Luminaire shall also be subjected for short time rating after continuous Long to ensure the temperature rise is within the permissible limit. The maximum temperature rise of the electronics devices on the PCBs shall be in limit for industrial grade components suitable for 85°C environment. In case of exceeding limit use of MIL grade component shall be considered keeping RDSO informed.

(x) Ra (Colour Rendering Index) measurement test :

The lumen is the unit of luminous flux, which is equal to the flux emitted in a solid angle of one SterCCGang by a uniform point source of one candela.

The initial reCCGng of the chromaticity co-ordinates x & y shall be within 5 SDCM (Standards Deviation for Colour matching) from the standardized rated value as per Annex. D of IEC 60081 – 1997.

The initial reCCGng of the general colour rendering index (Ra) shall not be less than the rated value decreased by 3.

The lumen maintenance of the lamp shall not be less than 80% of the initial lumen after 20000 burning hours and 70% of the initial lumen after 50000 hours. The initial lumen will be taken after 100 hours aging.

Photometric test shall be conducted as per annexure-B of IEC 60081-97. The lumen maintenance test shall be done as per annexure C of IEC 60081-97.

(xi) Lux Measurement –

Lux measurement with the help of Lux meter shall be done at a distance as shown in para 5.8 above. Value obtained shall not be less than the Lux specified in the table therein, considering 10% Lumen is absorbed by the reflector.

(xii) Fire Retardant Test

Fire Retardant test shall be conducted as per IEC 332-1 (For outdoor Lighting) and IEC 60332-1 (For indoor lighting) of the wire used in the fittings.

(xiii) Test for IP65 protection (For outdoor Lighting) & Test for IP20 protection (For Indoor Lighting)

This test shall be conducted as per IEC 60529.

(xiv) Environmental Tests –

The Luminaire shall meet the following tests as prescribed in IEC – 60571.

- a) Dry heat test. b) Damp heat test c) Test in corrosive atmosphere
- d) Combined dust, humidity and heat test.

(xv) Reliability Test:

The reliability can only be determined in actual service. However, the following tests shall be carried out on the prototype to simulate as close as possible, the service conditions. There shall be no failure during this test.

- (a) The light unit shall be mounted in an oven maintained at 75° C for outdoor lighting and 45° C for indoor lighting.

(b) The light will be operated at the specified maximum voltage and at 75° C for outdoor lighting and at 45°C for indoor lighting for a period of 100 hours.

(xvi) Life Test –

For Outdoor Lighting: The lumen maintenance & life test shall be done as per annexure C of IEC 60081-97.

For Indoor Lighting: The lumen maintenance and life test shall be done as per annexure C of LM 80 report of LEDs.

(xvii) Endurance Test:

The Luminaire shall be kept “ON” with input voltage of 250VAC for 200 hours. After this the Luminaire is subjected to 20,000 cycles of “ON” and “OFF”, each cycle consisting of 3 seconds “ON” and 10 seconds “OFF” period. Luminaire should survive this test. Test is to be continued for one lakh cycles, followed by performance test.

(xviii) Safety :

The Luminaire shall comply with the safety requirements as per IEC 61195.

(xix) Vibration Test:

The complete unit cubicles together with its mounting arrangements (including shock absorbing devices, if provided) shall be subjected to vibration & shock testing (for category I class A/B) as per IEC 61373

10.0 MARKING:

The following information shall be distinctly and indelibly marked on the housing

a) Year of manufacture / Batch Number / Serial Number b) Name of Manufacturer c) Rated watt and voltage d) Input frequency.

11.0 Manufacturer's Certificates:

Manufacturer should submit the certificate of having purchased LED from one of the approved source (LM-80 certificate should be submitted).

Manufactures test certificate to be submitted for (i) Mechanical strength, (ii) Endurance test and Thermal test. (ii) Resistance to dust and moisture (iv)

Insulation resistance and electrical strength (v) resistance to heat, fire and tracking and (vi) photometric tests as per the IS 10322 Part-5 Sec.-2.

12.0 Guarantee :

The complete system of LED lights (including Driver etc.) shall be guaranteed for satisfactory performance and manufacturing defects for a period of 60 months from date of commissioning or 72 months from the date of supply whichever is earlier.

Following items are the Part of the Scope of this Contract:

- 1.Preparation of all CRS/PCEE papers for Opening documents.
- 2.Preparation of all 41 Proforma for CRS/PCEE Inspection and all associated drawings.
- 3.Proof checking of all drawings and designs from suitable consultant.
- 4.Provision of material transport on ton/km basis.
- 5.Provision of staff transport for joint checking, blocks, crane working and measurement
- 6.Minor civil works
- 7.Minor Electrical works
- 8.Inspection arrangements
- 9.Site assistance
- 10.Office assistance in form of manpower, books, forms and furniture
- 11.Computer, Tabs and furniture
- 12.Follow up with DISCOMs- for EHT, UG Track crossing modifications.
- 13-Providing vehicle for inspection and during Block, TWO/NI/CRS / PCEE inspection.

Chapter 4: Details of Approved sources :

Details of **RDSO / CORE Approved vendors** for Electrical-TRD items is published and updated time to time on **ireps website**.

Supply of Electrical items is to be made only from “**Approved vendors**” of RDSO/CORE; **no item to be supplied from Developmental sources**.

The List of Approved Make for **General Services** items is attached with the tender.

Special Instructions to Contractor**I.Special Instructions to Contractors for OHE work**

1. All foundations if exposed then back filling and covering is in the scope of work.
2. Muffing is required to be done.
3. All muffs should be provided with white wash before PCEE/CRS inspection.
4. All released muck should be thrown on ballast.
5. Plastic bag, tin sheets should be used while casting foundation in platform area. Platform surface should not be damaged.
6. All broken tiles should be re-done properly.

7. In case leaning of mast occurs, it should be re-done.
8. All number plates should be retro-reflective with proper SPS as per RDSO drawings.
9. All Isolators should be with integral locks
- 10.No bond should be bolted. Multiple bond strips welded together should not be used.
- 11.Bond should be properly dressed.
- 12.Excessive length and width of bond should not be used.
- 13.Spare bolts on bridge mast should be provided.
- 14.ATD weights should be painted in stores before erection.
- 15.Thermometer should be used for X-Y cutting.
- 16.HTL should be written on the ATD
- 17.All RRA clamps should be as latest drawing .(-3 version)
- 18.All bonds from platform have to be provided with clit.
- 19.All ROB, FOBs to be provided with galvanized bonds.
- 20.All bond holes to be chamfered.
- 21.Joint testing record of insulator testing should be kept.
- 22.All tree coming the way of OHE and near vicinity to be trimmed and cut.
- 23.All released material to be removed from Railway site.
- 24.All earth pits should be embedded in the earth properly.
- 25.**Location plans for TSS/SP/SSPs** at suitable locations (nearby station area) are to be prepared and got approved from Division/Railway Authorities by the Contractor only.
- 26.**Leaning mast:** Due to washing away by rain or any other reasons, if masts are leaned then same has to be attended by the contractor as per codal provisions; and if required, new foundation and Mast erection to be done.
- 27.Guarding OHE till charging and commissioning by deputing patrol men in night.
- 28.Work should be done as per Hq letter of latest TC 127 and other latest guidelines issued by HQ.

List of Standard Drawings and Specifications

All references to drawings, charts, schedules, specifications, IS etc. given in this shall be taken to be the latest versions including all amendments. All other items not covered under the Drawing/Specification shall be referred to as per relevant IS and Railway practice in force.

A. List of standard drawings for “OHE”-

SN	Brief Description	Drawing		Mod. No.
		Series	Number	
1.	Extra allowance for setting of structures on curves (1676 mm Broad gauge)	ETI/OHE/G	00111 Sh-1	C
2.	Standard setting of structures in the vicinity of signals (broad gauge)	ETI/OHE/G	00112	D
3.	Typical design of side bearing foundation.	ETI/OHE/G	00131	-
4.	Typical design of cantilever mast.	RE/33/ G	00141 Sh.3	-
5.	Standard drilling schedule of OHE masts 9.5 m long RSJ and BFB	ETI/OH E/G	00144 Sh.3	D
6.	Span and stagger chart for (conventional OHE, Cad. Cu catenary & Cu cont. wire) wind pressure 75,112.5 & 150kgf/m ² .	ETI/OH E/G	00202	-
7.	Employment schedule for Cantilever mast Regulated OHE without return conductor and without Earth wire (WP- 112.5 kgf/m ² (Cd- 65/Cu, Cont. 107/Cu)	ETI/OH E/G	00153 Sh.1	F
8.	Employment schedule for Cantilever mast Regulated OHE without return conductor and with Earth wire (WP- 112.5 kgf/m ² (Cd- 65/Cu, Cont. 107/Cu)	ETI/OH E/G	00153 Sh.2	F
9.	Employment schedule for Cantilever masts Regulated OHE with return conductor and without Earth wire (WP- 112.5 kgf/m ² (Cd- 65/Cu Cont. 107/Cu)	ETI/OH E/G	00153 Sh.3	F

10.	Employment schedule for Cantilever masts Regulated OHE with return conductor and with Earth wire (WP- 112.5 kgf/m ² (Cd- 65/Cu, Cont. 107/Cu)	ETI/OH E/G	00153 Sh.4	E
11.	Employment schedule for Cantilever masts unregulated OHE without return conductor and without Earth wire (WP- 112.5 kgf/m ² at 35°C and 28kgf/m ² at 4°C (Cat- 65/Cu, Cont. 107/Cu)	ETI/OH E/G	00154	D
12.	Employment schedule of bracket tubes Conventional OHE (Cad Cu Caty & Cu contact wire 1000 kgf tension each) WP- 75 Kgf/ m ²	ETI/OH E/G	00158 sh.1 of 3	-

SN	Brief Description	Drawing		Mod. No.
		Series	Number	
13.	Employment schedule of bracket tubes Regulated Conventional OHE (Cad. Cu Cat & Cu contact wire 1000 kgf tension in each) WP-112.5 Kgf/ m ²	ETI/OHE /G	00158 sh.2 of 3	-
14.	Employment schedule of bracket tubes Regulated Conventional OHE (Cad Cu Caty & Cu contact wire 1000 kgf tension in each) WP-150 Kgf/ m ²	ETI/OHE /G	00158 sh.3 of 3	-
15.	Dropper schedule for uninsulated Overlap spans	ETI/OHE /G	00169	A
16.	Dropper schedule for insulated Overlap spans	ETI/OHE /G	00170	A
17.	Dropper schedule for conventional regulated OHE. With Zero pre sag (1400/1400)	ETI/OHE /G	00177	A

18.	Adjustment chart of Regulating equipment 3 Pulley Type (3:1 ratio)	ETI/OHE /G	00195	A
19.	Schematic arrangement of regulated OHE	ETI/OHE /G	02101	A
20.	Schematic arrangement of uninsulated overlap (3 & 4 span overlaps)	ETI/OHE /G	02121 Sh.4	A
21.	Schematic arrangement of insulated overlap	ETI/OHE /G	02131 Sh.3	A
22.	Standard termination of tramway type OHE (Regulated) with Pulley type regulating equipment (3:1 ratio).	ETI/OHE /G	04212	B
23.	General distribution of droppers	ETI/OHE/ G	0161	
24.	Outline of Pantograph (Broad gauge and metre gauge).	RE/33/G	00181	A
25.	General formation of single track in Embankments and cutting (Broad gauge.)	RE/33/G	01101 Sh.1	A
26.	General formation of double track in embankments and cutting (BG)	RE/33/G	01102 Sh.1	A
27.	General formation of multiple tracks BG	RE/33/G	01103 Sh.1	A
28.	Standard anchor arrangement	RE/33/G	01401	E
29.	Anchor arrangement with dwarf mast.	ETI/OHE/ G	01402	C
30.	Schedule of anchor block for B.G. track.	ETI/OHE/ G	01403 Sh.1	G

31.	Schedule of anchor block for B.G. track.	ETI/OHE/ G	01403 Sh.2	C
32.	Schedule of anchor block for B.G. track (Black cotton soil)	ETI/OHE/ G	01403 Sh.3	D
33.	Standard guide tube arrangement on a mast and structures.	ETI/OHE/ G	01505	-
34.	Trapezoidal counter weight arrangement on OHE structures.	ETI/OHE/ G	01502	-
35.	Arrangement of 3KV & 25 KV Pedestal Insulator support on OHE masts and portals.	ETI/OHE/ G	01601	-
36.	Standard arrangements for mounting of number plates on OHE Structures.	ETI/OHE/ G	01701	A

SN	Brief Description	Drawing		Mod. No.
		Series	Number	
37.	Schematic arrangement of regulated overhead equipment.	ETI/OHE/G	02101	A
38.	Typical arrangements of OHE on cantilever masts for double track section.	ETI/OHE/G	02102	-
39.	Typical arrangement for fixing of bracket assembly on 9.5 m mast and Structure to suit raising of tracks in future	ETI/OHE/G	02102 Sh.3	B
40.	Mast on platforms (BG)	ETI/OHE/G	02104 Sh.1	A
41.	Details of bracket arrangement on tangent and curved tracks	ETI/OHE/G	02106 Sh.1	A

42.	Details of bracket arrangement for OHE High Speed	ETI/OHE/G	02106 Sh.3	C
43.	Single bracket assembly on Structures and dropped arms.	RE/33/G	02107	D
44.	Box type cantilever Arrangement.	ETI/OHE/G	02108	A
45.	Arrangement at anticreep.	TI/DRG/OH E/GENL/R DSO/	00001/12/ 0	A
46.	Standard cantilever arrangement for boom anchor anticreep location.	ETI/OHE/G	02113	-
47.	Schematic arrangement of uninsulated over Lap (type-I) (3 & 4 Span overlaps)	ETI/OHE/G	02121 Sh.1	F
48.	Schematic arrangement of insulated overlap.	ETI/OHE/G	02131 Sh.1	-
49.	General arrangement of regulated OHE at turn-outs (overlap & crossed type).	ETI/OHE/G	02141	C
50.	General arrangement of regulated OHE at cross over(overlap & crossed type).	ETI/OHE/G	02151	-
51.	Arrangement of neutral section	ETI/OHE/G	02161 Sh.1	C
52.	Arrangement of neutral section assembly (PTFE Type) at SWS.	ETI/OHE/G	02162	-
53.	Arrangement of short neutral section.	ETI/OHE/G	02161 Sh.2	-
54.	Schematic arrangement of unregulated overhead equipment.	ETI/OHE/G	03101	-

55	Standard termination of OHE (Regulated & un-regulated).	ETI/OHE/G	03121 Pt 1 of 3	F
56	Standard termination of OHE (Regulated & un-regulated).	ETI/OHE/G	03121 Pt 2 of 3	F
57	Standard termination of OHE(Regulated & un-regulated).	ETI/OHE/G	03121 Pt 3 of 3	F
58.	General arrangement of Unregulated OHE at turnouts (crossed & overlap type).	ETI/OHE/G	03151	-
59.	General arrangement of unregulated OHE at crossovers and diamond crossings (overlap and crossed type).	ETI/OHE/G	03152 Sh.1	-
60.	General arrangement of unregulated OHE at diamond crossing.	ETI/OHE/G	03152 Sh.2	

SN	Brief Description	Drawing		Mod. No.
		Series	Number	
61.	General arrangement of pull off	ETI/OHE/G	03301	
62.	General arrangement of Head span	ETI/OHE/G	03201	
63.	In span jumper connection between catenary & contact wire.	ETI/OHE/G	05101	
64.	Continuity jumper connection at un-insulated overlap	ETI/OHE/G	05102	

65.	Anti- theft jumper	ETI/OHE/G	05107	
66.	Connections at turnouts	ETI/OHE/G	05103	
67.	Potential equalizer connection at insulated overlap and neutral section	ETI/OHE/G	05104	
68.	Connections at diamond crossing.	ETI/OHE/G	05106	
69.	General arrangement of connections to OHE by copper cross feeder (150).	ETI/OHE/G	05121 Sh.1	
70.	General arrangement of connections at switching station on double track section by copper cross feeder (150).	ETI/OHE/G	05122 Sh.1	
71.	General arrangement of connections at switching stations on multiple track sections by copper cross feeder (150).	ETI/OHE/G	05123 Sh.1	
72.	Suspension of 25kV feeder (Spider) on 25kV OHE masts	ETI/OHE/ G	05143	
73.	Termination of feeder, return conductor & return feeder(copper &aluminum).	RE/33/G	05145-1	
74.	Arrangement of suspension of double spider 25 KV feeder and return feeder between sub-station and feeding station	RE/33/G	05152	
75.	Assembly of section insulators	RE/33/G	05181	
76.	General arrangement of earth wire on OHE mast	ETI/OHE/ G	05201	
77.	General arrangement of earth wire on OHE mast	ETI/OHE/ G	05201-1	
78.	Arrangement of transverse bonds	ETI/OHE/ G	05251	

79.	Connection of return conductor to track	ETI/OHE/ G	05306	
80.	Suspension arrangement of aluminum return conductor (spider) on traction Structures	ETI/OHE/ G	05307	
81.	Suspension of return conductor (spider) from boom of Structures (with clevis type disc insulators)	ETI/OHE/ G	05312	
82.	Connections between OHE and aluminum return conductor at booster stations	ETI/OHE/ G	05413	
83.	Mounting of 25kv Isolators on OHE Structures (General arrangement)	ETI/OHE/ G	05513 Sh.1	
84.	Details of small part steel work for supporting 25kv Isolator on new T.T.C. boom	ETI/OHE/ G	05513 Sh.2	
85	Connection from Isolator to OHE	ETI/OHE/ G	05516	

SN	Brief Description	Drawing		Mod. No
		Series	Number	
86	Characteristics of conductors/ bus-bar for 25kv AC traction	ETI/OHE/ G	05600	
87	Mounting arrangement of Auxiliary Transformer on OHE masts	ETI/OHE/ G	05522	
88	Employment Schedule for Cantilever Mast regulated OHE without return conductor & without earthwire (WP- 75 kgf/ m ² .) (Cat. 65/Cu & Cont. 107/Cu)	ETI/C	0702 (Sh.1)	

89	Employment Schedule for Cantilever Mast regulated OHE with earth wire but without return conductor (WP- 75 kgf/ m ²) (Caty. 65/Cu & Cont. 107/Cu)	ETI/C	0702 (Sh.2)	
90	Employment Schedule for Cantilever Mast regulated OHE with return conductor but without earth wire (WP- 75 kgf/ m ²) (Caty. 65/Cu & Cont. 107/Cu)	ETI/C	0702 (Sh.3)	
91	Employment Schedule for Cantilever Mast regulated OHE with return conductor with earth wire (WP- 75 kgf/ m ²) (Caty. 65/Cu & Cont. 107/Cu)	ETI/C	0702 (Sh.4)	
92	Employment Schedule for Tramway type regulated OHE RC & EW (WP- 75 kgf/m ²)	ETI/C	0704	
93	Employment Schedule for 8''x 8''x35 lbs BFB (9.5 M. long)(WP-112.5 kgf/m ² Caty. 65/Cu & Cont. 107/Cu.	ETI/C	0708	
94	Employment Schedule for OHE mast (9.5m) overlap central location with 3.0 m implantation WP-75 kgf/m ² Caty. 65/Cu & Cont. 107/Cu.	ETI/C	0709	
95	Employment schedule for OHE mast (9.5m) overlap central with 3.0 M implantation WP-112.5 kgf/m ² (Caty 65/cu and Cont.107/Cu)	ETI/C	0710	
96	Employment Schedule for OHE mast (9.5m) overlap inter with 3.0 m implantation. WP-75 kgf/ m ² Caty. 65/Cu & Cont. 107/Cu.	ETI/C	0711	
97	Employment schedule for OHE mast (9.5m) overlap inter-location with 3.0 m implantations. WP-112.5kgf/m ² Caty.65/Cu and cont.107/Cu	ETI/C	0712	
98	Employment Schedule for 9.5 m 200x200x49.9 kg mast WP-75 kgf/m ² (Caty. 65/Cu & Cont. 107/Cu.)	ETI/C	0713	

99.	Employment schedule for 9.5 m long 200x200x49.9 kg mast WP-112.5 Kg/ m ² (Caty. 65/Cu and Cont.107/Cu)	ETI/C	0714	
-----	---	-------	------	--

SN	Brief Description	Drawing		Mod. No.
		Series	Number	
100	Employment Schedule for OHE mast 9.5m long overlap Anchor location with 3.0 m implantation Catenary 65/Cu, Contact 107/Cu, WP-75 kgf/m ² .	ETI/C	0715	
101	Employment schedule for OHE mast (9.5m) overlap anchor location with 3.0m implantations Catenary 65/Cu, Contact 107/Cu, WP 112.5 kgf/ m ²	ETI/C	0716	
102	Employment Schedule for pre-stressed span concrete mast (PC 42) - 9.5 M long conventional OHE, normal location (WP-150),112.5 &75kgf/ m ²)	ETI/C	0725	
103	Standard portals (N,O,R,P,G & Double BFB types)	ETI/C	0064	
104	Volume chart and equivalent chart of foundations (Side bearing, Side gravity and W.B.C.)	TI/DRG /CI V/ FND/R DSO	00001/04/ 0 SH-1	
105	Volume chart and equivalent chart of foundations (Side bearing, Side gravity and W.B.C.)	TI/CIV/ FND / RDSO	00001/12/ 0 SH-1	

106	Volume chart and equivalent chart of foundations (NG type)	TI/DRG /CI V/ FND/R DSO	00001/04/0 SH-2	
107	Volume chart and equivalent chart of foundations (NG type)	TI/CIV/ FND / RDSO	00001/12/0 SH-2	
108	Volume and equivalent chart of foundations for Dry black cotton soil (NBC type) (For 16500 & 11000kgf/ m ²)	TI/DRG /CI V/ FND/R DSO	00001/04/0 SH-3	
109	Volume and equivalent chart of foundations for Dry black cotton soil (NBC type) (For 16500 & 11000kgf/ m ²)	TI/CIV/ FND / RDSO	00001/12/0 SH-3	
110	Volume chart and equivalent chart of New pure gravity foundations (500 mm exposed)	TI/DRG /CI V/ FND/R DSO	00001/04/0 SH-4	
111	Volume chart and equivalent chart of New pure gravity foundations (500 mm exposed)	TI/CIV/ FND / RDSO	00001/12/0 SH-4	
112	Volume and equivalent chart of New foundations for Dry black cotton soil only (8000 kg/m ²)(NBC type) 2.5 m depth	TI/DRG /CI V/ FND/R DSO	00001/04/0 SH-5	
113	Volume and equivalent chart of foundations for Dry black cotton soil only (8000 kg/m ²)	TI/CIV/ FND	00001/12/0	

	NBC type 2.5 m depth	/ RDSO	SH-5	
114	Volume chart and equivalent chart of foundations (For 4000 kg/m ² Direct load)	ETI/C	0058 Sh.6	
115	Special BFB portal for 5 tracks (General arrangement)	ETI/C	0026 Sh.1	
116	Protective screen of foot-over bridge and road over-bridge.	ETI/C	0068	
117	Chart for portal foundation	ETI/C	0005/68	
118	Muff for OHE structures	ETI/C	0007/68	
119	Structures muff for sand cored foundations	ETI/C	0012/69	
120	9.5 m Standard traction mast (fabricated 'K' series)	ETI/C	0018-2	
121	Remote Control Cubicle at Stn, Foundation, RCC slab, Building plant & Steel door	ETI/C	0067	
122	9.5 m long standard traction mast (fabricated with batten plates 'B' series)	ETI/C	0071	
123 (a)	Details of OHE foundation in soft rock (Bearing capacity 45,000 Kgf/m ²).	ETI/C	0059	
123 (b)	Details of OHE foundation in Hard rock (Bearing capacity 90,000 Kgf/m ²).	ETI/C	0060	
124	Details of foundation for fencing upright	ETI/C	0032	

125	Employment schedule for switching and booster station main masts	ETI/C	0185	
126	Drilling schedule for S-1 mast	ETI/C	0030	
127	Drilling schedule for S-2 mast	ETI/C	0031	
128	Drilling schedule for S-3 mast (length 11.4 m)	ETI/C	0180	
129	Drilling schedule for 8" x 6" x 35 lbs. RSJ mast 8.0 m long for booster transformer station Type S-4	ETI/C	0036	
130	Drilling schedule for S-5 mast (11.4m long)	ETI/C	0042	
131	Drilling schedule for S-6 mast (length 12.4m)	ETI/C	0181	
132	Drilling schedule for S-7 mast (length 12.4m)	ETI/C	0182	
133	Drilling schedule for S-8 mast (length 12.4m)	ETI/C	0183	
134	Drilling schedule for S-9 mast (length 12.4m)	ETI/C	0184	
135	General arrangement & details of fencing panels & gate for switching station	ETI/C	0186 Sh.1	
136	Details of fencing uprights and anti-climbing device for switching station	ETI/C	0186 Sh.2	
137	S-100 fabricated mast for mounting LT supply transformer and drop out fuse switch at	ETI/C	0043	

	switching station			
138	S-101 details of mast for supporting Isolator inside switching station	ETI/C	0044	
139	Details of anchor beam or SP, SSP, & FP	ETI/C	0033	
140	Details of small part steel for switching station	ETI/C	0034 Sh.1	
141	Details of bracing for switching & B.T. masts	ETI/C	0034 Sh.2	
142	Details of small parts steel of out rigger for switching stations and booster transformer stations	ETI/C	0037	
143	Details of small parts steel for booster transformer stations	ETI/C	0040	
144	Details of pre-cast cable trench for switching station	ETI/C	0038	
145	Standard 'R' type portal rod laced general arrangement	ETI/C	0011/69 Sh.1	
146	'G' type portal special upright and end piece	ETI/C	0056	
147	Short bored pile foundation for traction mast (permissible BM & volume)	ETI/C	0062	
148	Chart for portal foundations in dry black cotton soil safe bearing capacity 16500 Kg/ M ²	ETI/C	0063	
149	Dwarf mast foundation on wet & dry	CORE/A	02	

	black cotton soil	LD /OHE/SK /C		
150	Typical design of new pure gravity foundation.	ETI/SK/C	131	
151	Typical design of side gravity foundation (Soil pressure=8,000 Kg/M ²)	ETI/SK/C	142	
152	Rock Anchor for B.G. Track. –	ETI/SK/C	208	
153	MS Bracket fitting for PSC Mast for arrangement and SPS details.	ETI/SK/C	214 Sh.1 of 2	
154	SPS details for Earth wire clamp on PSC mast	ETI/SK/C	214 Sh. 2 of 2	
155	Special arrangement of OHE under over line structure	ETI/OHE/SK	529	--
156	Earthing and bonding of PSC mast.	ETI/OHE/SK	537 Sh.1 of 2	D
157	Typical Earthing arrangement in SPUN PSC Mast with 18mm dia rod.	ETI/OHE/SK	537 Sh.2 of 2	B
158	Arrangement of overlap	ETI/OHE/SK	566	-
159	Catenary dropper assembly	ETI/OHE/P	1190	B
160	Parallel clamp (20/20)	ETI/OHE/P	1550	E
161	Standard guide tube assembly.	ETI/OHE/P	5060-2	C

161 A	Counter weight assembly for Regulating Equipment (3:1 Ratio)	ETI/OHE/P	5090-5	E
161B	Trapezoidal weight assembly for Regulating Equipment (3:1 Ratio)	TI/DRG/O H E/ATD/RD S O/	00004/00/2	C
161C	Trapezoidal weight assembly	ETI/OHE/P /	5090-1	G
161 D	Counter weight assembly	ETI/OHE/P /	5090	F
162	Standard anti-wind clamp	-do-	2550-1/2	L
163	Multiple cantilever cross arm assembly.	RE/33/P	3120	H
164	Anchor fitting assembly on rolled sections	ETI/OHE/P	3230	C
165	Anchor fitting assembly on 'K' series, TCC masts and 'P' type portal upright.	ETI/OHE/P	3240	D
166	Anchor assembly on 'N' and 'O' type portal upright	ETI/OHE/P	3250	D
167	Structure bonds	ETI/OHE/P	7000	F
168	Earthing station	ETI/OHE/P	7020	B
169	Longitudinal rail bond	ETI/OHE/P	7030	F
170	Short super mast assembly	ETI/C/P	8010	G
171	Long super mast assembly	ETI/C/P	8020	C

172	Bracket attachment assembly on portal upright (N,O,R,P,G &BFB Type)	ETI/C/P	8030	B
173	Super mast assembly on portals	ETI/C/P	8050	C
174	Medium super mast assembly	ETI/OHE/P	8060	C
175	Compensating plate	ETI/OHE/P	5191-1/2	D
176	Suspension clamp	RE/33/P	1160	K
177	Double suspension clamp	RE/33/P	1170	K
178	Double suspension lock plate.	RE/33/P	1172	C
179	Catenary splice (65)	ETI/OHE/P	1090	-
180	Typical location & schematic connection diagram for a three interrupter switching station	ETI/PSI	003	C
181	Typical general arrangement of a three interrupter switching station	ETI/PSI	004	F
182	Typical location plan & general arrangement for sectioning & paralleling station	ETI/PSI	005	F
183	Typical location plan and general arrangement for a feeding station	ETI/PSI	006	E
184	Typical general arrangement at a Booster transformer station (with 4 cross feeder) Type III	ETI/PSI	013	B
185	General arrangement of 280 KVA Booster Transformer station Type III (with 4 cross feeder)	ETI/PSI	018	A

186	Typical general arrangement at a booster transformer station (without cross feeder) Type-I	ETI/PSI	011	C
187	Typical number plate for Auxiliary Transformer	ETI/PSI/P	7525	-
188	Typical fencing and anti-climbing arrangement at switching stations	ETI/PSI	104	E
189	Typical earthing layout of sub-sectioning and paralleling station	ETI/PSI	201	B
190	Typical earthing layout of a sectioning and paralleling station	ETI/PSI	202	B
191	Typical earthing layout of a feeding station	ETI/PSI	203	B
192	Earthing details for interrupter L.T. supply transformer 25 KV Lightning Arrestors P.T. Type-I (S-100 masts, S-101 mast, fencing upright and main mast)	ETI/PSI	204	C
193	Typical earthing layout at a booster transformer stations	ETI/PSI	211-1	A
194	Typical cable run layout of a sub-sectioning & paralleling station	ETI/PSI	301	C
195	Typical cable run layout of a sectioning and paralleling station	ETI/PSI	302	C
196	Typical cable run layout of a feeding station	ETI/PSI	303	B
197	Typical earthing layout at a booster transformer station (with 4 cross feeder	ETI/PSI	212	B

	for Type III,IV and V			
198	Typical drawing for a terminal board	ETI/PSI	501	C
199	36 mm Aluminum Bus terminal for 25kv Isolator (Rigid type)	ETI/PSI/P	6480	C
200	36 mm Aluminum Bus splices	ETI/PSI/P	6490	B
201	36 mm Aluminum Bus Tee connector	ETI/PSI/P	6500	C
202	36 mm Aluminum Bus Tee terminal	ETI/PSI/P	6510	D
203	36/15 mm Tap connector	ETI/PSI/P	6520	B
204	36mm Aluminum flexible bus splice	ETI/PSI/P	6550	B
205	36 mm Aluminum bus splice cum tee connector	ETI/PSI/P	6560	B
206	Typical number plate for interrupter and double pole isolator	ETI/PSI/P	7520	B
207	Typical number plate for potential transformer Type	ETI/PSI/P	7521	B
208	Typical number plate for booster transformer	ETI/PSI/P	7522	B
209	Caution plate 25 KV AC	ETI/OHE/P	7531	C
210	General Caution notice at entrance to railway Station (Hindi & English)	RE/33/P	7551	C
211	Typical details of pressed steel door, window and ventilator	RE/Civil/S	129/ 2001	R2
212	Bolted base connection for portals located in drains	ETI/C	0010	C

213	Details of base plate for mast on drains in station yards	ETI/C	0002/68	A
214	Height gauge for level crossings (for clear span up to 7.3 mtr) details of structure and foundation (for class-I Road crossing Railway track)	TI/DRG/CI V/ HGAUGE/ RDSO	00001/05/0	--
215	Height gauge for level crossings (for clear span above 7.3 mtr up to 12.2 mtr) details of structure and foundation (for class-I Road crossing Railway track)	TI/DRG/CI V /HGAUGE /RDSO	00002/05/0	--
216	Standard plan details of Height gauge for span 7.3 M to 10.0 M with rail Type	RE/CIVIL/ S	146/2008	R3
217	Arrangement for false catenary under over line structure	ETI/OHE/S K	446	--
218	Typical arrangement of OHE with insulated copper catenary under over line structure	ETI/OHE/S K	570	--
218 A	Anti Climbing Arrangement	TI/SK/OHE / ANTIMON /R DSO	00001/08/0	--
218B	Anti Climbing Arrangement	TI/SK/OHE / ANTIMON /R DSO	00001/09/0	--
218C	GSSW Assembly	TI/DRG/O H E/GSSW	0002/09/0	--
218 D	18 mm Lug (Forged) (Compression type)	TI/DRG/O H E/GTBLUG / RDSO	00001/04/0	--

B.list of standard drawings for tramway type OHE (Regulated)-

SN	Brief Description	Drawing		Mod. No.
		Series	Number	
219	Span and stagger chart for Tramway type OHE (Regulated)	ETI/OHE/G	04201	
220	Drilling schedule of OHE mast 8.5m & 9m long RSJ and BFB for Tramway OHE (Regulated) respectively.	ETI/OHE/G	04202 Sh.1 Sh.2	C
221	Schematic arrangement of tramway type OHE (regulated).	ETI/OHE/G	04203	
222	Arrangement of bracket assembly for Tramway Type OHE (regulated)	ETI/OHE/G	04204	
223	Arrangement of anti-creep for Tramway Type OHE (Regulated)	ETI/OHE/G	04205	
224	Arrangement of anticreep (alternative arrangement) for Tramway OHE (Regulated)	ETI/OHE/G	04206	
225	Arrangement of section Insulator for Tramway Type OHE (Regulated)	ETI/OHE/G	04207 Sh.1	
226	Small parts steel for supporting section insulator assembly for (regulated Tramway Type OHE)	ETI/OHE/G	04207 Sh.2	
227	General arrangement of turnouts for Tramway type OHE (Regulated)	ETI/OHE/G	04208	-
228	Adjustment chart for Tramway type OHE (Regulated)	ETI/OHE/G	04209	-

229	Bridle wire clamp (6 mm) with two bolts	ETI/OHE/P	1070-1	B
230	Large suspension clamp 20mm (with Armour rod)	ETI/OHE/P	1580 Sh-2	-
231	Hook Bracket	ETI/OHE/P	2380	C
232	BFB Steady arm assembly for Tramway OHE (Regulated)	ETI/OHE/P	2540-1	-
233	Anti wind clamp for tramway OHE (Regulated)	ETI/OHE/P	2550-3	E
234	Counter weight assembly (light)	ETI/OHE/P	5090-3	I
235	Counter weight assembly	ETI/OHE/P	5090-6	E
236	Employment schedule for tramway type regulated OHE without R.C. and E.W. (W.P.112.5 kgf/sq.m)	ETI/C	0705	B
237	Protective screen at FOB/ROBs	ETI/C	0068	H

C.Standard typical and particular drawings for TSS and shunt capacitor banks-

SN	Brief Description	Drawing		Mod. No.
		Series	Number	
238	Typical layout of Remote Control cubicle at a switching station	ETI/PSI	0010	

239	Typical layout of 132/27kV Traction sub-station (Type-I) letter dated 16.07.2014.	TI/DRG/PSI /TSS LO/RDSO/	00001/01/0	A
240	Typical layout of 132/27kV Traction sub-station (Type-II)	TI/DRG/PSI /TSS LO/RDSO/	00002/02/0	A
241	Typical layout of 132/27kV Traction sub-station (Type-III)	TI/DRG/PSI /TSS LO/RDSO/	00003/02/0	A
242	Typical layout of 132/27kV Traction Sub-station (Type IV) (with outgoing feeders and metering Facilities)	TI/DRG/PSI /TSS LO/RDSO/	00004/02/1	B
243	Typical layout of 132/27kV Traction Sub-station (Type V)	TI/DRG/PSI /TSS LO/RDSO/	00005/02/1	B
244	Typical layout of 132/27kV traction sub-station (Type VI)	TI/DRG/PSI /TSS LO/RDSO/	00006/02/0	A
245	Typical layout of 132/27kV traction sub-station (Type VII)	TI/DRG/PSI /TSS LO/RDSO/	00007/02/0	A
246	Typical layout of 132/27kV traction sub-station (Type-VIII)	TI/DRG/PSI /TSS LO/RDSO/	00008/02/0	A
247	Typical layout of 132/27kV traction sub station with single transformer (Type -IX)	TI/DRG/PS I/TSS LO/RDSO/	00009/02/0	A
248	Typical layout of 132/27kv Traction Sub-station with 132kv Switching Station (Type x)	TI/DRG/PS I/TSS LO/RDSO/	00010/02/0	A
249	Typical layout of Control Room at	TI/DRG/PS I/CPR	00001/01/0	-

	traction sub-station.	OOM/RDS O/		
250	Standard plan of control room at traction sub-station (General arrangement and RCC details)	RE/Civil/	S-144/06	0
251	Typical return current connection to buried rail at 132/25kv Traction sub-station	ETI/PSI	0212-1	-
252	Typical general arrangement of earth screen wire termination at Traction substation	ETI/PSI	0225	C
253	Typical termination arrangement for strung bus "Spider" (AAC) conductor at TSS.	ETI/PSI	0226	B
254	General arrangement & terminal connection for 25kV PT Type-II at TSS	ETI/PSI	0227	A
255	General arrangement and terminal connection for 25kV Potential Transformer at TSS (220kV)	ETI/PSI	0227-1	-
256	Typical layout of 220/27kV traction sub station (Type -I)	ETI/PSI	0240-1	-
257	Typical return current connection to buried rail at 220/25kV TSS.	ETI/PSI	0242	A
258	Typical termination arrangement for strung bus (ZEBRA ACSR) conductor at TSS (220kV)	ETI/PSI	0243	A
259	Typical general arrangement of earth screen wire termination at 220/25kV traction sub-station.	ETI/PSI	0244	-
260	Mounting arrangement of 100 kVA 25kV/240V	ETI/PSI	0312	B

	LT supply transformer at TSS			
261	25kv D.O. Fuse switch assembly	ETI/PSI	032	D
262	Typical fencing layout at traction Sub-station (Details of fencing panel, door, anti-climbing device etc.)	ETI/PSI	121	F
263	Typical arrangement of an earth electrode	ETI/PSI	222-1	-
264	Typical earthing, cable trench & foundation layout of 132/25kv TSS	ETI/PSI	224	E
265	Typical earthing arrangement for equipment/ structure at TSS	ETI/PSI	228	A
266	Typical earthing cable trench and foundation layout of 132/25kV traction sub-station with Shunt Capacitor bay	ETI/PSI	229	-
267	Typical details of cable run at a two transformer TSS	ETI/PSI	323	E
268	Part Plan for Details of position of feeder Bus coupling interrupter at TSS	ETI/PSI/SK	272	-
269	Terminal connector for 220kV equipments (Typical drawing)	ETI/PSI/SK	324	-
270	Typical schematic diagram of protection for double Transformer traction sub station	ETI/PSI	024-1	-
271	Typical layout for 25kv Shunt capacitor with series reactor to be installed at 132/25kv TSS	ETI/PSI	0223	E

272	High speed auto reclosing scheme for feeder circuit breaker at 25kV A.C TSS	ETI/PSI	0231-1	A
273	Typical details of cable run at a two transformer TSS with Shunt Capacitor	ETI/PSI	325	-
274	Typical details of cable run at two transformers Traction Sub-station with Shunt capacitor (220kV)	ETI/PSI	326	-
275	General Scheme of supply for 25kV, 50 Hz single phase traction system	ETI/PSI	702-1	D
276	Standard Post Insulator for clean area (Creepage path 850mm min)	ETI/OHE/P	6090-1	C
277	Typical number plate for circuit breaker	ETI/PSI/P	7523	-
278	Typical number plate for Auxiliary Transformer	ETI/PSI/P	7525	-
279	Typical number plate for Power transformer at TSS	ETI/PSI/P	7526	-
280	Typical number plate for PT at TSS	ETI/PSI/P	7527	A
281	Typical number plate for CT at TSS	ETI/PSI/P	7528	A
282	Typical number plate for Isolators at TSS	ETI/PSI/P	7529	A
283	Bimetallic terminal connector to suit 'ZEBRA' ACSR conductor and 30 dia Cu stud of CT/CB/traction power	ETI/PSI/P	11010	C

	transformer.			
284	Bimetallic terminal connector to suit 'ZEBRA' (28.58 Dia) ACSR conductor & Al./Cu. pad of Isolator /CT/CB for 220 kV system.	ETI/PSI/P	11030	D
285	Tee connector to suit 'ZEBRA' (28.58 dia) ACSR conductor on both ways for 220 kV system.	ETI/PSI/P	11040	C
286	Rigid connector on SI to suit ZEBRA (28.58 dia) ACSR conductor for 220 kV system.	ETI/PSI/P	11050	C
287	Details of expansion type terminal connector to suit 50 dia Al. tubular busbar to terminal pad of 25kv CT/ Isolator/ CB and Interrupter	ETI/PSI/P	11060 Sh.2 of 2	E
288	Details of rigid type bimetallic terminal connector suitable for 50 dia Al. tubular busbar to suit 30 dia Cu. Stud of 25kV CT.	ETI/PSI/P	11070	B
289	Rigid bimetallic terminal connector suitable for 50 dia Al. tubular busbar to terminal pad of 25kv Isolator/ CT	ETI/PSI/P	11090	C
290	Rigid through connector to suit 50 dia Al. Tubular bus bar and 'SPIDER' AAC conductor for 25kv PT Type-II	ETI/PSI/P	11110	C
291	Details of Rigid terminal connector suitable for 20 dia Al. Conductor to terminal pad of 25kv PT Type I & II	ETI/PSI/P	11120	C
292	25kV system tee connector to suit 50 O/D Al. Tube and 'SPIDER' 'AAC' conductor	ETI/PSI/P	11140	B
293	25kV system Tee connector to suit 50. O/D AL. tubular busbar to 50.	ETI/PSI/P	11150	B

	O/D AL. tubular busbar			
294	Rigid bus splice connector to suit 50 O/D Al. tube on both ways for a 25 kV system.	ETI/PSI/P	11180	B
295	25 kV System Sliding clamp for 50mm O/D Aluminium Bus bar	ETI/PSI/P	11190	C
296	25Kv System Rigid connector on S.I to suit 50 mm O/D Al. Bus bar	ETI/PSI/P	11200	C
297	25kv system expansion bus coupler on SI to suit 50 O/D Al. tube.	ETI/PSI/P	11210	D
298	Typical fencing , door and anticlimbing device details of traction sub-station	CORE/AL D/PSI	01	D
299	Structural layout of 132/25 kV traction sub-stations (type-I to type-VI)	ETI/C	0200, SH.No.-1	H
300	Structural layouts of 132/25kV traction sub-stations (type-VII to type-X)	ETI/C	0200, SH.No.-2	D
301	Details of Beam B/1 for 132/25 kV TSS	ETI/C	0201	D
302	Details of Tower T1 for 132/25 kV TSS	ETI/C	0202	H
303	Details of Tower T2 for 132/25 kV TSS	ETI/C	0203	G
304	Details of beam B/2 and column C/1 for 132/25kV traction sub-station.	ETI/C	0208	E
305	Typical cable trench and foundation lay out of 132/25kV TSS (Trench	ETI/C	0210	F

	cover improved)			
306	Details of baffle wall at TSS(WP-112.5kg/sq.m) and WP (75kg/sq.m)	ETI/C	0213	D
307	Details of RCC baffle Wall at TSS(WP-150kg/sq.m)	ETI/C	0214	B
308	Transformer oil drainage arrangement at sub-stations	ETI/C	0216	B
309	Line Diagram of Structural layouts of 220/25kV Traction sub-station	ETI/C	0222	-
310	Structural layout of 220/27kV traction sub-station (Type-I)	ETI/C	0222-1	-
311	Control Room for Traction substation	ETI/C	0225 Sheet-1	-
312	Control Room for Traction Sub-station(RCC details)	ETI/C	0225 Sheet-2	-
313	Details of structure for 132kv double pole Isolator	ETI/C	0310	G
314	Details of structure for 132kV support insulators	ETI/C	0320	E
315	Details of structure for 132kV Current transformer	ETI/C	0330	F
316	Details of structure for 120kv Lightning Arrestor	ETI/C	0340	F

317	Details of structure for 25kV Current transformer	ETI/C	0360	F
318	Details of structure for 42kv ,10kA LA & 25kv support insulator	ETI/C	0370 Sheet-1	J
319	Black Weight of Structure for 42kV,10kA LA & 25kV support insulator.	ETI/C	0370 Sheet-2	-
320	Details of structure for 25kV Single Pole isolator	ETI/C	0380	F
321	Details of structure for 25kV Potential transformer	ETI/C	0390	E
322	S-100 Fabricated Mast for mounting LT supply transformer and DO fuse switch at switching station	ETI/C	0043	B
323	Details of structure and foundation for 25kV DP Isolator at TSS	ETI/SK/C	0180	C
324	Gillsans Letters and Figures	RE/33	527	A
325	Typical schematic diagram of protection for single transformer traction sub-station	ETI/PSI	0228-1	-
326	25 kV drop out fuse switch details	ETI/PSI	038	C
327	Operating pole for 25kV drop out fuse switch	ETI/PSI	039	B
328	Typical schematic diagram for TSS, FP, SSP and SP with 21.6 MVA or 30 MVA transformer for three lines.	TI/DRG/PS I/3L- TSS/RDSO	00001/07/1	-

329	Scheme of locking /Interlocking arrangement of 132 kV Isolator at Traction Sub-Station.	ETI/PSI	5212	B
330	Typical return current connection to buried rail at 132 kV/25 kV Traction Sub-Station.	ETI/PSI	0212-1	-
331	Typical arrangement of an earth electrode.	ETI/PSI	222-1	-
332	Flexible connector for 25 kV circuit breaker 25kV Interrupter & 25 kV side of 13.5/20 MVA traction transformer.	ETI/PSI/P	6570	F
333	Scheme of Interlocking arrangement for 25kV circuit breakers at Traction Sub-Station	ETI/PSI	5214	B
334	Expansion type terminal connector for 25 kV, 60mm dia terminal for traction power transformer.	ETI/PSI/P	11220	D

D.Standard typical and particular drawings for SCADA works -

The annexure contains reference to standard, typical and particular drawings & specifications referred to in various paragraphs of tender specification (Pt.II) and particular specifications

SN	Brief Description	Drawing		Mod. No.
		Series	Number	
335	General scheme of supply for 25 kV 50 Hz Single Phase AC traction system.	ETI/PSI	702-1	
336	Typical layout of control room at TSS	TI/DRG/P SI/CPROO	00001/0 1	

		M/RDSO		
337	Typical layout of remote control cubicle at switching stations.	ETI/PSI	0010	
338	Schematic inter connection diagram for remote control of power gear & supervision equipment at TSS.	ETI/PSI	644	
339	Schematic inter connection diagram for remote control of power gear and supervision of equipments at controlled station (SP & SSP)	ETI/PSI	645	
340	High speed Auto reclosing Scheme for feeder Circuit Breaker at 25 kV A.C. Traction Sub-station.	ETI/PSI	0231-I	
341	Control desk arrangement for 2 work stations of the SCADA system.	ETI/PSI/S K	337	
342	Setting up earthing stations at switching posts (SSP & SP) with conventional earthing as per Special Maintenance No. TI/SMI/0032 Rev-1	-	-	

E. (a) List of Standard Drawing For High Rise OHE-

SN	Brief Description	Drawing		Mod. No
		Series	Number	
343	Design handout for Overhead equipment for running double stack containers under electrified routes (High Rise OHE) with speed potential of 140 Kmph based on revised wind zone.	TI/DESIG NS/O HE/2013/0 0001 (July'13)	-	

344	Terms of reference for consultancy contract for high speed OHE and high rise OHE.	RDSO Letter No.TI/Trac tion policy/201 3 dated 25.04.2013	-	
345	OHE span in view of changes in wind zones in the country.	RDSO Letter No.TI/OH E/GA/ 2013 dated 25/30.04.2 013	-	
346	SPECIAL BFB PORTAL FOR 5 TRACKS (GENERAL ARRANGEMENT) for High Rise OHE.	TI/DRG/CI V/BF B- POTAL	00001/13/0 Sheet-1	
347	SPECIAL BFB PORTAL DETAILS OF UPRIGHT Part-A for High Rise OHE.	TI/DRG/CI V/BF B- PORTAL	00001/13/0 Sheet-2	
348	G-TYPE PORTAL DETAILS SPECIAL UPRIGHT AND END PIECE	TI/DRG/CI V/G- PORTAL	00001/13/0	
349	HIGH RISE OHE Employment Schedule Mast (11.4 m) (Wind Pressure 178 kgf/m ²) (Basic Wind Speed 50 m/s) (Without Return Conductor and Without Earth Wire)	TI/DRG/CI V/ES /	00001/13/0 Sheet-1	
350	HIGH RISE OHE Employment Schedule Mast (11.4 m) (Wind Pressure 155 kgf/m ²) (Basic Wind Speed 47 m/s) (Without Return Conductor and Without Earth Wire)	TI/DRG/CI V/ES /	00001/13/0 Sheet-2	

351	HIGH RISE OHE Employment Schedule Mast (11.4 m) (Wind Pressure 136 kgf/m ²) (Basic Wind Speed 44 m/s) (Without Return Conductor and Without Earth Wire)	TI/DRG/CI V/ES /	00001/13/0 Sheet-3	
352	HIGH RISE OHE Employment Schedule Mast (11.4 m) (Wind Pressure 105 kgf/m ²) (Basic Wind Speed 39 m/s) (Without Return Conductor and Without Earth Wire)	TI/DRG/CI V/ES /	00001/13/0 Sheet-4	
353	HIGH RISE OHE Employment Schedule Mast (11.4 m) (Wind Pressure 73 kgf/m ²) (Basic Wind Speed 33 m/s) (Without Return Conductor and Without Earth Wire)	TI/DRG/CIV/ ES /	00001/13/0 Sheet-5	B
354	TWO TRACK CANTILEVER STRUCTURE (TTC) GENERAL ARRANGEMENT for High Rise OHE.	TI/DRG/CIV/ TT C/	00001/13/0 Sheet-1	-
355	TWO TRACK CANTILEVER STRUCTURE (TTC) DETAILS OF UPRIGHT for High Rise OHE.	TI/DRG/CIV/ TT C/	00001/13/0 Sheet-2	A
356	11.4 M Long Standard Traction Mast “B” Series (B-150, B-175, B-200, B-225 & B-250 type Fabricated with Batten Plates)	TI/DRG/CIV/ B- Mast/	00001/13/0	A
357	Volume Chart & Equivalent Charts of Foundations (Side Bearing, Side Gravity & WBC) for High Rise OHE.	TI/DRG/CIV/ FN D/	00001/13/0 Sheet-1	-
358	Volume Charts & Equivalent Charts of Foundations (NG Type) for High Rise OHE.	TI/DRG/CIV/ FN D/	00001/13/0 Sheet-2	-

359	Volume Charts & Equivalent Charts of Foundations for Dry Black Cotton Soil only (NBC type) for 16500 & 11000 kgf/m ² 3.0m depth for High Rise OHE.	TI/DRG/CIV/ FN D/	00001/13/0 Sheet-3	-
360	Volume Chart & Equivalent Chart of New Pure Gravity Foundation (500 mm exposed) for High Rise OHE.	TI/DRG/CIV/ FN D/	00001/13/0 Sheet- 4	-
361	Volume Charts & Equivalent Charts of Foundations for Dry Black Cotton Soil only 8000 kgf/m ² (NBC Type, 2.5 metre Depth) for High Rise OHE.	TI/DRG/CIV/ FN D/	00001/13/0 Sheet- 5	-
362	Employment Schedule OHE Mast (11.4 metre) Wind Pressure 155 kgf/m ²	TI/DRG/CIV/ ES /	Sheet- 1	B
363	Employment Schedule OHE Mast (11.4 metre) Wind Pressure 136 kgf/m ²	TI/DRG/CIV/ ES /	00001/13/0 Sheet- 2	B
364	Employment Schedule OHE Mast (11.4 metre) Wind Pressure 105 kgf/m ²	TI/DRG/CIV/ ES /	00001/13/0 Sheet- 3	B
365	Schedule Anchor Blocks for BG Tracks	TI/DRG/OH E/G UYHR/	00001/13/0	Sheet- 1
366	Double Guy Rod Arrangement with Anchor Block for BG Tracks	TI/DRG/OH E/G UYHR/	00001/13/0	Sheet- 2
367	Schedule Anchor Blocks for BG Track Black Cotton Soil	TI/DRG/OH E/G UYHR/	00001/13/0	Sheet- 3

368	Guy Rod Ø 25 mm	TI/DRG/OH E/G UYHR/	00001/13/0	Sheet-4
368A	Dropper Schedule Encumbrance 1.4m/1.4m (For 25 kV AC Regulated OHE) (65 and 107 SQ. MM)	TI/DRG/OH E/D ROP/	00001/10/1	Rev-1
368B	Dropper Schedule Encumbrance 1.4m/0.9m (For 25 kV AC Regulated OHE) (65 and 107 SQ. MM)	TI/DRG/OH E/D ROP/	00002/10/1	Rev-1
368C	Dropper Schedule Encumbrance 1.4m/0.75m (For 25 kV AC Regulated OHE) (65 and 107 SQ. MM)	TI/DRG/OH E/D ROP/	00003/10/1	Rev-1
368D	Arrangement of mounting of 25kV/240V, 50kVA LT Supply Transformer for High Rise OHE (On separate mast)	ETI/OHE/HR /A T/G/	05522 Sheet-2	-
368E	Mounting Arrangement of Auxiliary Transformer on High Rise OHE mast	ETI/OHE/HR /A T/G/	05522 Sheet-1	-
368 F	Anchor Arrangement with Dwarf Mast for conventional and High Rise OHE	ETI/OHE/HR / G/	01402	-
368G	Standard Arrangement of Drop Arm for supporting Cantilevers on the Booms of Portals and TTC (For Normal as well as High Rise OHE)	ETI/C/HR/	0076	-

368H	Drilling schedule for S-6H mast (length 13.0 m) (for High Rise OHE)	ETI/C/HR/	0181	A
368 J	Drilling schedule for S-7H mast (length 13.0 m) (for High Rise OHE)	ETI/C/HR/	0182	A
368 K	Drilling schedule for S-8H mast (length 13.0 m) (for High Rise OHE)	ETI/C/HR/	0183	A
368 L	‘P’ Type Portal General Arrangement and details of upright & End Pieces (High Rise OHE)	TI/DRG/CIV/ P- Portal/	00001/13/0	A

E. (b) List of Standard Drawing as Per New Wind Zones -

SN	Brief Description	Drawing		Mod. No.
		Series	Number	
369	Normal OHE Employment Schedule Mast (9.5 m) (Wind Pressure 178 kgf/m ²) (Basic Wind Speed 50 m/s) (Without Return Conductor and Without Earth Wire)	ETI/C/	0758 Sheet-1	
370	Normal OHE Employment Schedule Mast (9.5 m) (Wind Pressure 155 kgf/m ²) (Basic Wind Speed 47 m/s) (Without Return Conductor and Without Earth Wire)	ETI/C/	0758 Sheet-2	
371	Normal OHE Employment Schedule Mast (9.5 m) (Wind Pressure 136 kgf/m ²) (Basic Wind Speed 44 m/s) (Without Return Conductor and Without Earth Wire)	ETI/C/	0758 Sheet-3	

372	Normal OHE Employment Schedule Mast (9.5 m) (Wind Pressure 105 kgf/m ²) (Basic Wind Speed 39 m/s) (Without Return Conductor and Without Earth Wire)	ETI/C/	0758 Sheet-4	
373	Normal OHE Employment Schedule Mast (9.5 m) (Wind Pressure 73 kgf/m ²) (Basic Wind	ETI/C/	0758 Sheet-5	A
	Speed 33 m/s) (Without Return Conductor and Without Earth Wire)			
374	Normal OHE Employment Schedule Mast (9.5 m) (Wind Pressure 178 kgf/m ²) (Basic Wind Speed 50 m/s) (Without Return Conductor and Without Earth Wire)(1100+1100) kgf tension CAT-65 mm ² , CONT-107 mm ² .	ETI/C/	0759 Sheet-1	-
375	Normal OHE Employment Schedule Mast (9.5 m) (Wind Pressure 155 kgf/m ²) (Basic Wind Speed 47 m/s) (Without Return Conductor and Without Earth Wire) (1100+1100) kgf tension CAT-65 mm ² , CONT-107 mm ² .	ETI/C/	0759 Sheet-2	-
376	Normal OHE Employment Schedule Mast (9.5 m) (Wind Pressure 136 kgf/m ²) (Basic Wind Speed 44 m/s) (Without Return Conductor and Without Earth Wire) (1100+1100) kgf tension CAT-65 mm ² , CONT-107 mm ² .	ETI/C/	0759 Sheet-3	-
377	Normal OHE Employment Schedule Mast (9.5 m) (Wind Pressure 105 kgf/m ²) (Basic Wind Speed 39 m/s) (Without Return Conductor and Without Earth Wire) (1100+1100) kgf tension CAT-65 mm ² , CONT-107 mm ² .	ETI/C/	0759 Sheet-4	-
	Normal OHE Employment Schedule Mast (9.5 m) (Basic Wind Speed 33 m/s) (Wind Pressure 73 kgf/m ²) (Without Return Conductor and Without Earth Wire) (1100+1100) kgf tension			

378	CAT-65 mm ² , CONT-107 mm ² .	ETI/C/	0759 Sheet-5	-
379	Normal OHE Employment Schedule Mast (9.5 m) Basic Wind Speed 50 m/s Wind Pressure 178 kgf/m ² (Without Return Conductor and Without Earth Wire) 1000 kgf tension in CAT. 65mm ² 1000 kgf tension in CONT. 107mm ²	TI/DRG/CIV/ES/RDSO/ 00001/18/0 Sheet-1/5		-
380	Normal OHE Employment Schedule Mast (9.5 m) (Basic Wind Speed 47 m/s) (Wind Pressure 155 kgf/m ²) (Without Return Conductor and Without Earth Wire) 1000 kgf tension in CAT. 65mm ² 1000 kgf tension in CONT. 107mm ²	TI/DRG/CIV/ES/RDSO/ 00001/18/0 Sheet-2/5		-
381	Normal OHE Employment Schedule Mast (9.5 m) (Basic Wind Speed 44 m/s) (Wind Pressure 136 kgf/m ²) (Without Return Conductor and Without Earth Wire) 1000 kgf tension in CAT. 65mm ² 1000 kgf tension in CONT. 107mm ²	TI/DRG/CIV/ES/RDSO/ 00001/18/0 Sheet-3/5		-
382	Normal OHE Employment Schedule Mast (9.5 m) (Basic Wind Speed 39 m/s) (Wind Pressure 105 kgf/m ²) (Without Return Conductor and Without Earth Wire) 1000 kgf tension CAT-65 mm ² , 1000 kgf tension in CONT-107 mm ² .	TI/DRG/CIV/ES/RDSO/ 00001/18/0 Sheet-4/5		A
383	Normal OHE Employment Schedule Mast (9.5 m) (Basic Wind Speed 33 m/s) (Wind Pressure 73 kgf/m ²) (Without Return Conductor and Without Earth Wire) 1000 kgf tension in CAT. 65mm ² 1000 kgf tension in CONT. 107mm ²	TI/DRG/CIV/ES/RDSO/ 00001/18/0 Sheet-5/5		-
	Normal OHE Employment Schedule Mast (9.5 m) Basic Wind Speed 50 m/s			

384	<p>Wind Pressure</p> <p>178 kgf/m² (Without Return Conductor and Without Earth Wire) 1000 kgf tension in CAT. 65mm² 1000 kgf tension in CONT. 107mm² (with implantation more than 2.8 m & upto 3.8 m)</p>	<p>TI/DRG/CIV/ES/RDSO/ 00002/18/0</p> <p>Sheet-5/5</p>	-
385	<p>Normal OHE Employment Schedule Mast (9.5 m) (Basic Wind Speed 47 m/s) (Wind Pressure 155 kgf/m²) (Without Return Conductor and Without Earth Wire) 1000 kgf tension in CAT. 65mm² 1000 kgf tension in CONT. 107mm² (with implantation more than 2.8 m & upto 3.8 m)</p>	<p>TI/DRG/CIV/ES/RDSO/ 00002/18/0</p> <p>Sheet-4/5</p>	-
386	<p>Normal OHE Employment Schedule Mast (9.5 m) (Basic Wind Speed 44 m/s) (Wind Pressure 136 kgf/m²) (Without Return Conductor and Without Earth Wire) 1000 kgf tension in CAT. 65mm² 1000 kgf tension in CONT. 107mm² (with implantation more than 2.8 m & up to 3.8 m)</p>	<p>TI/DRG/CIV/ES/RDSO/ 00002/18/0</p> <p>Sheet-3/5</p>	-
387	<p>Normal OHE Employment Schedule Mast (9.5 m) (Basic Wind Speed 39 m/s) (Wind Pressure 105 kgf/m²) (Without Return Conductor and Without Earth Wire) 1000 kgf tension CAT-65 mm², 1000 kgf tension in CONT-107 mm². (with implantation more than 2.8 m & upto 3.8 m)</p>	<p>TI/DRG/CIV/ES/RDSO/ 00002/18/0</p> <p>Sheet-2/5</p>	A
388	<p>Normal OHE Employment Schedule Mast (9.5 m) (Basic Wind Speed 33 m/s) (Wind Pressure 73 kgf/m²) (Without Return Conductor and Without Earth Wire) 1000 kgf tension in CAT. 65mm² 1000 kgf tension in CONT. 107mm² (with implantation more than 2.8 m & upto 3.8 m)</p>	<p>TI/DRG/CIV/ES/RDSO/ 00002/18/0</p> <p>Sheet-1/5</p>	-
	<p>Normal OHE Employment Schedule Mast (9.5 m) Basic Wind Speed 50 m/s</p>	<p>TI/DRG/CIV/ES/RDSO/</p>	

389	<p>Wind Pressure</p> <p>178 kgf/m² (Without Return Conductor and Without Earth Wire) 1000 kgf tension in CAT. 65mm² 1000 kgf tension in CONT. 107mm² (with implantation more than 3.8 m & upto 4.85 m)</p>	<p>00003/18/0</p> <p>Sheet-5/5</p>	-
390	<p>Normal OHE Employment Schedule Mast (9.5 m) (Basic Wind Speed 47 m/s) (Wind Pressure 155 kgf/m²) (Without Return Conductor and Without Earth Wire) 1000 kgf tension in CAT. 65mm² 1000 kgf tension in CONT. 107mm² (with implantation more than 3.8 m & upto 4.85 m)</p>	<p>TI/DRG/CIV/ES/RDSO/ 00003/18/0</p> <p>Sheet-4/5</p>	-
391	<p>Normal OHE Employment Schedule Mast (9.5 m) (Basic Wind Speed 44 m/s) (Wind Pressure 136 kgf/m²) (Without Return Conductor and Without Earth Wire) 1000 kgf tension in CAT. 65mm² 1000 kgf tension in CONT. 107mm² (with implantation more than 3.8 m & upto 4.85 m)</p>	<p>TI/DRG/CIV/ES/RDSO/ 00003/18/0</p> <p>Sheet-3/5</p>	-
392	<p>Normal OHE Employment Schedule Mast (9.5 m) (Basic Wind Speed 39 m/s) (Wind Pressure 105 kgf/m²) (Without Return Conductor and Without Earth Wire) 1000 kgf tension CAT-65 mm², 1000 kgf tension in CONT-107 mm². (with implantation more than 3.8 m & upto 4.85 m)</p>	<p>TI/DRG/CIV/ES/RDSO/ 00003/18/0</p> <p>Sheet-2/5</p>	A
393	<p>Normal OHE Employment Schedule Mast (9.5 m) (Basic Wind Speed 33 m/s) (Wind Pressure 73 kgf/m²) (Without Return Conductor and Without Earth Wire) 1000 kgf tension in CAT. 65mm² 1000 kgf tension in CONT. 107mm² (with implantation more than 3.8 m & up to 4.85 m)</p>	<p>TI/DRG/CIV/ES/RDSO/ 00003/18/0</p> <p>Sheet-1/5</p> <p>-</p>	

Note: Wind pressures/speeds as per RDSO letter No TI/CIV/MS/14 dated 14.07.2014 & IS: 875 Part-III, 1987, Reaffirmed during 1997 are:

SN	Design Wind Pressure (Kg/m ²)	Basic Wind Speed	
		metre / second	Km / hour
i	178	50	180.0
ii	155	47	169.2
iii	136	44	158.4
iv	105	39	140.4
v	73	33	118.8

E. (c) List of Standard Drawing as per OHE Guideline vide Instruction No.TI/IN/0042 :-

E	Brief Description	Drawing		Mod. No.
		Series	Number	
1	Employment Schedule for OHE mast (9.5m) wind pressure 112.5kgf/m Copper OHE with 1200 kgf tension (OHE+EW)	ETI/C/	0730 - Sheet-2	
2	25kV Feeder Arrangement on Separate mast	TI/DRG/OHE/F EEDER/RDSO/	00001/19/0	
3	Employment Schedule for 25kV Feeder Arrangement on Separate mast for 155kgf Wind Pressure	TI/DRG/CIV/FE EDERES/RDS O/	00001/20/0 (Sheet-I)	
4	Employment Schedule for 25kV Feeder Arrangement on Separate mast for 178 kgf Wind Pressure	TI/DRG/CIV/FE EDERES/RDS O/	00001/20/0 (Sheet-II)	

5	Feeder Termination Drawing	RE/33/G/	05145-1	
6	Employment Schedule for OHE Mast (9.5m) wind pressure 155 kgf/m & 2.8 m/3.8 m/4.85 m implantation (OHE + Feeder wire + Earth wire) for 1200 kgf tension in 65 mm catenary wire & 1200 kgf tension in 107 mm ² contact wire.	TI/DRG/CIV/ES/ RDSO/	00004/19/0 (Sheet-I to III)	
7	Employment Schedule for OHE Mast (9.5m) wind pressure 178 kgf/m && 2.8 m/3.8 m/4.85 m implantation (OHE + Feeder wire + Earth wire) for 1200 kgf tension in 65 mm catenary wire & 1200 kgf tension in 107 sq.mm contact wire.	TI/DRG/CIV/ES/ RDSO/	00004/19/0 (Sheet-IV to VI)	
8	General Arrangement of OHE with Feeder, Earth wire & BEC (1200+1200)	TI/DRG/OHE/F EEDER/RDSO/	00002/19/0	
9	Employment Schedule for OHE Mast (9.5m) wind pressure 155kgf/m & 2.8 m/ 3.8 m/ 4.85 m implantation (OHE + Feeder wire + Earth wire) for 1500 kgf tension in 125 sq.mm catenary wire & 1500 kgf tension in 150 sq.mm contact wire.	TI/DRG/CIV/ES/ RDSO/	00004/20/0 (Sheet-I to III)	
10	Employment Schedule for OHE Mast (9.5m) wind pressure 178 kgf/m & 2.8 m/ 3.8 m/ 4.85 m implantation (OHE + Feeder wire + Earth wire) for 1500 kgf tension in 125 sq.mm catenary wire & 1500 kgf tension in 150 sq.mm contact wire.	TI/DRG/CIV/ES/ RDSO/	00004/20/0 (Sheet-IV to VI)	
11	General Arrangement of OHE with Feeder, Earth wire & BEC	TI/DRG/OHE/F EEDER/RDSO/	00002/20/0	

	(1500+1500)			
12	Counter Weight Eye Rod	ETI/OHE /SK/	588	
13	Counter Weight Assembly	ETI/OHE/SK/	587	B
14	X-Y adjustment Chart	TI/DRG/OHE/A TD/RDSO/	00003/99/0	-
15	Dropper Schedule	TI/DRG/OHE/D ROP/ & TI/DRG/OHE/D ROP/RDSO/	00001-00007 /18/0 00001/20/0	-
16	25mm drop Bracket Assembly	ETI/OHE/P/	2360	N
17	BFB Steady Arm Assembly	ETI/OHE/P/	2390	C
18	Current Carrying Dropper Assembly	TI/DRG/OHE/C CD/RDSO/	00001/20/0	-
19	Catenary wire Clamp for Current Carrying Dropper	TI/DRG/OHE/C CD/RDSO/	00002/20/0	-
20	Contact wire clamp for Current Carrying Dropper	TI/DRG/OHE/C CD/RDSO/	00003/20/0	-
21	Compression sleeve, thimble & cable lug for Current Carrying Dropper	TI/DRG/OHE/C CD/RDSO/	00004/20/0	-
22	Mounting details of Double Pole Isolator on Mast (For 2X25kV)	ETI/OHE/G/	06005-Sheet 2	-
23	Mounting Details of Double Pole Isolator on Portals (For 2X25kV)	ETI/OHE/G/	06008	-
24	Tee Connector suitable for 20mm dia GS wire to 20mm dia GS wire	TI/DRG/OHE/F TGFE/RDSO/	0020/22/0	-

25	Straight Connector suitable for 20mm dia GS wire to 20mm dia GS wire	TI/DRG/OHE/F TGFE/RDSO/	0021/22/0	-
26	Cross Bonding Arrangement	TI/DRG/OHE/EA RTHING/RDSO/	00001/20/0	-

E. (d) List of Standard Drawing as per PSI Guideline vide Instruction No. TI/IN/0043 Rev.01 :

SN	Brief Description	Drawing		M N
		Series	Number	
(i) <u>Traction Sub Station with Scott Connected Transformers</u>				
1	Typical layout of 132/2X25kV Traction Sub Station with Scott Connected Transformers (For Double Line section) with parallel to track.	TI/DRG/PSI/AT/ RDSO/	00009/20/1	C
2	Typical layout of 132/2X25kV Traction Sub Station with Scott Connected Transformers (For Double Line section) with perpendicular to track.	TI/DRG/PSI/AT/ RDSO/	00010/20/1	C
3	Typical layout of 132/2X25kV Traction Sub Station with Scott Connected Transformers (For Three Line section) with parallel to track.	TI/DRG/PSI/AT/ RDSO/	00030/20/1	B
4	Typical layout of 132/2X25kV Traction Sub Station with Scott Connected Transformers (For Three Line section) with perpendicular to track.	TI/DRG/PSI/AT/ RDSO/	00031/20/1	B
5	Typical layout of 132/2X25kV Traction Sub Station with Scott Connected Transformers (For Four Line section) with parallel to track.	TI/DRG/PSI/AT/ RDSO/	00032/20/1	B

6	Typical layout of 132/2X25kV Traction Sub Station with Scott Connected Transformers (For Four Line section) with perpendicular to track.	TI/DRG/PSI/AT/ RDSO/	00033/20/1	B
7	Typical layout of 220/2X25kV Traction Sub Station with Scott Connected Transformers (For Double Line section) with parallel to track	TI/DRG/PSI/AT/ RDSO/	00024/20/1	C
8	Typical layout of 220/2X25kV Traction Sub Station with Scott Connected Transformers (For Double Line section) with perpendicular to track	TI/DRG/PSI/AT/ RDSO/	00025/20/1	C
9	Typical layout of 220/2X25kV Traction Sub Station with Scott Connected Transformers (For Three Line section) with parallel to track.	TI/DRG/PSI/AT/ RDSO/	00038/20/1	B
10	Typical layout of 220/2X25kV Traction Sub Station with Scott Connected Transformers (For Three Line section) with perpendicular to track	TI/DRG/PSI/AT/ RDSO/	00039/20/1	B
11	Typical layout of 220/2X25kV Traction Sub Station with Scott Connected Transformers (For Four Line section) with parallel to track.	TI/DRG/PSI/AT/ RDSO/	00040/20/1	B
12	Typical layout of 220/2X25kV Traction Sub Station with Scott Connected Transformers (For Four Line section) with perpendicular to track	TI/DRG/PSI/AT/ RDSO/	00041/20/1	B
(ii) <u>Traction Substation with V Connected Transformers</u>				
13	Typical layout of 132/2X25kV Traction Sub Station with V-Connected Transformers (For Double Line section) with	TI/DRG/PSI/AT/ RDSO/	00034/20/1	B

	parallel to track.			
14	Typical layout of 132/2X25kV Traction Sub Station with V-Connected Transformers (For Double Line section) with perpendicular to track.	TI/DRG/PSI/AT/RDSO/	00035/20/1	B
15	Typical layout of 132/2X25kV Traction Sub Station with V-Connected Transformers (For Three Line section) with parallel to track.	TI/DRG/PSI/AT/RDSO/	00011/20/1	B
16	Typical layout of 132/2X25kV Traction Sub Station with V-Connected Transformers (For Three Line section) with perpendicular to track.	TI/DRG/PSI/AT/RDSO/	00012/20/1	B
17	Typical layout of 132/2X25kV Traction Sub Station with V-Connected Transformers (For Four Line section) with parallel to track.	TI/DRG/PSI/AT/RDSO/	00013/20/1	B
18	Typical layout of 132/2X25kV Traction Sub Station with V-Connected Transformers (For Four Line section) with perpendicular to track.	TI/DRG/PSI/AT/RDSO/	00014/20/1	B
19	Typical layout of 220/2X25kV Traction Sub Station with V-Connected Transformers (For Double Line section) with parallel to track.	TI/DRG/PSI/AT/RDSO/	00042/20/1	B
20	Typical layout of 220/2X25kV Traction Sub Station with V-Connected Transformers (For Double Line section) with perpendicular to track.	TI/DRG/PSI/AT/RDSO/	00043/20/1	B

21	Typical layout of 220/2X25kV Traction Sub Station with V-Connected Transformers (For Three Line section) with parallel to track.	TI/DRG/PSI/AT/ RDSO/	00026/20/1	B
22	Typical layout of 220/2X25kV Traction Sub Station with V-Connected Transformers (For Three Line section) with perpendicular to track.	TI/DRG/PSI/AT/ RDSO/	00027/20/1	B
23	Typical layout of 220/2X25kV Traction Sub Station with V-Connected Transformers (For Four Line section) with parallel to track.	TI/DRG/PSI/AT/ RDSO/	00028/20/1	B
24	Typical layout of 220/2X25kV Traction Sub Station with V-Connected Transformers (For Four Line section) with perpendicular to track.	TI/DRG/PSI/AT/ RDSO/	00029/20/1	B
(iii) <u>Details of SP & SSP</u>				
25	General arrangement of Sub Sectioning and Paralleling Post (SSP) in 2X25kV 'AT' System (on double line section) for Scott Connected Transformer TSS	TI/DRG/PSI/AT/ RDSO/	00015/20/0 1	A
26	General arrangement of Sectioning and Paralleling Post (SP) in 2X25kV 'AT' System (on double line section) for Scott Connected Transformer TSS	TI/DRG/PSI/AT/ RDSO/	00016/20/01	A
27	General arrangement of Sub Sectioning and Paralleling Post (SSP) in 2X25kV 'AT' System (on double line section) for V-Connected Transformer TSS	TI/DRG/PSI/AT/ RDSO/	00036/20/01	A

28	General arrangement of Sectioning and Paralleling Post (SP) in 2X25kV 'AT' System (on double line section) for V-Connected Transformer TSS	TI/DRG/PSI/AT/RDSO/	00037/20/01	A
29	General arrangement of Sub Sectioning and Paralleling Post (SSP) in 2X25kV 'AT' System (on three line section).	TI/DRG/PSI/AT/RDSO/	00017/20/01	A
30	General arrangement of Sectioning and Paralleling Post (SP) in 2X25kV 'AT' System (on three line section).	TI/DRG/PSI/AT/RDSO/	00018/20/01	A
31	General arrangement of Sub Sectioning and Paralleling Post (SSP) in 2X25kV 'AT' System (on four line section).	TI/DRG/PSI/AT/RDSO/	00019/20/01	A
32	General arrangement of Sectioning and Paralleling Post (SP) in 2X25kV 'AT' System (on four line section).	TI/DRG/PSI/AT/RDSO/	00020/20/01	A
33	General arrangement of Boundary Sectioning and Paralleling Post (SP) in 2X25kV 'AT' System for Scott Connected Transformer TSS (on double line section)	TI/DRG/PSI/AT/RDSO/	00021/20/01	A
34	General arrangement of Boundary Sectioning & paralleling post (SP) in 2 x 25 kV 'AT' system (on 3 line section)	TI/DRG/PSI/AT/RDSO/	00022/20/01	A
35	General arrangement of Boundary Sectioning & paralleling post (SP) in 2 x 25 kV 'AT' system (on 4 line section)	TI/DRG/PSI/AT/RDSO/	00023/20/01	A

36	General arrangement of Boundary Sectioning & Paralleling post (SP) in 2 x 25 kV "V-connected" 'AT' system (on Double line section)	TI/DRG/PSI/AT/RDSO/	00050/21/01	A
(iv) <u>Other Miscellaneous drawings</u>				
37	Typical schematic diagram of protection for 132/2x25kV Traction sub-station with Scott-connected transformers	TI/DRG/PSI/AT/RDSO/	00051/21/0	A
38	Typical schematic diagram of protection for 220/2x25kV Traction sub-station with V-connected transformers	TI/DRG/PSI/AT/RDSO/	00044/21/0	-
39	General scheme of supply for 2x25 kV, 50 Hz Scott connected traction transformer traction system	TI/DRG/PSI/SL D/RDSO/	00045/21/0	-
40	General scheme of supply for 2x25 kV, 50 Hz V - connected traction transformer traction system	TI/DRG/PSI/SL D/RDSO/	00046/21/0	-
41	Typical layout of cable trench, foundation & cable schedule of 132/2x25 kV Traction Sub - Station with Scott connected transformers (for four line section) with parallel to track	TI/DRG/PSI/TR CSFD/RDSO/	00047/21/0	-
42	Typical layout of cable trench, foundation & cable schedule of 132/2x25 kV Traction Sub - Station with V connected transformers (for four line section) with perpendicular to track	TI/DRG/PSI/TR CSFD/RDSO/	00048/21/0	-

43	Typical layout of cable trench, foundation & cable schedule of Switching Station in 2X25kV 'AT' System (for four line section)	TI/DRG/PSI/AT/RDSO/	00049/21/0	-
44	Typical layout of cable trench, foundation & cable schedule of Sectioning and Paralleling Post (SP) in 2x25 kV AT System on Double line for Scott Connected Transformer TSS.	TI/DRG/PSI/AT/RDSO/	00052/21/0	-
45	Typical layout of Control room Building in 2X25kV Traction SubStation.	TI/DRG/PSI/CR 2X25/	RDSO/0210	-
46	Typical layout of Control room Building in 2X25kV SP/SSP/AT Post.	TI/DRG/PSI/CR 2X25/	SPSSPATP/0210	-
47	Tee Connector to suit "BERSISMIS" 'AAAC' and "BERSISMIS" 'AAAC' in 2X25 kV system.	TI/DRG/PSI/CONNECT/RDSO/	00053/21/0	-
48	Tee Connector to suit BULL 'AAC' conductor and BULL 'AAC' conductor in 2X25 kV system	TI/DRG/PSI/CONNECT/RDSO/	00054/21/0	-
49	Rigid connector on S.I. to suit BERSISMIS (36mm Dia.) "AAAC" conductor in 2X25 kV system.	TI/DRG/PSI/CONNECT/RDSO/	00055/21/0	-
50	Rigid connector on S.I. to suit BULL (38.25mm Dia.) "AAC" conductor in 2X25 kV system.	TI/DRG/PSI/CONNECT/RDSO/	00056/21/0	-
51	Flexible connector to suit 50MM O/D Al. Tube Bus bar for Double Pole circuit breaker and LV side of Traction transformer in	TI/DRG/PSI/CONNECT/RDSO/	00057/21/0	-

	2X25kV system.			
52	Rigid through connector to suit BERSIMIS (36mm Dia) “AAAC” Conductor and SPIDER “AAC” conductor for 25 kV PT type II. (T-Type)	TI/DRG/PSI/CO NECT/RDSO/	00058/21/0	-
53	Rigid through connector to suit BULL (38.25mm Dia) “AAC” Conductor and SPIDER “AAC” conductor for 25 kV PT type II (T-Type)	TI/DRG/PSI/CO NECT/RDSO/	00059/21/0	-
54	Tee Connector to suit 50 O/D Al. Tube and “BERSISMIS” ‘AAAC’ conductor in 2X25 kV system.	TI/DRG/PSI/CO NECT/RDSO/	00060/21/0	-
55	Tee Connector to suit 50 O/D Al. Tube and BULL ‘AAC’ conductor in 2X25 kV system.	TI/DRG/PSI/CO NECT/RDSO/	00061/21/0	-
56	Typical Termination arrangement for strung bus “BERSISMIS” (AAAC) conductor in 2X25 kV system.	TI/DRG/PSI/CO NECT/RDSO/	00062/21/0	-
57	Typical Termination arrangement for strung bus “BULL” (AAC) conductor in 2X25 kV system.	TI/DRG/PSI/CO NECT/RDSO/	00063/21/0	-
58	Flexible connector to suit BULL (38.25mm Dia.) “AAC” Conductor for Double Pole circuit breaker and LV Side of traction transformer in 2X25kV System.	TI/DRG/PSI/CO NECT/RDSO/	00064/21/0	-
59	Bimetallic terminal Connector to suit ZEBRA (28.58mm Dia.) ACSR conductor & AL/CU Pad of isolator/CT/CB or 50mm O/D	ETI/PSI/P/	11030	D

	Al tube and AL/CU Pad of isolator/CT/CB.			
--	--	--	--	--

F. List Of Standard RDSO's Specifications for OHE, TSS And SCADA-

SN	Title of Specification	Specification No.
1.	Annealed stranded copper conductors for jumper	TI/SPC/OHE/JMP/0941 (01/21)
2.	Copper busbar	RE/30/OHE/5 (11/60)
3.	Structural Steel tubes.	ETI/OHE/11 (5/89) Rev-1 (05/18)
4.	Hot dip zinc galvanization of steel masts (Rolled and Fabricated) tube and fittings used on 25 kV AC OHE.	ETI/OHE/13(4/84) with A&C slip No. 1 of (5/86), 2 of (4/90), 3 of (4/90) & 4(05/18)
5.	Stainless steel wire ropes	TI/SPC/OHE/WR/1060 (06/06) with A&C slip No 1 of (11/06), 2 of (05/07), 3 of (02/17) & 4 of (03/18)
6.	Solid core porcelain insulators for 25 kV AC 50 Hz single phase over-head Traction lines	TI/SPC/OHE/INS/0071 Rev-3 (04/22)
7.	25 kV motorized/manual operated single pole and double pole isolators.	TI/SPC/PSI/ISOLTR/0210 WITH A & C Slip No. 1 & 2 (10/25)
8.	Steel fasteners & Stainless-Steel fasteners for 25 kV AC Traction Over Head Equipment.	TI/SPC/OHE/Fasteners/0120 Rev-1 (03/17)
9.	Aluminum alloy section and tubes	ETI/OHE/21(9/74)
10.	Standard for drawings for Traction Overhead equipment	ETI/OHE/25(3/66)

11.	Light Weight Section Insulators assembly. OR Section Insulator assembly without sectioning insulator.	TI/SPC/OHE/LWTSI/0060 (8/2006) OR ETI/OHE/27(8/84) with A&C slip No.1 of (10/92) & 2(09/16)
12.	Enameled steel plates	ETI/OHE/33(8/85)
12A.	Retro-reflective Structure Number Plates & Caution/Warning Boards	ETI/OHE/33A (12/97) Rev-8 (11/12)
13.	Galvanized steel wire	ETI/OHE/36(12/73) with A&C Slip No.1 of (5/98)
14.	3 pulley Type Regulating Equipment	TI/SPC/OHE/ATD/0060 (08/15) (Rev-1)
15.	Fitting for 25 kV 50 Hz AC Overhead equipment.	TI/SPC/OHE/Fitting/0130(10/13) Rev-1
16.	Cadmium copper conductor for overhead Railway Traction	TI/SPC/OHE/CAT(Cu-Cd)/0971(01/21)
17.	Principles of OHE layout plans and sectioning diagrams for 25 kV AC traction.	ETI/OHE/53(6/88) with A&C slip no.1 of (12/88), 2 of (8/89), 3 of (6/90), 4 of (8/92) & 5 of (11/2006)
18.	19/2.79mm All Aluminum alloy stranded catenary wire.	ETI/OHE/54(2/85) with A&C slip No. 1 of (11/89) & 2 of (10/92)
19.	Bimetallic (Al-cu) strip	ETI/OHE/55(4/90)
20.	Short Neutral Section Assembly (Phase Break)	TI/SPC/OHE/SNS/0000 of (2/2000) with A&C slip No. 1
21.	Code for bonding and earthing for 25 kV,	ETI/OHE/71(11/90) Rev-1

	AC single phase, 50 Hz traction system.	
22.	Insulated Cadmium copper catenary 19/2.10 mm dia for provision under overline structures in the 25 KV AC Electric Traction.	TI/SPC/OHE/INSCAT/0000 of (4/2000)
23.	Battery charger for 110 V battery, 150 Ah (2x25 kV) & 40 Ah (25 kV) at SP/SSP for Electrification Installation.	TI/SPC/PSI/40-150CHGR/1210 (07/21)
24.	Lightning arrestor- 7.5 kV	ETI/PSI/3(8/75) with A&C slip No.1 of (2/91)
25.	220 kV or 132 kV or 110 kV or 66 kV or 25 kV Potential transformers for Railway Electric Traction.	TI/SPC/PSI/PT/0210 (06/21) with A&C slip No. 1 (12/24)
26.	25 kV Dropout fuse switch & operating pole.	ETI/PSI/14(01/86) with A&C slip no 1 of (4/87)
27.	25 kV/240 V, Auxiliary Transformers 5 kVA,10 kVA, 25 kVA & 50 kVA.	ETI/PSI/15(08/03) with A&C slip No.1 (12/24)
28.	Low maintenance Lead Acid 40AH & 200 AH cells.	RDSO/PE/SPEC/TL/0040-2003(Rev-0) with A&C slip no 1 of (9/2005)
29.	150 kVA, 25 kV, single phase, 50 Hz. Dry type Cast resin Booster Transformers	ETI/PSI/97(6/87) with A&C slip No.1 of (9/88)
30.	100 kVA & 150 kVA, 25 kV, single phase, 50 Hz, oil filled Booster Transformers	ETI/PSI/98(8/92) with A&C slip No.1 of (9/92), 2 of (1/94)
31 (a)	25 kV AC Single Pole, Double Pole, Pole mounted, Out Door Vacuum Circuit Breaker (VCB) and Vacuum Interrupter (BM).	TI/SPC/PSI/LVCBIN/0121 (05/23 with A& C slip No. 1 (01/25)
31 (b)	220 kV,132 kV,110 kV,100 kV,66 kV,50 kV, Double Pole/Triple Pole, Out Door, SF ₆	TI/SPC/PSI/HVCB/0121 (June'2014) with A&C slip No.1(08/21)

	Circuit Breakers.	
32	Hard drawn grooved copper Contact wire (Drawn out of continuous cast Copper wire rods).	TI/SPC/OHE/CW/0971 (01/21)
33	Metal Oxide Gapless type Lightning Arrester for use on 25kV side of Rly. traction sub stations & switching stations	TI/SPC/PSI/MOGTLA/0101(02/15)
34	Technical Specification for Silicon Composite Insulators for 25 kV A.C. 50 Hz single phase over-head traction equipment.	TI/SPC/OHE/INSCOM/1072 (08/23)
35	Solid core porcelain cylindrical post insulator for system with nominal voltage of 66kV, 110kV, 132kV & 220kV.	TI/SPC/OHE/POST/0101 (06/2022)
36	25kv/240V Auxiliary Transformer, 100 KVA.	ETI/PSI/15 A (7/82) with A&C Slip No.1(9/89) & 2 (12/24)
37	Battery charger for 110V Battery, 200/250 Ah at Traction Substations for 25 kV/2x25 kV Electrification Installation.	TI/SPC/PSI/200-250CHGR/0210 (07/21)
38	Low tension Distribution panels for Rly. A.C traction sub-stations, Sub-sectioning &Paralleling Post and Sectioning & Paralleling Post	TI/SPC/PSI/LTDPNL/0210 (10/21)
39	Standard for drawings for power supply Installations.	ETI/PSI/31 (5/76)
40	Low tension distribution panels.	ETI/PSI/63(7/82)
50	Technical specification for 220 kV or 132 kV or 110 kV or 66kV or 25 kV potential transformer.	TI/SPC/PSI/PTs/0990 with A&C Slip No.1, 2, 3, 4 & 5 (April 09)
51	Delta I type High resistive fault selective Relay for 25 kV AC Single phase 50 Hz traction system.	TI/SPC/PSI/PROTCT/1982(12/2003) with A&C slip No.1(10/13)

52	Panto flashover protection relay for 25 kV A.C. single phase 50 Hz traction system.	TI/SPC/PSI/PROTCT/2983 (09/2001)
53	Technical Specification of SCADA system for 25kV, AC Single phase Traction supply on Indian Railway.	TI/SPC/RCC/SCADA/0130(04/2014)
54	Technical Specification for Galvanized Steel Stranded Wire for Traction Masts	TI/SPC/OHE/GSSW/0090 (10/2009)
55	Technical specification for galvanized steel stranded wire for traction bonds	TI/SPC/OHE/GALSTB/0040(09/04) Rev. 1 (08/05)
56	Setting up Earthing Station at switching posts (SSP & SP) with conventional Earthing.	Special Maintenance Instruction No. TI/SMI/0032 Rev-1
57	Design handout for Overhead equipment for running double stack containers under electrified routes (High Rise OHE) with speed potential of 140 kmph based on revised wind zone.	TI/DESIGN/OHE/2013/00001 (July'13)
58	OHE span in view of changes in wind zones in country	TI/OHE/GA/2013 DATED 25/30.04.2013
59	Technical guidelines and Standard Instruction for Railway Electrification Works including OHE, TSS, Transmission Line, SCADA, Electrical General Works, signaling Works, Telecom works & Civil Engineering Works.	CORE/RE/TENDER/EPC/2014/STANDARD INSTRUCTIONS AND GUIDELINES
60	Control and Distribution panel for Colour Light Signaling supply in 25 kV AC Traction System.	TI/SPC/PSI/CLS/0025 (12/02) with A&C slip NO. 1 to 5 (01/25).
61	Five Pulley Regulating Equipment ATD	TI/SPC/OHE/5PATD/0130 with ACS 1 &2
62	Three Pulley Higher Tension ATD (2400 kgf)	TI/SPC/OHE/3PHTATD/0150 with ACS 1

G. List Of Standard RDSO's Specifications for TSS, SP, SSP as per PSI Guideline vide Instruction No. TI/IN/0043 Rev.01-

i. Traction Sub Station with Scott Connected Transformer

SN	Equipment Description	Specification no.
1	220kV or 132kV , 1250A Triple Pole Isolator (with earth blade)	TI/SPC/PSI/ISOLTR/0210(06/21)
2	220kV or 132kV , 1250A Triple Pole Isolator (For Bus Coupling)	TI/SPC/PSI/ISOLTR/0210(06/21)
3	220kV or 132kV Potential Transformer (accuracy class 0.2) for ABT metering (Indication and Metering)	To be procured as per the specification/sources of DISCOMs/Power utilities
4	220kV or 132kV Current Transformer (accuracy class 0.2s) for ABT metering (Metering)	To be procured as per the specification/sources of DISCOMs/Power utilities
5	220kV or 132kV , 1250A Triple Pole Isolator (without earth blade)	TI/SPC/PSI/ISOLTR/0210(06/21)
6	220kV or 132kV Support Insulator	TI/SPC/OHE/POST/0100 (01/10) with A&C slip no.01.
7	220kV (400-200/5A) or 132kV (800-400/5) Current transformer (For Transformer Protection)	TI/SPC/PSI/CT/0210(06/21)
8	220kV or 132kV SF6 Circuit Breaker (Triple Pole)	TI/SPC/PSI/HVCB/0121 (05/21) with A&C slip no. 01
9	198kV or 120kV Lightning	ETI/PSI/137(08/89) with A&C slip no. 01 to 07

	arrester (HV Side)	
10	60/84/100MVA, 220/2X25kV or 132/2X25kV Single Phase Traction Power Transformer with Bushing CTs	TI/SPC/PSI/TRNPWR/5200 (02/21) with A&C slip no. 01
11	60kV Lightning arrester	ETI/PSI/137(08/89) with A&C slip no. 01 to 07.
12	50kV Current Transformer (1500-750/5)	TI/SPC/PSI/CT/0210(06/21)
13	50kV Double pole SF6 Breaker (2000A)	TI/SPC/PSI/HVCB/0121(05/21)
14	50kV Double Pole Manual Isolator	TI/SPC/PSI/ISOLTR/0210(06/21)
15	50kV Support Insulator or 66kV Support Insulator	TI/SPC/OHE/POST/0100 with A&C slip no. 01
16	27.5kV/110V Potential Transformer (Type-II) (52kV Insulation Class)	TI/SPC/PSI/PT/0210(06/21)
17	25kV Double Pole Manual Isolator (2000A)	TI/SPC/PSI/ISOLTR/0210(06/21)
18	27.5kV/110V Potential Transformer (Type-I) (52kV Insulation Class)	TI/SPC/PSI/ PT/0210(06/21)
19	12.3MVA Autotransformer (55/27.5kV) with Bushing CTs	TI/SPC/PSI/AUTOTR/1200 (02/21)
20	25kV Double Pole Vacuum Interrupter	TI/SPC/PSI/LVCBIN/0120(12/13)
21	50kVA, 25kV/240Volt LT supply transformer	ETI/PSI/15 (08/03)

22	25kV Drop Out Fuse	ETI/PSI/14(01/86) with A&C slip no. 01
23	42kV Lightning Arrester	TI/SPC/PSI/MOGTLA/0101 (02/15)
24	Shunt capacitor 2400kVAR at 25kV	TI/SPC/PSI/FC&SR/0100 (01/10)
25	Series Reactor for Low loss	TI/SPC/PSI/FC&SR/0100 (01/10)
26	220kV or 132kV , 1250A Triple Pole Isolator(with earth blade)	TI/SPC/PSI/ISOLTR/0210(06/21)
27	25kV Double Pole Vacuum Circuit Breaker(2000A)	TI/SPC/PSI/ISOLTR/0210(06/21)
28	220kV or 132kV Potential Transformer (accuracy class 0.2) for ABT metering (Indication and Metering)	To be procured as per the specification/sources of DISCOMs/Power utilities
29	25kV Current Transformer (200-100/5A) (For compensation equipment)	TI/SPC/PSI/CT/0210(02/21)
30	Low Tension Distribution Panel	TI/SPC/PSI/ISOLTR/0210(06/21)
31	220kV or 132kV Support Insulator	TI/SPC/OHE/INS/0070 (04/07) with A&C slip no. 01 & 02
32	25 kV Double Pole Motorised isolator (2000A)	TI/SPC/PSI/ISOLTR/0210(06/21)

ii. Traction Sub Station with Transformers in V Connection

SN	Equipment Description	Specification no.
1	220kV or 132kV , 1250A Triple Pole Isolator (with earth blade)	TI/SPC/PSI/ISOLTR/0210(06/21)

2	220kV or 132kV , 1250A Triple Pole Isolator(For Bus Coupling)	TI/SPC/PSI/ISOLTR/0210(06/21)
3	220kV or 132kV Potential Transformer (accuracy class 0.2) for ABT metering (Indication and Metering)	To be procured as per the specification/ sources of DISCOMs/Power utilities
4	220kV or 132kV Current Transformer (accuracy class 0.2s) for ABT metering (Metering)	To be procured as per the specification/ sources of DISCOMs/Power utilities
5	220kV or 132kV , 1250A Double Pole Isolator(without earth blade)	TI/SPC/PSI/ISOLTR/0210(06/21)
6	220kV or 132kV Support Insulator	TI/SPC/OHE/POST/0100 (01/10) with A&C slip no.01.
7	220kV (400-200/5A) or 132kV (800-400/5) Current transformer (For Transformer Protection)	TI/SPC/PSI/CT/0210(06/21)
8	220kV or 132kV SF6 Circuit Breaker (DoublePole)	TI/SPC/PSI/HVCB/0121(05/21)
9	198kV or 120kV Lightning arrester (HV Side)	ETI/PSI/137(08/89) with A&C slip no. 01 to 07
10	38/53/63MVA, 220/2X25kV or 132/2X25kV Single Phase Traction Power Transformer	TI/SPC/PSI/TRNPWR/4200 (02/21)
11	42kV Lightning arrester	TI/SPC/PSI/MOGLA/0101 (02/15)
12	25kV Current Transformer (1500-750/5A) (Including 03 as NCT)	TI/SPC/PSI/CT/0210(02/21)

SN	Equipment Description	Specification no.
13	25kV Current Transformer (200-100/5A) (For compensation equipment)	TI/SPC/PSI/CT/0210(02/21)
14	25kV Double pole Vacuum Circuit Breaker (2000A)	TI/SPC/PSI/LVCBIN/0120(12/13) with A&C slip no. 01
15	25kV Double Pole manual Isolator(2000A)	TI/SPC/PSI/ISOLTR/0210
16	25kV Support Insulator	TI/SPC/OHE/INS/0070 (04/07) with A&C slip no. 01 & 02
17	50kVA, 25kV/240Volt LT supply transformer	ETI/PSI/15 (08/03)
18	220kV or 132kV , 1250A Triple Pole Isolator (with earth blade)	TI/SPC/PSI/ISOLTR/0210(06/21)
19	27.5kV/110V Potential Transformer (Type-II)(52kV Insulation Class)	TI/SPC/PSI/ISOLTR/0210(06/21)
20	220kV or 132kV Potential Transformer (accuracy class 0.2) for ABT metering (Indication and Metering)	To be procured as per the specification/ sources of DISCOMs/Power utilities
21	25kV Double Pole Vacuum Interrupter (2000A)	TI/SPC/PSI/LVCBIN/0120(12/13) with A&C slip no. 01
22	Shunt capacitor (2400kVAR at 25kV)	TI/SPC/PSI/ISOLTR/0210(06/21)
23	220kV or 132kV Support Insulator	TI/SPC/PSI/FC&SR/0100 (01/10)
24	25kV Double Pole Motorized Isolators (2000A)	TI/SPC/PSI/ ISOLTR/0210

25	Low Tension Distribution Panel	TI/SPC/PSI/LTDPNL/0210(10/21)
----	--------------------------------	-------------------------------

iii. **Sectioning and Paralleling post (SP) for two line**

SN	Equipment Description	Specification no.
1	8MVA Auto Transformer (55/27.5 kV)with Bushing CTs	TI/SPC/PSI/AUTOTR/1200 (02/21)
2	16.5MVA Auto Transformer (55/27.5 kV) with Bushing CTs	TI/SPC/PSI/AUTOTR/1200 (02/21)
3	25 kV Double Pole Vacuum Circuit Breaker (2000A)	TI/SPC/PSI/LVCBIN/0120(12/13) with A&C slip no. 01
4	50kV Double Pole SF6 Circuit Breaker (2000A)	TI/SPC/PSI/HVCB/0121 (05/21) with A&C slip no. 01
5	25 kV Double Pole Vacuum Interrupter (2000A)	TI/SPC/PSI/LVCBIN/0120(12/13) with A&C slip no. 01
6	25 kV Double Pole Isolator (Manual) (2000A)	TI/SPC/PSI/ISOLTR/0210 (02/21)

SN	Equipment Description	Specification no.
7	25 kV Double Pole Isolator (Motorised) (2000A)	TI/SPC/PSI/ISOLTR/0210 (02/21)

8	25kV Potential Transformer (Type-1)	TI/SPC/PSI/PT/0210 (06/21)
9	25kV/240V LT Supply Transformer (10kVA)	ETI/PSI/15 (08/03)
10	25kV Dropout Fuse Switch	ETI/PSI/14(01/86) with A&C slip no. 01
11	42kV Lightning Arrester	TI/SPC/PSI/MOGTLA/0101 (02/15)
12	Low Tension Distribution Panel	TI/SPC/PSI/LTDPNL/0210 (10/21)
13	25kV Support Insulator	TI/SPC/OHE/INS/0070 (04/07) with A&C slip no. 01 & 02

iv. Sub Sectioning and Paralleling Post (SSP) for Two line

SN	Equipment Description	Specification no.
1	8MVA Auto Transformer (55/27.5kV) with Bushing CTs	TI/SPC/PSI/AUTOTR/1200 (02/21)
2	16.5MVA Auto Transformer (55/27.5kV) with Bushing CTs	TI/SPC/PSI/AUTOTR/1200 (02/21)
3	25 kV Double Pole Vacuum Circuit Breaker (2000A)	TI/SPC/PSI/LVCBIN/0120(12/13) with A&C slip no. 01
4	220kV or 132kV , 1250A Triple Pole Isolator (with earth blade)	TI/SPC/PSI/ISOLTR/0210(06/21)
5	25 kV Double Pole Isolator (Manual) (2000A)	TI/SPC/PSI/ISOLTR/0210(06/21)

6	220kV or 132kV Potential Transformer (accuracy class 0.2) for ABT metering (Indication and Metering)	To be procured as per the specification/ sources of DISCOMs/Power utilities
7	25kV Potential Transformer (Type-I	TI/SPC/PSI/PT/0210 (06/21)
8	25kV/240V LT SupplyTransformer(10kVA)	TI/SPC/PSI/ISOLTR/0210(06/21)
9	220kV or 132kV Support Insulator	ETI/PSI/14(01/86) with A&C slip no. 01
10	42kV Lightning Arrester	TI/SPC/PSI/MOGLTA/0101 (02/15)
11	Low Tension Distribution Panel	TI/SPC/PSI/LTDPNL/0210 (10/21)
12	25kV Support Insulator	TI/SPC/OHE/INS/0070 (04/07) with A&C slip no. 01 & 02

v. Sectioning and Paralleling Post (SP) For three line and Four Line (for both Scott Connected and V connected Scheme)

SN	Equipment Description	Specification no.
1	16.5MVA Auto Transformer (55/27.5kV) with Bushing CTs	TI/SPC/PSI/AUTOTR/1200 (02/21)
2	25 kV Double Pole Vacuum Circuit Breaker (2000A)	TI/SPC/PSI/LVCBIN/0120 (12/13) with A&C slip no. 01
3	50kV Double Pole SF6 Circuit Breaker (2000A)	TI/SPC/PSI/HVCB/0121 with A&C slip no. 01
4	25 kV Double Pole Vacuum Interrupter (2000A)	TI/SPC/PSI/LVCBIN/0120(12/13) with A&C slip no. 01

5	25 kV Double Pole Isolator (Manual) (2000A)	TI/SPC/PSI/ISOLTR/0210 (06/21)
6	25 kV Double Pole Isolator (Motorised) (2000A)	TI/SPC/PSI/ISOLTR/0210 (06/21)
7	25kV Potential Transformer (Type-1)	TI/SPC/PSI/PT/0210 (06/21)
8	25kV/240V LT Supply Transformer (10kVA)	ETI/PSI/15 (08/03)
9	25kV Dropout Fuse Switch (1A)	ETI/PSI/14(01/86) with A&C slip no. 01
10	42kV Lightning Arrester	TI/SPC/PSI/MOGTLA/0101 (02/15)
11	Low Tension Distribution Panel	TI/SPC/PSI/LTDPNL/0210 (10/21)
12	25kV Support Insulator	TI/SPC/OHE/INS/0070 (04/07) with A&C slip no. 01 & 02

vi. Sub Sectioning and Paralleling Post (SSP) For three line and Four Line (forboth Scott Connected and V connected Scheme)

SN	Equipment Description	Specification no.
1	16.5MVA Auto Transformer (55/27.5kV) with Bushing CTs	TI/SPC/PSI/ISOLTR/0210(06/21)
2	220kV or 132kV Potential Transformer (accuracy class 0.2) for ABT metering (Indication and Metering)	To be procured as per the specification/ sources of DISCOMs/Power utilities
3	25 kV Double Pole Vacuum Interrupter (2000A)	TI/SPC/PSI/LVCBIN/0120(12/13) with A&C slip no. 01
4	25 kV Double Pole Isolator (Manual)	TI/SPC/PSI/ISOLTR/0210(06/21)

	(2000A)	
5	220kV or 132kV Support Insulator	TI/SPC/PSI/ISOLTR/0210 (06/21)
6	25kV Potential Transformer (Type-1)	TI/SPC/PSI/PT/0210 (06/21)
7	25kV/240V LT Supply Transformer (10kVA)	ETI/PSI/15 (08/03)

SN	Equipment Description	Specification no.
8	25kV Dropout Fuse Switch (1A)	ETI/PSI/14(01/86) with A&C slip no. 0
9	42kV Lightning Arrester	TI/SPC/PSI/MOGLTA/0101 (02/15)
10	Low Tension Distribution Panel	TI/SPC/PSI/LTDPNL/0210 (10/21)
11	25kV Support Insulator	TI/SPC/OHE/INS/0070 (04/07) with A&C slip no. 01 & 02
12	25kV Support Insulator	TI/SPC/OHE/INS/0070 (04/07) with A&C slip no. 01 & 02

vii. Boundary Sectioning and Paralleling Post (SP) for Two line, three Line and Four Line

SN	Equipment Description	Specification no.
1	12.3MVA Auto Transformer (55/27.5kV) with Bushing CTs	TI/SPC/PSI/AUTOTR/1200(02/21)

	16.5MVA Auto Transformer (55/27.5kV) with Bushing CTs	TI/SPC/PSI/AUTOTR/1200(02/21)
2	50kV Double Pole SF6 Circuit Breaker (2000A)	TI/SPC/PSI/HVCB/0121(05/21)with A&C slip no. 01
3	25 kV Double Pole Vacuum Circuit Breaker (2000A)	TI/SPC/PSI/LVCBIN/0120(12/13) with A&C slip no. 01
4	25 kV Double Pole Vacuum Interrupter (2000A)	TI/SPC/PSI/LVCBIN/0120(12/13) with A&C slip no. 01
5	25 kV Single Pole Vacuum Interrupter (2000A)	TI/SPC/PSI/LVCBIN/0120(12 /13) with A&C slip no. 01
6	25 kV Double Pole Isolator (Manual) (2000A)	TI/SPC/PSI/ISOLTR/0210 (06/21)
7	25 kV Double Pole Isolator (Motorised) (2000A)	TI/SPC/PSI/ISOLTR/0210 (06/21)
8	25 kV Single Pole Isolator (Manual) (2000A)	TI/SPC/PSI/ISOLTR/0210 (06/21)
9	25 kV Single Pole Isolator (Motorised) (2000A)	TI/SPC/PSI/ISOLTR/0210 (06/21)
10	25kV Potential Transformer (Type-1)	TI/SPC/PSI/PT/0210 (06/21)
11	220kV or 132kV , 1250A Triple Pole Isolator (with earth blade)	TI/SPC/PSI/ISOLTR/0210(06/21)
12	25kV Dropout Fuse Switch (1A)	TI/SPC/PSI/ISOLTR/0210(06/21)
13	220kV or 132kV Potential Transformer (accuracy class 0.2) for ABT metering (Indication and Metering)	To be procured as per the specification/ sources of DISCOMs/Power utilities
14	Low Tension Distribution Panel	TI/SPC/PSI/LTDPNL/0210 (10/21)
15	25kV Support Insulator	TI/SPC/PSI/ISOLTR/0210(06/21)

viii. Battery Capacity and battery charger to be used

SN	Equipment Description	Specification no.
1	Lead Acid Batteries 110V, 250AH	DSO/PE/SPEC/TL /0040 (Rev. '2')- 2021
2	Lead Acid Batteries 110V, 150AH	DSO/PE/SPEC/TL /0040 (Rev. '2')- 2021

3	Battery Charger for Lead Acid Batteries 110V, 250AH	TI/SPC/PSI/200-250/ CHGR/0210 (07/21)
	Battery Charger for Lead Acid Batteries 110V, 150AH	TI/SPC/PSI/40-150/ CHGR/1210 (07/21)

H. List of IS Specification-

S No.	IS Code No.	Descriptions
1	IS:210 2009	Grey iron castings
2	IS:269 - 2015	Specification for 33 grade ordinary Portland cement (4 th Rev)
3	IS:282-1982	Dropper Wire
4	IS:306-1983 (Reaffirmed 2015)	Tin bronze castings
5	IS:335 - 2018	New Insulating oil (4 th Rev) Reaffirmed 2000
6	IS:371-1999	Ceiling rose spec. (3 rd Rev)
7	IS: 383 - 2016	Specification for coarse & fine aggregates from natural sources for concrete
8	IS:398 (Part-1) -1996	Aluminium Conductors for Overhead transmission purposes - Aluminium Stranded Conductors
9	IS:398 (Part 2) -1996	Aluminium Conductors for Overhead transmission purposes - Aluminum conductors, Galvanised Steel Reinforced

10	IS:398 (Part-III) 1976. With Amendment No. 1, 2 & 3.	Aluminium Conductors for Overhead transmission purposes - Aluminum conductors, Aluminised Steel Reinforced
11	IS: 432 Pt.1-1982	Specification for mild steel & medium tensile steel bars and hard drawn steel wires for concrete reinforcement
12	IS: 456-2000	Plain & Reinforced concrete Code of practice (4 th Rev)
13	IS:516-1959.	Method of tests for strength of concrete
14	IS:617-2024	Aluminum Alloy Ingots for Remelting & Casting for General Engg. Purposes.
15	IS:694 - 2010	PVC insulated unsheathed & sheathed cables/cords with rigid and flexible conductors for rated voltage up to including 450/750 Volts.
16	IS:702-2022	Specification for industrial bitumen (3 rd Rev)
17	IS:731-1971	Porcelain Insulator for overhead power lines with a nominal voltage greater than 1000V
18	IS:732-2019	Code of practice for electrical wiring installation (4 th Rev)
19	IS:800-2007	Code of practice for general construction in steel (3 rd Rev)

S No.	IS Code No.	Descriptions
20	IS:808-2021	Dimensions for hot rolled steel beam, column, channel & angle sections
21	IS:816-1969	Code of practice for use of metal arc welding for general construction in mild steel.

22	IS:875 (Part-3) 2015	Design loads (other than earthquakes) for building and structures – Part 3: Wind loads.
23	IS:1293-2019	Plugs & socket outlets of rated voltage upto and including 250V and rated current up to 16 Amp (4 th Rev)
24	IS:1387-1993	General requirements for the supply of metallurgical materials
25	IS: 1489 Pt. I 2015	Specification for Portland-Pozzolana cement Pt .I Fly ash based (4 th Rev)
26	IS:1554 (Part-I) 1988	PVC insulated (Heavy duty) Electric cables for working voltage up to and including 1100 Volts
27	IS:1608 - 2005	Metallic Materials tensile testing at ambient temperature (3 rd Rev)
28	IS:1731-1971	Dimensions for steel flats for structural & general engineering purpose
29	IS:1777-1978	Industrial Luminaries with metal reflectors (1 st Rev)
30	IS:1786-2008	Specification for high strength deformed steel bars and wires for concrete reinforcement
31	IS:1897- 2008	Copper strip for Electrical purposes (3 rd Rev)
32	IS:2004-1991	Carbon steel forgings for general engineering purpose
33	IS:2062-2011	Hot Rolled medium and high tensile Structural Steel for general structural purpose
34	IS: 2074-2023	Ready mix Paint, air drying, Red oxide, Zinc chrome priming
35(a)	IS:2121-1981 (Part-I)	Specification for Conductors & Wire Accessories for Overhead Power lines – Armour Rods, Binding Wires and tapes for Conductors.

35(b)	IS:2121-1981 (Part-II)	Specification for Conductors and Earth Wire Accessories for Overhead Power Lines - Mid span joints and Repair Sleeves for Conductors Power lines – Midspan joints and Repair sleeves for conductors.
36	IS:2141-2000	Hot Dip Galvanised stay strand
37	IS:2312-1967	Propeller type AC ventilating fans (1 st Rev)
38	IS: 2386 Pt.III-1963	Method of tests for aggregates for concrete Pt. III Specific gravity, density voids, absorption & buckling
39	IS:2673-2002	Dimensions for wrought Aluminum and Aluminium Alloy extruded round tubes Tubular Busbar.
40	IS:2675-1983	Enclosed distribution fuse boards and cut-outs for voltage not exceeding 1000V AC & 1200V DC (2 nd Rev)
41	IS:3043-1987	Code of practice for earthing (1 st Rev)
42	IS:3091-1999	Aluminum bronze castings for overhead fittings in electrification.
43	IS:3188-1980	Characteristics of string insulator units
44	IS:3837-1976	Accessories for Rigid steel conduit for electrical wiring
45	IS:3854-1997	Switches for domestic & similar purposes (2 nd Rev)

S No.	IS Code No.	Descriptions
46	IS:4826-1979	Specification for hot dip galvanized coatings on round steel wires (1 st Rev)
47	IS:5082-1998	Wrought Aluminium and Aluminium Alloy Bars, Rods, Tubes, Sections, Plates & Sheets for Electric

		Applications.
48	IS: 6403-1981	Code of practice for determination of bearing capacity of shallow foundations (1 st Rev)
49	IS:7098 (Part I) 1988	Cross Linked Polyethylene Insulated PVC sheathed Cables for working Voltage up to and including 1100 Volts.
50	IS:7098 (Part II) 2011	Cross Linked Polyethylene Insulated Thermoplastic sheathed Cables for working Voltage from 3.3 kV up to and including 33 kV.
51	IS: 8130 -2013	Conductor for Insulated electric cables & flexible cords (2 nd Rev)
52	IS:9537 Pt-I-1980	Conduits for electrical installations, General Requirements.
53	IS: 14214 - 1994	Annealed Stranded Copper Conductors for Jumper wires.
54	IS:13947 Pt. III 1993 (Reaffirmed-2004)	Specification for low voltage switchgear & control gear- Switches, Disconnectors, Switch disconnectors & fuse combination units.
55	IS:14329-1995	Malleable iron castings
56	IS:9968(Pt.2)-2002	Specification for Elastomer Insulated Cabled : For working voltage from 3.3 kV upto and including 33 kV

[Specify details of tools, equipment, Materials for supply to stores]

3.18 Signalling system (for electrification works)

3.18.1 Modification to existing PI/RRR/EI systems and modification in signalling system of LC gates

All signalling works including design of signalling plan, route control chart or selection/control table, panel diagram, wiring/circuit diagram, application logic, interface details, cable route chart, cable core diagram, termination and equipment position diagram etc. as part of the modification to the existing signalling system along with supply, installation, testing and commissioning

shall be executed in accordance with the provision of IRSEM and signal and Interlocking principles issued in the form of typical designs.

In addition to above, augmentation of existing service buildings to accommodate additional signalling equipment/ racks etc shall be carried out.

The released materials shall be transported to the railway depot within the Site, as nominated by the Authority Engineer.

(a) Modification in existing PI/RRI/EI systems.

S N	Description of work	Details of modifications														
		Name of station	No of Lines	Std of interlocking	Major (Junction)/ Wayside station	Relay type (metal to metal or metal to carbon)	Cables (Sig/Tele)	Type of Signal feed (local or remote)	Type of train detection system (relay, AC, AFTC Etc.)	Point immunisation	Type of lifting barrier & locking arrangement	Earthing and protection	Power supply	Block working	Details of siding	Any other requirement
1	Survey, Design, Supply, Installation, Testing, supply of manuals for new technology equipment for each place, supply of completion drawings, and commissioning of															
2	Supply of signalling spares: 2.1 Electronic Interlocking or Relay Interlocking equipment 2.2 Power supply system 2.3 Data logger system 2.4 Axle counter system 2.5 Signalling cables 2.6 Power cables 2.7 Relays 2.8 Point machines with accessories 2.9 Train Detection system 2.10 Any other item/items for functioning of Signalling system as per contract requirement. 2.11 Testing and measuring tools and equipment as determined in accordance with the manufacturer's manuals	Name of station			Quantity with unit											
3	Integrated testing and commissioning															

(b) Modification in existing LC gate:

S	Description of work	Details of modifications
---	---------------------	--------------------------

N		LC Gate No.	Type of lifting barrier & locking arrangement	Cables (Sig/Tele)	Type of Signal feed (local or remote)	Earthing and protection	Power supply	Any other requirement
1	Survey, Design, Supply, Installation, Testing, supply of manuals for new technology equipment for each place, supply of completion drawings, and commissioning of							
2	Supply of signalling spares: 2.1 Electronic Interlocking or Relay Interlocking equipment 2.2 Power supply system 2.3 Data logger system 2.4 Axle counter system 2.5 Signalling cables 2.6 Power cables 2.7 Relays 2.8 Train Detection system 2.9 Any other item/items for functioning of Signalling system as per contract requirement. 2.10 Testing and measuring tools and equipment as determined in accordance with the manufacturer's manuals	LC gate No.		Quantity with unit				
3	Integrated testing and commissioning							

3.18.2 Commissioning of new Electronic Interlocking/Panel Interlocking/ Route Relay Interlocking

All signalling works including design of signalling plan, route control chart or selection/control table, panel diagram, wiring/circuit diagram, application logic, interface details, cable route chart, c core diagram, termination and equipment position diagram etc. as part of the detail design along with supply, installation, testing and commissioning shall be executed in accordance with the provision of IRSEM and signal and interlocking principles issued in the form of typical designs.

In addition to above, provision of new service buildings to accommodate signalling equipment, power supply equipment etc., shall be carried out.

Releasing and transporting the released materials to railway depot nominated by the Authority Engineer.

S N	Description of work	Details of Major/Junction or Wayside stations									
		Name of station	No of Lines	Std. of interlocking	Type of Signalling	Junction (major)/ Wayside station	Type of block working	Type of train detection system	Type of point operation & locking arrangement	Type of lifting barrier & locking arrangement	Details of siding

1	Survey, Design, Supply, Installation, Testing, supply of manuals for new technology equipment for each place, supply of completion drawings, and commissioning of										
2	Supply of signalling spares: 2.1 Electronic Interlocking or Relay Interlocking equipment 2.2 Power supply system 2.3 Data logger system 2.4 Axle counter system 2.5 Signalling cables 2.6 Power cables 2.7 Relays 2.8 Point machines with accessories 2.9 Train Detection system 2.10 On Board (Cab) equipment for TPWS system 2.11 Line side equipment for TPWS system 2.12 TMS (with remote operation system) 2.13 Any other item/items for functioning of Signalling system as per contract requirement. 2.14 Testing and measuring tools and equipment as determined in accordance with the manufacturer's manuals	Name of station	Quantity with unit								
3	Integrated testing and commissioning										

3.18.3 Diversion of utilities like cables, location boxes and huts and lifting barriers etc., wherever necessary shall be done prior to taking up of any work in the vicinity of existing Signalling and Telecom systems.

3.18.4 All other associated materials and works for completion not limited to items in the above table as required for execution of the signalling and telecom works to suit 25 KV has to be provided by the Contractor.

3.19 Telecommunication (for electrification works)

3.19.1

a) Where optical fibre cable (OFC) and quad cable already exist in the section

Where optical fibre cable (OFC) and quad cable already exist in the section , scope of work includes supply , trenching and laying of 6 quad cables, jointing of quad cables for provision of emergency sockets in the section and SP/SSP/TSS /LC gates etc., transferring the existing communication circuits including block on new cables, supply and installation of power supply equipment, batteries and other telecom

equipment, supply and installation of SDH and PD MUX equipment and their networking with the existing OFC link for augmenting existing OFC equipment at stations in the section, supply, installation and testing and commissioning of HQ and way station control equipment for giving various control phones at stations, SP/SSP/TSS etc., augmentation of existing service buildings as required, provision of cable huts and service buildings, protection of telecom lines entering 25 KV sub-station /switching posts, and protection against surge and lightning. The scope also includes masonry works for erection and installation of signalling equipment and all types of painting as per Railway Telecom Manual and standard practices. Supply of spares to the extent of 10% (minimum 1) of each type of equipment like SDH, PDMUX, control phones, emergency sockets etc.

All the materials not limited to above as required for execution of the signalling works to suit 25 KV has to be provided by the Contractor in accordance with the Good Industry Practice. The Contractor shall transport the released materials railway depot nominated by the Authority Engineer.

b) Where OFC and quad cable does not exist in the section.

Where OFC and quad cable does not exist in the section, scope of work includes supply , trenching and laying of OFC and 6 quad cables, jointing of quad cables, splicing of OFC cable, provision of emergency sockets in the section and SP/SSP/TSS /LC gates etc., transferring the existing communication circuits including block on new cables, supply and installation of power supply equipment , batteries and other telecom equipment, supply and installation of SDH and PD MUX equipment and their networking with the existing OFC link or forming new link if OFC is not existing in the section, commissioning of quad cable system , supply, installation and testing and commissioning of HQ and way station control equipment for giving various control phones at stations, SP/SSP/TSS etc., provision of cable huts and service buildings, protection of telecom lines entering 25 KV sub-station /switching posts, protection against surge and lightning . The scope also includes masonry works for erection and installation of signalling equipment and all types of painting as per Railway Telecom Manual and Good Industry Practice. Supply of spares to the extent of 10% (ten percent) (minimum 1) of each type of equipment like SDH, PDMUX , control phones, emergency sockets, etc.

All the materials not limited to above as required for execution of the signalling works to suit 25 KV has to be provided by the Contractor.

On completion of above works, testing and commissioning of entire system in totality shall be carried out by the Contractor. The Contractor shall transport the released materials to railway depots nominated by the Authority Engineer.

3.19.2 Quad cable work

The details of quad cable work are:

S N	Description of work	Details of 6 Quad telecom cable system					
		Chainage		Name of stations	LC gate No.	Loc of TSS/S P/SSP	Any other details
		From	To				
1	Survey, design, supply, installation, testing, supply of manuals for new technology equipment for each place, supply of completion drawings, and commissioning of 6 Quad telecom cable system						

2	Supply of communication spares: 2.1 Six quad telecom cable and accessories 2.2 Emergency sockets with box and pins 2.3 Any other item/items for functioning of telecommunication system as per contract requirement 2.4 Testing and measuring tools and equipment as determined in accordance with the manufacturer's manuals	Quantity with unit
3	Integrated testing and commissioning	

3.19.3 Optic Fibre Cable work

The details of optic fibre cable work are:

S N	Description of work	Details of OFC system											
		Chainage		Name of stations	OF Cable	Type of STM equipment		Type of multiplexer	Power supply	Control office equipment with Power supply			Any other details
		From	To			Short Haul	Long haul			Way station	HQ	Emergency control equipment	
1	Survey, design, supply installation, testing, supply of manuals for each place, supply of completion drawings, and commissioning of optical fibre cable communication system												
2	Supply of communication spares: 2.1 Optical fibre cable with accessories 2.2 HDPE duct with accessories 2.3 Optical fibre Digital equipment's (STM with accessories) 2.4 Digital Multiplexer equipment's (PDH with accessories). 2.5 Power supply of STM/PDH with accessories 2.6 Control office equipment with accessories (a) Way station (b) HQ © Power supply 2.7 Emergency communication system with accessories 2.8 Any other item/items for functioning of telecommunication system as per contract requirement. 2.9 Testing and measuring tools and	Quantity with unit											

	equipment as determined in accordance with the manufacturer's manuals	
3	Integrated testing and commissioning	

3.19.4 Modification in passenger amenity works

The details of modification in passenger amenity works are

S N	Description of work	Details of telecommunication equipment														
		Station	LC Gate	Mobile radio communication system	CCTV	PA system	Passenger information display system	Electronic exchange	Digital clock	Master Clock system	Video surveillance System	Telephone exchange	EC Sockets	LC Gate Telephones	Earthing arrangements	Power supply equipment with protection
1	Survey, Design, Supply, Installation, Testing, supply of manuals for new technology equipment for each place, supply of completion drawings, and commissioning of Telecommunication equipment															
2	Supply of communication spares: 2.1 Mobile Radio comm. system 2.1 CCTV system 2.4 Electronic Exchange system 2.5 Public address system 2.6 Passenger Information display system 2.7 Digital Clock system 2.8 Master clock system 2.9 Video surveillance system	Quantity with unit														

	2.10 Telephone exchange 2.11 EC Sockets 2.12 LC Gate telephones 2.13 Any other item/items for functioning of telecommunication system as per contract requirement. 2.14 Testing and measuring tools and equipment as determined in accordance with the manufacturer's manuals.	
3	Integrated testing and commissioning	
2	Inventory: Supply of communication spares: 2..1 Optical fibre cable communication system 2.2 Mobile Radio communication system 2.3 CCTV system 2.4 Electronic Exchange system 2.5 Public address system 2.6 Passenger Information display system 2.7 Digital Clock system 2.8 Control office equipment's with accessories 2.9 Master switching centre equipment 2.10 Base switching centre equipment 2.11 DT/Cab radio/Handheld 2.12 Dispatch/Control	Quantity with unit

terminals 2.13 OPH 2.14 GPH 2.15 GSM Set 2.16 Cab radio 2.17 Master clock system 2.18 Any other item/items for functioning of telecommunicati on system as per contract requirement. 2.19 Testing and measuring tools and equipment as determined in accordance with the manufacturer's manuals.	
---	--

All other associated materials and works for completion not limited to items in the above table as required for execution of the signalling and telecom works to suit 25 KV has to be provided by the Contractor.

3.20 Civil works (for electrification works)

3.20.1 General

Civil works include building works (staff quarters, service building, tower wagon shed and siding, platform shed) raising height of FOB/ROB and any other work necessary for completion of the electrification works.

3.20.2 Staff quarter

Construction and development of staff colony comprising of following types of staff quarters including electrical internal wiring with allied work, electrical power supply arrangement with transformer/main distribution supply, sewerage system, water supply arrangement, augmentation of water supply, provision of bore well with electrical pump and pump house, approach road, levelling and earth filling of land, barbed wire fencing, boundary wall, development of lawn, rain water harvesting, street lighting arrangement etc.

S. N.	Location	Type of quarters	Single storey/multi-storey building	No. of quarters
		Type-II	As per clause 1.8 of Schedule B	

		Type-III	
		Type-IV	
		Type-V	

3.20.3 Tower wagon shed and siding:

Construction of tower wagon shed and siding including inspection pit, earthwork, approach road, water supply arrangement, ballast supply and its spreading, permanent way work with all Contractor's permanent way material for M+7 sleeper density with 60 Kg (90 UTS) rail and sleeper (Drg. No. T/2496), track connection with main line including thermit welding, insertion of glued joint, internal electrical wiring with allied works and electrical power supply arrangement with transformer/main distribution supply, as per the Schedule D.

Description of permanent way associated with the above work is:

S. No.	Location	Length of track	No. of turnout and derailing switch with sleepers, rail components and fittings	No. of glued joint
As per approved ESP				

3.20.4 Service buildings

Construction of service buildings including electrical internal wiring with allied work, electrical power supply arrangement with transformer/main distribution supply, sewerage system, water supply arrangement, augmentation of water supply, provision of bore well with electrical pump and pump house, approach road, levelling and earth filling of land, boundary wall, street lighting arrangement etc.

Sr. no.	Description of service building	Location	Plinth area
	Administrative Offices	As per clause 1.8 of Schedule B	
	Supervisor's office and store		
	Remote Control Centre		
	OHE Depot		
	OHE and PSI depot		

3.20.5 Trip shed and siding:

Construction of trip shed and siding including inspection pit, earthwork, water supply arrangement, ballast supply and its spreading, Permanent way work with all Contractor's permanent way material for M+7 sleeper density with 60 Kg (90 UTS) rail and sleeper (Drg. No. T/2496), track connection with main line including thermit welding, insertion of glued joint, approach road, levelling and earth filling of land, street lighting arrangement, internal wiring with allied works and electrical power supply arrangement with transformer/main distribution supply.

Description of permanent way associated with the above work is:

S. No.	Location	Length of track	No. of turnout and derailing switch with sleepers, rail components and fittings	No. of glued joint
As per approved ESP				

3.20.6 Raising height of FOB

Raising height of FOB with running out of ramp up to specified height including material required for this work, design and drawings and temporary arrangement drawing adhering approved FOB drawing.

Sr. no.	Location	FOB no.	Existing height	Height to be raised
NA				

3.20.7 Raising height of ROB

Raising height of ROB with running out of approach road up to specified height including material required for this work, design and drawings and Temporary arrangement drawing adhering approved ROB drawing.

Sr. no.	Location	ROB no.	Existing height	Height to be raised
NA				

3.20.8 Modification of platform shed

Modification of platform shed up to specified height including material required for this work, adhering approved cover over platform drawing in connection with railway electrification works.

Sr. no.	Location	Length of shed	Existing height	Height to be raised

NA

3.20.9 Other works**Provide details of other works (sample list below)**

- (a) Service roads for traction substation and switching posts,
- (b) Tree plantation
- (c) Fencing
- (d) Bore wells
- (e) Pump house
- (f) General power supply sub-station
- (g) Number plates
- (h) [others (to be specified)]

SCHEDULE - C*(See Clause 2.1)***PROJECT FACILITIES¹⁸****1 Project Facilities**

The Contractor shall provide the Project Facilities in accordance with the provisions of this Agreement. The Contractor shall provide and maintain these project facilities throughout the course of the work and for such period of time during defect liability period, as the Authority's Engineer may require. Such Project Facilities shall include:

Civil works, signalling and telecom

- a) Provisional site office for Authority Engineer
- b) Main Site offices & related facilities for PMS/Authority Engineer
- c) Sub-Site offices (2 Nos)
- d) Furniture & Office Equipment
- e) Manning of Offices & Maintenance FACILITIES FOR CONTRACTOR'S USE
- f) Transport Facilities
- g) Temporary works / Temporary Facilities for Contractor's use / Contractors' office / Camp / Contractors labour camp
- h) Survey equipment
- i) Services such as water supply, electrification, sanitation, communications
- j) Providing electricity to the various project facilities
- k) Project network with project monitoring software like MS project along with closed user telecom group, fax & e-mail facilities and mobile communication network for project monitoring.
- l) Contractor's personnel.

Railway electrification

- a) Officers' rest house (As detailed vide table under clause no 2 of Schedule 'C')
- b) Camp office for authority (As detailed vide table under clause no 2 of

¹⁸This Schedule may be suitably modified to reflect project specific requirements.

Schedule'C')

- e) ~~Subordinate rest house~~
- d) Danger and caution boards
- e) Protective screens
- f) Earthing arrangement for structures

2 Description of Project Facilities

Each of the Project Facilities is described below:

S. No.	Project Facility	Location	Design Requirements	Other essential details
1	Main Site office	Near VPPL Holding Yard	1940 Sqm	There is a provision of Office building to be constructed as a scope in the work. This building shall be converted as Main site office cum rest house with all the furniture's , electrical equipment, housekeeping etc till completion of defect liability period as detailed below.

Each of the building to be provided as a part of Project Facilities is described below:

2.1 REQUIREMENTS COMMON TO ALL BUILDING FACILITIES:

- 2.1.1 All the building facilities shall be made at the specified locations, as approved by the Authority Engineer. The contractor shall submit necessary drawings of the various buildings (being provided as a part of project facilities) to the Authority Engineer and his approval shall be taken before commencement of any work.
- 2.1.2 The site offices should remain open for 24 hours a day and 7 days a week i.e., round the clock till the defect liability period is over.
- 2.1.3 Materials used for the construction of the offices shall be new and of good quality. Materials shall be chosen such that the buildings when erected shall give good ventilation, heat & sound insulation.
- 2.1.4 All buildings shall be supplied with continuous (24 hour) running potable water to the kitchens & wash rooms. The toilets may use raw water for flushing. The Contractor shall also arrange for the constant & hygienic disposal of all effluent, sewage & rubbish from the buildings.
- 2.1.5 All buildings shall be supplied with electricity, AC 240 Voltage in accordance with the Regulations. Lighting & electrical power points shall be provided in each room. The disposition & location of light & power points will be as directed by the Authority's Engineer. 24 hours power supply is to be arranged by Contractor to meet full power load. Fans and Air conditioners in all rooms shall be provided as per the directions of Authority Engineer.
- 2.1.6 Firefighting equipment shall be provided in accordance with the local recommendations.
- 2.1.7 The contractor shall maintain all the facilities in good condition which includes cleaning of the premises, maintenance of office equipments,

- 2.1.8 Maintenance of office furniture, repairs, replenishment of consumables in toilets, cartridges, stationery for the plotter/printers, replenishment of first aid box items, batteries and other consumables.
- 2.1.9 All furniture, furnishing, fittings & fixtures, equipment, electrical equipment etc., shall be of the configuration, make & quality as approved by the Authority's Engineer.
- 2.1.10 All the project facilities including all furniture, furnishings, fittings & fixture, equipment, electrical items etc., as provided by the Contractor for the use of Authority's Engineer/ Authority shall be the property of the Authority.
- 2.1.11 The provisional site office can be removed after commissioning of main site office. The sub-site offices can be removed after issue of Completion certificate. The main site office is required to be continued upto the end of defect liability period.
- 2.1.12 The areas surrounding the offices shall be well drained and provided with concrete pavements, walkways & parking areas for the vehicles, as per the requirement.
- 2.1.13 The Contractor shall maintain the project facilities/offices listed in para 2 above by doing the following, but not limited to:
- Pay all electricity charges
 - Pay all water charges
 - Carry out necessary repairs to all office and equipments as & when required
 - Day-to-Day cleaning & maintenance and watch & ward, etc.,
 - Provide watchman/security (1 No in each shift) at each office.
 - Collect & dispose off, in a location and manner consented by the Authority Engineer, all domestic waste & garbage from the offices on daily basis.
 - Provision of a properly designed and maintaining sewerage & sanitation facilities at all the offices.

2.2 TIME LIMITS FOR MAKING PROJECT FACILITIES:

The following time limits for providing various project facilities shall be adhered to. The time limit will be counted from the Appointed date.

Sl. No	Project facility	Time limit in Days	Penalty for delay (Rs. Per Week)
1	Provisional Site office	60	5000
2	Main Site Office	180	5000
3	Sub-Site Office	60	5000
4	Transport facilities	15	As per Para 2.9.4.6
5	Office equipment	60	5000
6	Survey Equipment	30	Nil

2.3 REQUIREMENTS OF PROVISIONAL SITE OFFICE:

- 2.3.1 One provisional site office shall be constructed, furnished & maintained in good condition for use while the main site office for Authority Engineer is being constructed for a total floor area of 125 sqm. The provisional site office shall be constructed at suitable location as decided by Authority.

Sl. No	Room Designation	Floor Area (Sqm)
1	Dy Chief Engineer	15
2	Offices for other Engineers	25
3	General Office	35
4	Meeting Room	25
5	Wash Rooms/ Stores/ Miscellaneous	25
	Total Area	125

- 2.3.2 The provisional site office shall be constructed using the consented materials. They shall be capable of being dismantled but of sound, weatherproof construction and shall be provided with lockable doors & windows, mosquito screens, sanitary facilities, lighting, electrical power supply.
- 2.3.3 The provisional site office shall have internal partition walls & doors, and shall contain at least the following rooms. Within the given total area, necessary modification can be made with the approval of Authorities Engineer without effecting the overall floor area. Within the given total area, necessary modification can be made with the approval of Authorities Engineer without effecting the overall floor are
- 2.3.4 The provisional site office shall be provided with necessary furniture, furnishings, fittings, fixtures and equipment, etc. They shall be of approved make / brand, model, type, size, capacity as approved by the Authority's Engineer. All the said furniture, furnishings, fittings, fixtures and equipment as provided by the Contractor for the Provisional Site Office may be shifted to the Authority Engineer's Main Site Office and shall be adjusted against the quantities of furniture, furnishings, fittings, fixtures and equipment required for the Authority Engineer's Main Site Office.

2.4 REQUIREMENTS OF MAIN SITE OFFICE FOR AUTHORITY ENGINEER:

- 2.4.1 Main site office for the Authority's Engineer shall be with a total floor area of 1940 sqm and constructed at the location decided by Authority Engineer.
- 2.4.2 The Authority Engineer's Main Site Office building shall be of sound design and of the material as approved by the Authority's Engineer. The office shall be weatherproof, and painted with luppam finish along with plastic emulsion paint internally & with water proof cement paint externally. Flooring shall be with vitrified tiles and floor to ceiling height shall be a minimum of 3.65m (12'). Each room having an internal wall shall have at least one screened window. The office building shall have two external lockable doors with fly proof mesh doors.

Electrical supply & receptacles shall be provided in various locations appropriate to the usage of the rooms. Rooms shall be well lighted.

- 2.4.3 Plumbing fixtures shall be standard type made out of porcelain or stainless steel and all pipe work & fittings shall be polyvinyl chloride (PVC).

2.4.4

Sl. No	Description	Main Office
	General Main Site Office Requirement	
1	Executive table along with high back revolving chair for AE, Authority	2
2	Table with high back revolving chair for PMs	4
3	Conference table (at least 4m x 1.5m)	1
4	Conference chairs (revolving high back)	16
5	Glass-fronted lockable bookcase	2
6	1800mm x 1200mm double pedestal desk	2
7	1200mm x 900mm single pedestal desks	8
8	Swivel office chair	4
9	Visitors' Chairs	20
10	4-drawer filing cabinet	4
11	Plan chest (A 0 size)	1
12	Work stations along with revolving chairs (medium back) 1.5m x 0.6m with partitions in between.	As per requirement furnished by Authority Engineer
13	Steel lockable cupboard 6 ft. high with internal shelves	6
14	Sofa Set (3+1+1) along with center table	1
15	Waste paper bin	As per site requirement
16	Display Boards (Wall Type)	4
17	Fully automatic camera with date and time recording facility loadable to a PC	1
18	Refrigerator 180 Ltr capacity	1
19	Crockery/Cutlery	For serving 10 persons at a time
20	Rain coats (various sizes)	As per site requirement
21	Safety boots (various sizes)	As per site requirement
22	Flashlight with batteries	5
23	Wall clock	2
24	First aid kits	As per site Requirement
25	Safety helmets	As per site Requirement
26	Safety harness	As per site

Sl. No	Description	Main Office
		Requirement
27	Day-glow waistcoat	As per site requirement
28	2 Ltr kettles	As per site requirement
29	Potable water dispenser with hot/cold taps	2
30	Cups & Plates	As per site Requirement
31	Fire Extinguisher	As required conforming to the stipulations of local authorities
32	Water purifier	1

2.4.5 The equipment & furniture to be provided are listed in Table below and shall be of make/ brand, model, type, size, capacity as approved by the Authority's Engineer. The furniture and equipment shall be brand new. The furniture & equipment shall be provided within 7 days of commissioning of main site office and shall be maintained until the end of defect liability period. All electrical components shall be of standard approved make, as approved by the Authority Engineer. The above list is only indicative. Necessary toiletries like plastic bucket (10 Ltrs capacity), mugs (2 Nos), liquid soap wash will also be provided in each toilet. All other equipment, tools, furniture as required for the efficient running of office shall be ensured.

2.5 REQUIREMENTS OF SUB-SITE OFFICE:

2.5.1 The Sub-site office shall be constructed to the same standards & specifications except dimensions of the buildings as described those of the main site office above.

2.5.2

Sl. No	Room No & Designation	No of Rooms	Floor Area (Sq.m)
1	Engineers & Authority Engineer	2	50
2	Record Room	1	10
3	Washrooms	2	10
	Total Floor Area		70

2.5.3 Each Sub-site office shall be with a total floor area of 70 sqm. The approximate are as of various rooms is as under. The Authority Engineer can modify the individual areas of rooms, keeping the overall area unaffected.

2.5.4 Each Sub-site office shall be provided with the following furniture:

Sl. No	Item	Size (Mt)	Quantity
--------	------	-----------	----------

1	Table	1.2 x 1.5m	4
2	Visitors Chairs		4
3	Steel Almirahs		2
4	Electrical Kettles	2 Lit	2
5	Safety Helmets, Safety Waist coats		As per site requirement
6	Portable Water dispenser		1
7	Cups & Plates		As per site requirement

2.6 SANITATION AND SEWERAGE

- (i) Sanitation and sewerage systems for the office and restrooms shall be installed and made operational within the specified period of construction as mentioned above in respect of the respective Site Offices.
- (ii) The Contractor shall provide a properly designed and constructed septic tank approved by the Engineer for the disposal of domestic sewage from each building in the Engineer's site offices
- (iii) Each septic tank shall be regularly emptied, maintained and serviced by the Contractor to ensure proper functioning.

2.7 SURVEY EQUIPMENT

- (i) All the survey instruments required by the Engineer shall be provided by the Contractor. The surveying instruments, to be provided for the exclusive use of the Employer/PMC and their site staff, shall be brand new, of the latest design, and manufactured by Wild, Kern, Nikon, or any other reputable manufacturer acceptable to the Engineer/Authority. The instruments shall include all items necessary for the Engineer to establish horizontal and vertical control, both on the surface and underground, and to check the Contractor's surveying work.
- (ii) The surveying instruments, to be provided for exclusive use of the Authority's and Authority Engineer's site staff, shall be brand new, of the latest design and manufactured by Wild, Kern, Nikon or other reputable manufacturer as acceptable to the Authority's Engineer/Authority. The instruments shall include all items necessary for the Authority's Engineer to be able to establish horizontal and vertical control both on the surface and underground and to check the Contractor's surveying work.
- (iii) The Contractor shall present to the Authority's Engineer for consent the proposed make, type, and models with parts and performance catalogues and manufacturer's warranty, prior to purchase.

Following equipment shall be provided:

- a) No. Levels type Wild N#2 or similar, (2 No. with parallel plate attachments) complete with tripods, plumbing rods and staves (including 2 sets of precise staves).
- b) 2 No. Wild Total-stations or similar, complete with tripods and accessories

- c) 4 sets Sighting targets, illuminated for night use, complete with batteries, etc.
- d) 4 No. each Steel tapes of 30 m and 60 m each, with spring gauges
- e) 35 No. Metric steel tapes 3 m, retractable
- f) 2 No. Optical plumbs
- (iv) The Contractor shall furnish the survey equipment within 60 days after the Appointed Date and maintain it in good conditions until the issue Over Certificate unless otherwise authorised by the Authority's Engineer.
- (v) All the survey instruments shall be maintained by the Contractor through service agent and shall be regularly checked and calibrated.
- (vi) The Contractor shall provide the Authority's Engineer with any additional surveying equipment and materials such as pegs, mallets, stakes, nails, paint, etc., as required, and shall make available to the Authority's Engineer any surveying instrument owned by his surveying department, but not included in the above list of equipment, which may be necessary for checking the Works. Any instrument which has been damaged or been non-operational shall be immediately replaced or repaired by the Contractor. Equivalent replacement shall be provided by the Contractor in such cases including the equipment which is being repaired or serviced.

2.8 EQUIPMENT FOR USE OF THE AUTHORITY'S ENGINEER:

The Contractor shall provide at his own cost new equipment & software as listed below and maintain them for the exclusive use of the Authority and the Authority's Engineer in various site office of the Authority Engineer along. Equipment provided in provisional site office can be shifted to main site office. **USE OF CONTRACTORS FIRST AID FACILITIES**

1	Desktop Computer: (Provisional site office -2 Nos, Main site office – 06 Nos, each sub-site office - 3 Nos)	With minimum specification of Intel Core i7, 3.5 GHz, 3MB Cache, 8 GB DDR3 RAM, 500 GB Hard Disk Drive, DVD writer, 18.5" colour TFT monitor, 10/100 LAN card, Modem Card, operating system Windows 10 professional or higher preloaded with media and documentation and certificate of authenticity and Microsoft Security Essentials preloaded anti-virus software.
2	Printers: (Provisional site office-A4 size-1 No., Main site office- A4 size-2 No., A3 size-1 No., each Sub-site office – A4 size 1 No	The A4 size printer shall be all-in-one Colour Officejet having features of Fax, Scanner, Copier and Printer. The A3 size printer shall be Colour office jet with a print speed of up to 8 pages at 800 dpi or more.
3	Large Format Plotter-1 No. in main site office.#	HP Model C6084A (3800CP 54 colour plotter) or similar / better
4	Application Software to all Computers	<ul style="list-style-type: none"> ● Microsoft Office latest release. ● AutoCAD 2D & 3D latest release. ● MS Project or equivalent ● PDF Converter/Professional
5	Xerox Machine- 1 No. in main site office	For paper prints capable of reduction & copying A3 & A4 size paper with Automatic document feeder capability & sorter (Canon IR 2020 or similar/better).

6	UPS system to all Computers and Printers	With sufficient power backup (minimum backup of 30 minutes) to meet the sufficient power load in case of power disruption.
7	Surge Protection Devices	One for each computer & printer as given above.
8	Power supply for systems	AC 240 volts, 50 Hz from normal building wiring circuit mains, stabilizer for Refrigerator / ACs, UPS for the computer systems such that the systems can function efficiently.
9	Internet	Internet connection with WiFi facility so that multiple devices can be connected for each site office.
10	Required Spares	Ink, Cartridges for PCs, Printer, Photocopier including AMC for the equipment
11	Stationery	Stationery as required for day-to-day working shall be provided.

The contractor emergency medical services shall be made available for use of Employer's and Engineer site staff and their families living at the site or the work areas free of charges.

2.9 TEMPORARY WORKS.

Scope of Work: All necessary Temporary Works adequate for the realization of the Works such as Temporary Facilities and Temporary Utility Services shall be provided and maintained by the Contractor for his own use, for his sub-contractors, the Authority 's Engineer and the Authority unless otherwise authorized by the Authority 's Engineer.

The Temporary Facilities including, but not limited to, offices, warehouses and material stock areas as well as the Temporary Utility Services including, but not limited to, power, lighting, water and communication shall be provided, equipped, and maintained in good conditions until the issue of Taking-Over Certificate.

The Contractor shall ensure that the Temporary Facilities and Services do not interfere with the Permanent Works or prevent the installation, commissioning and testing of the Permanent Works and works and services of Other Contractors. Where necessary the Contractor shall divert or relocate the temporary facilities / services in the course of the works at his own cost.

The Temporary Works shall include but not limited to the following:

- a) Contractor 's camp: Detailed drawings at scale 1:500 showing the camp layout, buildings, road recreation areas, all public utilities, etc., and drawings at scale 1:50 showing type building construction details with specifications
- b) Offices, parking areas, warehouses, storage areas, and medical care services: Drawings and specifications for the establishments and facilities with appropriate details and First Aid Station.
- c) Water supply, sewerage, sewage treatment and disposal, power supply and illumination, communication services (basically mobile phones and land phones), firefighting services

- Detailed design for industrial and potable water supply to the camps and working areas as well as sewerage systems, sewage treatment and disposal system based upon estimated number of users.
- Detailed layout drawings for electrical installations and distribution system at the Site and Work Areas, showing power sources, voltages, outlets, and routing of power lines
- d) Temporary construction works including support systems for deep excavations, cofferdam and the support, concrete formworks and its support, temporary bridges and staging and so on.
- e) Access routes including temporary road works to all locations necessary to be reached in the course of construction in the Site and the Work Areas including public road diversions
- f) Equipment pools and mechanical workshops
- g) The detailed plan for operation of the Borrow Areas and Quarries as detailed hereinafter including approach roads
- h) The Stockpile areas as detailed hereinafter including approach roads.
- i) Concrete batching & mixing plant and crushing plants, including cement storage: Detailed design and drawings including manufacturer's drawings and foundation drawing with the supporting design calculations prepared by the Contractor for concrete batching & mixing plant and crushing plants in accordance with the requirements of the pertinent provisions of the Specifications. Fabrication Yard, Casting Yard including casting bed, lifting, curing and stacking system for pre-cast concrete elements along with the supporting design calculations and drawings
- j) Transporting, handling and launching system for the precast concrete elements/steel fabricated elements including design and drawings for launching truss/girder etc.
- k) Material testing laboratories: Detailed breakdown of all equipment to be used for material testing in field and in laboratories in accordance with the requirements of the pertinent provisions of the Specifications.
- l) Explosive's magazines - their proposed locations and operation plan
- m) Security and safety arrangements
- n) Layout and drawings for offices for the Authority's and the Authority Engineer's staff.
- o) Project Signboards and diversion boards.
- p) Barricades and other temporary walls and alike with pertinent design considerations & drawings containing details such as height, material, colour scheme, Logo, anchoring mechanism etc. complying with the requirements.

2.9.1 Temporary Facilities for the Contractor's Use

- a) Contractor's Site Offices, Warehouses, Material Yards
 - i. The Contractor shall provide and equip, for his own and his subcontractors' use, main and secondary offices, warehouses, materials stock areas, fuel storage areas and explosives magazines, all of which shall be constructed and furnished for use within 120 days after the Appointed Date and maintained in good conditions until the issue of Taking-Over Certificate.
 - ii. Listed hereunder are the buildings, shops and warehouses expected to be constructed and equipped by the Contractor for his use in the performance of the

Work under this Contract, in addition to facilities explicitly specified elsewhere in this Contract:

- Mechanical repair shop
 - Electrical repair shop
 - Metal work and wood fabrication shop
 - Main warehouse and tools & parts store
 - Bulk cement silo
 - Bagged cement store
 - Spare parts store
 - Testing facilities & site laboratory
- b) Land for temporary facilities for Contractor's Use: Wherever available, the Contractor shall be allowed to use Railway land for carrying out his Temporary Works including stockpiling of ballast and other materials but excluding the Borrow Pits and the Quarries subject to the consent by the Authority's Engineer. Any land required in excess of that shall have to be arranged by the Contractor using his own resources and at his own cost under due intimation to the Authority's Engineer.
- c) Stockpile Areas
- i. The Land available within the ROW may be used by the Contractor for stacking of girder components and other materials, subject to consent of the Authority's Engineer.
 - ii. The Contractor may also arrange additional stockpile areas as required by him at his own discretion and cost.
 - iii. The location and size of the Stockpile Areas proposed by the Contractor shall be subject to consent of the Authority's Engineer. The Authority Engineer's consent may be withheld for any of the following reasons:

If the Stockpile Area, or access into them, in the opinion of the Authority's Engineer:

 - Will have a detrimental effect on the natural and social environment;
 - Will disturb drainage system around the Stockpile Areas;
 - Would constitute a danger to the public; or
 - Becomes too high stockpile as decided by the Authority's Engineer.
- iv) Before commencing operations, the Contractor shall submit detail drawings of the proposed Stockpile Areas together with the proposed method of operation including stockpile heights, runoff / dust control measures, access road layout, drainage and measures to be taken for restoration etc.
- v) On completion of stockpile operations, the Contractor shall reinstate the Stockpile Area in a safe and stable condition.
- vi) The Contractor shall indemnify the Authority against all claims in relation to the Stockpile Areas during and after the Works.
- vii) All the soil excavated in the ROW shall be the property of the Authority and shall not be removed from the Site without the consent of the Authority's Engineer/Authority and shall be used for the Works to the extent feasible.
- d) Concrete Batching & Mixing Plant and Crushing Plants

The Contractor shall plan, install and erect all necessary concrete batching & mixing plant and crushing plants of sufficient capacity to meet the planned peak requirements during construction. The capacity of the plants shall be subject to consent by the Authority's Engineer. All control and measuring equipment shall be

regularly calibrated. The Contractor shall submit the Authority's Engineer the results of the calibration regularly.

e) Material Testing Laboratories

- i. The Contractor shall build and equip adequate Material Testing Laboratories on the Site and / or at the Work Areas for sampling and testing of materials for concrete, earth or any other materials as specified in the Specifications. The location of the Material Testing Laboratories shall be consented by the Authority's Engineer.
- ii. The laboratory shall be located in a building properly equipped with electricity, water, air-conditioning etc., and shall have enough room for storing the samples.
- iii. The equipment to be supplied and the methods of testing shall be in accordance with the relevant Indian Standards specified in the Specifications and / or as described in the respective Manual. All apparatus and equipment shall be brand new and of the latest design and manufactured by a reputable manufacturer. The proposed type and number of items of laboratory equipment shall be presented to the Authority's Engineer prior to purchase.
- iv. The equipment and apparatus shall be calibrated before the testing starts and at regular intervals as specified by the manufacturer and as directed by the Authority's Engineer. The Contractor shall submit the results of the calibration to the Authority's Engineer regularly.
- v. The constructor shall complete the construction and installation of the facility for operation within 90 days after the Appointed Date and operate and maintain the facility until the issue of Taking-Over Certificate unless otherwise authorized by the Authority's Engineer. The Contractor shall also make all facilities and services available to the Authority's Engineer as required. All sampling and testing to be undertaken shall be under the direct supervision of the Authority's Engineer. The Material Testing Laboratory shall be run by Contractor's personnel fully experienced in sampling and testing of materials, and quality control.
- vi. Specialized testing which may be required and which cannot be performed in the Contractor's laboratory due to lack of time or equipment shall be assigned to an independent organization having NABL Accreditation and duly consented by the Authority's Engineer. The Contractor shall accept all results, instructions or restrictions stipulated by the Authority's Engineer based on such tests.

f) Communication Systems

The Communication System to be applied to the project shall be basically the Mobile Phone Base Communication System. The Contractor shall establish the Mobile Phone Base Communication System Plan solely dependent on ready-to-use mobile phones for internal and external communication and submit the plan to the Authority's Engineer for consent. The Contractor shall ensure that his Communication System is available for communication with the Authority's Engineer and Authority within 30 days after Appointed Date and shall maintain the same until completion of the Defect Notification Period. He will also provide internet facility at all site offices.

g) Contractors camp

- i. The Contractor shall provide adequate camping facilities for the use of his employees/staff and those of his sub-contractors. Camping facilities shall have adequate sanitary facilities including sewage disposal system, medical service, drainage, fire control and all utility services (potable water, power etc.) and shall comply with statutory requirements.

- ii. Contractor's Employee's Camp can be located at the land available within the ROW wherever available subject to the consent by the Authority's Engineer. If any additional area is required by the Contractor for the purpose, the same shall have to be arranged by the Contractor at his own cost.
 - iii. No camp construction shall commence until the Contractor's drawings and specifications have been consented by the Authority's Engineer.
 - iv. Camp facilities shall be provided to meet the requirements of the maximum anticipated workload and labor force. These facilities shall be available and fully operational within 90 days after the Appointed Date and maintained in good conditions until the issue of Taking-Over Certificate unless otherwise authorized by the Authority's Engineer.
 - v. The Contractor's camp shall comply with the applicable laws, Codes and Standards.
 - vi. The Contractor shall be responsible for keeping the camp, and the buildings within it, in good hygienic conditions. The standards and regulations presently in force in India with regard to personnel treatment, sanitary conditions, and fire and accident prevention shall be duly taken into account.
- h) First Aid Stations
- i. The Contractor shall comply with the applicable laws and health standards presently in force in India. In the event of an epidemic breaking out, the Contractor shall carry out and comply with all orders, arrangements or regulations which may be issued by the Government or local authorities.
 - ii. The Contractor shall construct, equip, and maintain the First Aid Station at adequate locations on the Site and at each and every camp.
 - iii. These facilities shall be fully equipped and staffed as per the applicable regulations in force. These facilities shall be available and fully operational within 120 days after the Appointed Date and maintained in good conditions until the issue of Taking-Over Certificate unless otherwise authorized by the Authority's Engineer.
 - iv. Medical services in the First Aid Stations shall be under the direction of a licensed doctor and nurses on the same working hours as the Works throughout the duration of the construction.
 - v. Standing arrangements shall have to be made with the nearest general hospital for providing treatment in case of emergencies and serious cases. The Contractor shall summarise the design of all his Temporary Facilities in the Temporary Works Design Report and Drawings.

2.9.2 Temporary Utility Services for the Contractor's Use

Power Supply and Illumination

- a) The electric power supplies for the Temporary Facilities including but not limited to Contractor's camps, offices, Site, Work Areas and other facilities as described herein shall be arranged by the Contractor at his own cost. If water & Electricity connections are available and provided to the Contractor for Project facilities, they will be charged as per the extant rules of Railways.
- b) The Contractor shall install, operate and maintain its own electrical distribution systems for the power supply for his Temporary Facilities including Site, Work Areas.

- c) The Contractor shall also furnish, install and keep operational the diesel power generating facilities of such capacity what he considers necessary to prevent the interruption of the Works.

Water Supply

- d) The Contractor shall design, install, operate and maintain water supply systems including pumps, piping system, valves, storage tanks etc., at the Site with respect to:

- i) Industrial water supply system;

For construction use meeting the quality requirements as specified in Specifications

- ii) Potable water supply system:

For supply to all the Temporary Facilities including but not limited to Contractor's camps, offices, Site, Work Areas and other facilities for human consumption and use

In case the Contractor plans to install a bore well for water supply, he shall thoroughly investigate the relevant legislation and regulations imposed by the competent authorities and the installation shall be subject to approval by the said competent authorities and/or consent of the Authority's Engineer.

Throughout the duration of the construction, the Contractor shall take samples from all water supplies at regular intervals and test it for its suitability for the intended use.

b) Fencing and Site Security and Safety

The Contractor shall be responsible for the security and safety of site. Accordingly, the contractors' offices, workshops, and storage compounds, campsites, all construction areas, storage areas shall be adequately fenced, gated, lighted and guarded round the clock. Firefighting equipment shall be provided in accordance with the applicable Codes and requirements of local authorities.

The explosive magazines comply with the relevant regulations of India and shall be at the locations approved by the competent authorities. Detonators and fuse shall be stored in separate magazines away from explosives. In no case they shall be transported in the same vehicles with explosives. Explosive magazines shall be kept locked and keys accounted for at all times.

The Contractor shall be responsible for any losses occurring within the Site premises. The Contractor shall install, furnish all these facilities within 120 days after the Appointed Date and maintained in good conditions until the issue of Taking-Over Certificate.

2.9.3 Inspection by the Authority or Authority's Engineer

The Authority and the Authority's Engineer have the right at any time to inspect any part of the Contractor's Temporary Facilities and to require immediate rectification to comply with the specified requirements.

Upon the Completion of Works, or when any of the plants and facilities have completed its functions, the Contractor shall dismantle and demobilize the temporary facilities and remove all refuse, debris, objectionable material, and fill, grade and dress all the areas to its original condition as it was before commencement of the Work.

No demobilization or removal of temporary facilities and equipment shall be made without prior consent of the Authority's Engineer.

2.9.4 Contractor's Labour Camp

General

2.9.4.1 The Contractor shall comply with all requirements as specified in the local bye laws formulated by the state government.

2.9.4.2 The Authority will not provide living accommodation for the use of the Contractor or any of his staff or labour employed on the Works.

2.9.4.3 Provision of Labour Camp

The Contractor shall, at his own expense, make adequate arrangements for the housing, supply of drinking water and provision of bathrooms, latrines and urinals, with adequate water supply, for his staff and workmen at the location authorized by the Authority.

No labour camp shall be allowed at Site without the consent of the Authority or any unauthorized place. The Contractor shall prepare a detailed labour camp plan to obtain the consent from the Authority.

The Contractor at his own cost shall maintain all camp sites in a clean and sanitary condition.

The Contractor shall obey all health and sanitary rules and regulations, and carry out at his cost all health and sanitary measures that may from time to time be prescribed by the Local/Medical Authorities and permit inspection of all health and sanitary arrangements at all times by the Authority and the staff of the local municipality or other authorities concerned.

Should the Contractor fail to provide adequate health and sanitary arrangements, these shall be provided by the Authority and the cost recovered from the Contractor.

The Contractor shall at his own cost, provide First Aid Stations within the camp.

The Contractor shall at his own cost, provide the following minimum requirements for fire precautions at suitable locations complying with the requirements of applicable codes:

- a. Portable fire extinguishers.
- b. Manual Fire Alarms.
- c. Water Supply for use by the Fire Service.

The Contractor at his own cost shall provide necessary arrangements for keeping the camp area sufficiently lighted to avoid accidents to the workers.

The Contractor shall ensure that electrical installations are done by trained electricians and as per the applicable Codes and Standards and these installations shall be maintained and daily maintenance records shall be made available for inspection of the Authority.

Camp Discipline

The Contractor shall take requisite precautions, and use his best endeavours to prevent any riotous or unlawful behaviour by or amongst his workmen, and others, employed directly or through sub-contractors.

These precautions shall be for the preservation of the peace and protection of the inhabitants and security property in the neighbourhood of the Works.

In the event of the Authority requiring the maintenance of a Special Police Force at or in the vicinity of the site, during the tenure of the work, the expenses thereof shall be borne by the Contractor.

The sale of alcoholic drinks or other intoxicating drugs or beverages upon the work, in any labour camp, or in any of the buildings, encampments or tenements owned or occupied by, or within the control of, the Contractor or any of his employees directly or through sub-contractors employed on the work shall be strictly prohibited and the contractor shall ensure strict compliance with this condition.

The Contractor shall also ensure that no labour or employees are permitted to work at the site in an intoxicated state or under the influence of drugs.

The Contractor shall remove from his camp such labour and their families, who refuse protective inoculation and vaccination when called upon to do so by the Authority on the advice of the Medical Authority.

Should Cholera, Plague or any other infectious disease break out, the Contractor shall at his own cost burn the huts, bedding, clothes and other belongings of or used by the infected parties.

The Contractor shall promptly erect new accommodation on healthy sites as required by the Authority, within the time specified by the Authority failing which the work shall be done by the Authority and the cost recovered from the Contractor.

Labour Accommodation. The Contractor shall provide living accommodation for all staff employed by himself or his subcontractors that is equal to or exceeds the minimum criteria established in the following sub-sections.

The buildings shall be constructed so as to have a minimum life of not less than the period of the Contract.

The roofs shall be leak proof and laid with suitable non-flammable materials permissible for residential use under local regulations and for which the consent of the Authority has been obtained.

Each unit shall have suitable ventilation with all doors, windows and ventilators provided with security leaves and fasteners and back-to-back units are to be avoided.

1. The minimum height of each unit shall be 2.1 m.
2. The Contractor shall provide a suitable cooking area.
3. The number of common toilet/bath/urinals shall be provided as per camp requirement.

Water Supply. The Contractor shall make his own arrangements to provide adequate potable water supply in the Camp.

Where piped water supply is available, supply shall be at stand posts and where the supply is from wells or rivers, storage tanks of metal or other consented material shall be provided.

The Contractor shall also at his expense make arrangements for the provision and laying of water pipe lines from the existing mains wherever available.

Drainage

The Contractor shall provide efficient arrangements for draining away surface water so as to keep the camp neat and tidy.

Surface water shall be drained away from paths and roads and shall not be allowed to accumulate into ditches or ponds where mosquitoes can breed.

Sanitation.

The Contractor shall make arrangements for conservancy and sanitation in the labour camps according to the rules and regulations of the Local Public Health and Medical Authorities.

The Contractor shall provide a sewage disposal system that is adequate for the number of residents in the camp, and which meets the norms of the local authorities.

The provision of the latrines and wash places shall be in accordance with applicable Codes and Standards. However, the layout shall be subject to consent by the Authority.

The Contractor shall be responsible for maintaining all latrines and wash places on the Site in a clean and sanitary condition and for ensuring that they do not pose a nuisance or a health threat.

The Contractor shall also take such steps and make such provisions as may be necessary or directed by the Authority to ensure that vermin, mosquito breeding etc. are at all times controlled.

The Contractor shall be responsible for providing water, electricity, communication, sewage disposal arrangements, drainage, roads, paths and parking facilities etc. for all the site accommodations, structures and buildings and meeting all the requirements as specified in the Bid Documents.

The Contractor shall also be responsible to obtain the necessary approval from the relevant civic and utility authorities and shall maintain all such services that are necessary for satisfactory performance of the Works.

2.9.5 Laboratory

Contractor shall establish a Central laboratory for carrying out testing to ensure compliance as per the Quality Assurance Plan (QAP) as per details in this document. The laboratory should be well equipped for the testing facilities for the following in addition to the other requirements as per QAP:

- Concrete: Set of IS Sieves for coarse and fine aggregate, slump cone, cube moulds, Compression strength testing machine.
- Earthwork: Grain size analysis, Atterberg Limits, Modified Proctor density (OMC & MDD), Field Density (OMC & MDD), Plate Load Test (Ev2), CBR (CBR value) etc.,
- Ballast: Set if IS sieves for sieve analysis of ballast, impact testing machine, abrasion test, water absorption test equipment, flakiness and elongation test equipment.

The above central laboratory shall have facility for carrying out all tests required, as per Specifications or as stated elsewhere in the contract, including supply of laboratory equipment and also provision of adequate number of qualified personnel, erection, maintenance & running of laboratory including all consumable like chemicals & reagents. If the laboratory is not provided within one month of issue of letter of acceptance, a deduction of Rs. 2,00,000/- will be made on monthly basis. In addition of these, field testing equipments are also to be arranged wherever required and instructed by Authority Engineer. Further, cost of tests and all incidental & departmental charges, etc., carried out at any other approved laboratory/test house shall be borne by the contractor.

2.9.6 TRANSPORT

2.9.6.1 General

The Contractor shall provide the following road transport vehicles for the use of the Authority and the Authority's Engineer within 15 days from the date of commencement of the works Or appointed date whichever is earlier.

Vehicles as detailed below to shall be provided for the use of Authority Engineer/his representatives.

Type	No of Vehicles (Civil)	No of vehicle (Electrical)	Total vehicle Months
Innova	1	0	One Each Month Till completion of Defect Liability period
Ertiga/ Scorpio or any other SUV	2	2	Four Each Month Till completion of Defect Liability period
Total	3	2	Five Each Month Till completion of Defect Liability period

2.9.6.2 Type of AC vehicles: Innova/ Ertiga/ Scorpio or any other SUV, Non-AC: Bolero /Tavera / Mahindra TUV. General requirements of vehicles and their maintenance:

2.9.6.3 The vehicles shall not be more than 1 year old as on the day of initial deployment & maintained by the Contractor in good roadworthy condition including daily cleaning. Any vehicle shall be replaced with a suitable vehicle of appropriate category, as per the advice of the Authority, if the vehicle condition is found to be not satisfactory.

2.9.6.4 The Contractor shall employ & make available competent licensed drivers to operate the vehicles. The Contractor shall replace drivers at the request of the Authority's Engineer, if required.

2.9.6.5 The vehicles shall have comprehensive insurance covering driver, authorised passengers, third party and for the carriage of goods. The vehicle should conform to the norms prescribed by the local pollution control boards.

2.9.6.6 The Contractor shall provide fuel, oil for running of each vehicle and ensure maintenance in conformity with the vehicle manufacturer's recommendations. All relevant toll & parking charges shall be paid while the vehicles are in use. The vehicle shall be provided day & night as required by the Authority's Engineer or his representative.

2.9.6.7 A suitable replacement shall be provided by the contractor for any vehicle out of service for more than 24 hours. If the contractor at any time fails to provide vehicle(s) or substitute vehicle(s) as specified, an amount of Rs. 2500/- per day for each vehicle (that the Contractor failed to provide) shall be recovered from the Contractor.

2.9.6.8 Each Vehicle supplied is likely to ply 3000 km per month (on an average)

- 2.9.6.9 Vehicle shall be provided during the Defect Liability Period, as per the day-to-day requirement.
- 2.9.6.10 Vehicles shall be provided so as to cover the entire completion period(s) & Defect Liability Period(s).
- 2.9.6.11 The vehicles can be taken back by the agency after completion of defect liability period under prior approval of Authority Engineer.

3.0 Contractor's Project Organisation

The content given below is for guidance only. It can be modified as per requirement of Authority.

3.1 The Contractor is fully responsible for ensuring quality of construction, supervision of the works being executed by him. He has to deploy an adequate number of personnel from his side in order to complete the work within the completion period and also to maintain the infrastructure created under this work till defect liability period. Please refer para 3.4 of Article-3. However, the Contractor(s) shall employ following minimum number of technical personnel during the execution of the allotted work as per table below. This list is only minimum and not exhaustive. Additional manpower as required from time to time to be deployed as per progress for ensuring supervision, quality control etc., Apart from the key personnel mentioned below, the Agency has to engage required number of skilled and un-skilled workers to complete the work within the stipulated time and to meet the targets of the project.

S. No	Title of Position	Nos	Minimum Experience in relevant field (in Years)	Scale Check	Minimum Qualification
1	Project Head	1	15	---	B. Tech (Civil Engg.)
2	PMs for Civil, S&T and Electrical Works	3	10	2 for Civil, 1 for Electrical	B. Tech/ diploma in relevant field.
3	Safety Consultant	1	10	---	Science/Engineering Graduate. Refer para 10.2.11 under Article-10
4(a)	Quality Assurance Engineer/ Civil	2	10	1 per each 20 Km length	B. Tech/ diploma in relevant field.
4(b)	Quality Assurance Engineer/S&T	1	10	1 per each 40 Km length	B. Tech/ diploma in relevant field.
4(c)	Quality Assurance Engineer/Electrical	1	10	1 per each 40 Km length	B. Tech/ diploma in relevant field.

5(a)	Site Engineer (Civil)	3	5	1 per each 10 Km, 1 per each Imp. Bridge	B. Tech/ diploma in relevant field.
5(a)	Site Engineer (S&T)	2	5	1 per each 20 Km length	B. Tech/ diploma in relevant field.
5(a)	Site Engineer (Electrical OHE)	2	3/5	1 per each 10 Km length	B. Tech/ diploma in relevant field.
5(a)	Site Engineer (Electrical PSI)	1	3/5	1 per each project	B. Tech/ diploma in relevant field.
5(a)	Site Engineer (Electrical GS)	1	3/5	1 per each project	B. Tech/ diploma in relevant field.
6	Asst. Site Engineer	12	2	6 for Civil, 6 for Electrical	Diploma in relevant field.
7	Computer Operator with knowledge of Software like Trimble Tilos or equivalent, AutoCAD, STAAD, Microsoft Office, etc.	2	5	---	Graduate
8	Design Engineer (Electrical)	3	2	1 each for OHE/ PSI/ GS	B. Tech/ diploma in relevant field.

3.2 The Personnel shall be deployed throughout the Contract period during the execution of work. However, the deployment schedule of these Engineers shall be as per the plan submitted by the Contractor and approved by Authority Engineer. Further Deployment of these personnel will not absolve the Contractor from his responsibility of proper supervision of work.

3.3 Sufficient number of personnel to assist the personnel at S. No.-3,4,5 shall be deployed fulfilling the requirement of Article 11 of the EPC document

3.4 In case the Contractor(s) fails to employ the Contractor's personnel aforesaid above, he shall be liable to pay an amount given below for the default period:

- (i) Rs. 200,000/- per head per month for Sr.No. 1
- (ii) Rs. 100,000/- per head per month for Sr.No. 2 ,3 & 4
- (iii) Rs. 50,000/- per head per month for Sr.No. 5 & 6
- (iv) Rs. 40,000/- per head per month for Sr.No.7 & 8

3.5 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 Authority Engineer and the same will be approved by Authority Engineer and shall be available during the currency of work execution for record purpose. Authority Engineer reserves the right to scrutinise the records of the

Contractor to ascertain as to whether the qualified staff has been actually employed by him and is paid for.

- 3.6 The contractor's technical personnel should work in cohesion with Authority Engineer's personnel. The agency shall provide adequate personnel to facilitate the PMS engineers in collecting samples, in conducting various quality control tests, in carrying out survey works, in checking measurements, facilitating site inspections, etc. as required.
- 3.7 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.
- 3.8 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.
- 3.9 The Contractor shall be responsible for the Security of the Work Site and for keeping the unauthorized persons off the Site.
- 3.10 The contractor's technical personnel should work in cohesion with Authority Engineer's personnel.
- 3.11. The agency shall provide adequate personnel to facilitate the PMS engineers in collecting samples, in conducting various quality control tests, in carrying out survey works, in checking measurements, facilitating site inspections, etc as required.

3.12. FACILITIES FOR CONTRACTOR'S USE

The Agency shall make necessary site office, labour camps, storage houses, transport facilities, fabrication yards, concrete batching plants, pug mills etc., as per his requirement at his own expense.

Railway will provide land free of cost, based on the written request of the Agency, for the above purposes, if the land is available. If Railway cannot provide land, the Agency sha

Necessary plans for the construction of the above-mentioned facilities shall be submitted to the Authority Engineer and his approval shall be taken before taking up any construction. All the facilities created shall be temporary ones and needs to be removed after completion of the works and before issuing of final completion certificate. Only those bare minimum facilities which are required in the defect liability period shall be continued during this period.

The Agency shall provide and maintain potable water supply, sanitation, electricity, communications, firefighting arrangements for all the facilities at his own cost.

The Authority Engineer will have access to inspect the facilities, if warranted, at any time during the course of execution of work.

These facilities should not be constructed at such locations causing obstruction to the main work.

It shall be ensured by the Agency that his workers are equipped with necessary safety equipment like helmets, waist jackets etc.,.

Necessary first aid station with all the required medicines shall be constructed within 30 days of Appointed date at the Contractor's camp office.

Sale and consumption of intoxicating beverages in the Contractor's camp office, labour camps or in any premises within the Project site is strictly prohibited. The agency shall abide by the local bye laws in storing inflammable articles like Deisel, petrol, explosives etc.

Appendix -1:
Request for Inspection (RFI) Procedure:

- 1.**RFI Submission Timeline:** The contractor is required to submit a Request for Inspection (RFI) **24 hours** prior to the activity that requires inspection on a given day.
- 2.**RFI Format:** The contractor must use the **approved RFI format** for all submissions. This format must be prepared and approved by the Engineer in Charge (EIC) before it is used for inspections.
- 3.**Inspection and Billing Considerations:** Only **approved RFIs** will be considered valid for Billing purposes.
- 4.**Furthermore, only approved RFIs** will be accepted for billing and payment. The contractor must ensure that all RFIs, along with any required supporting documents, are submitted with the invoice or bill.
- 5.**RFI Documentation:** RFIs should be submitted in **triplicate** (three copies), and each RFI must be closed and completed **on a daily basis**. If RFI gets rejected, the said activity would be rectified and RFI to be closed by the one rank above officer.
6. **Non-Compliance Consequences:** Any activity executed **without an approved RFI** will be treated as **non-accepted** by the Engineer in Charge and will not be considered for payment. Subsequent **activities** that rely on the non-compliant activity will also not be eligible for payment.

Appendix 2: Procedure Order for Ensuring Safety At Work Site

No. T5/18/29/O(POLICY) Vol. III dated 13.03.2018

CAO (C)-CCG

DRM-BCT/BRC/RTM/ADI/RJT/BVP

Sub: PROCEDURE ORDER FOR ENSURING SAFETY AT WORK SITE.**Ref:** Compendium of instructions on safety at work site.

A number of Engineering, S&T and Electrical works in connection with gauge conversion, doubling, third line, dedicated freight corridor, Railway Electrification, yards remodeling and traffic facilities, RUBs etc. are progressing on various divisions which require excavation/digging, movement of vehicles/equipment near the running tracks.

While carrying out these works in the vicinity of running tracks, there is always a danger of disturbance to existing embankment, track geometry, damage to electrical/S&T cables and other utilities and above all infringement of moving dimensions which may result into disruption of traffic, and other repercussions on safety as well.

The work sites shall also include all work and activities in proximity of existing running tracks, in which any incident at the work site may lead to implications on safety of trains e.g. Foundation works close to track. Unloading of P. Way, materials from road vehicles i.e. ballast, sleepers, earth or any other materials.

Hence forth, the following instruction shall be followed by all the executing agencies like Open Line, Construction, R.E, RVNL, MRVC, DFCCIL, other SPV/PSUs etc. while planning and carrying out such works.

In view of above, following guidelines are issued in supersession of compendium issued earlier vide letter No T5/18/29/Safety Vol-XVIII dated 30/04/2008. These are divided in various groups as under:

A.Undertaking Any Type of Work Adjoining the Running Tracks.

1. Before undertaking any work/activities adjoining the running track. Engineer In charge of executing agency shall advise in writing to the respective open line SSE (P. Way), Sectional ADEN, sectional Sr. DEN before start of the work clearly indicating the following details:

- a. Nature of work, location, and Name of the Executing Agency
- b. Approximate duration of work
- c. Sequence of work
- d. The List of vehicles and approx. Number of Vehicles to be deployed.
- e. Details of Location where vehicles are likely to work.
- f. Detailed planning of work including protection of track and safety measure proposed to be adopted i.e., safety protocol should be given in detail.

g.Certification regarding.

- 1) Availability of Railway's Supervisor and Competent authorized supervisor of the contractor.
- 2) Training to supervisor and driver (staff) of contractor and competency certificate issued as per Ara 826 (IV) Annexure 8/5, of IRPWM by Assistant Engineer/Executing engineer in charge of the site, wherever applicable.

- 3) Driving licenses are available and record, of the drivers and vehicles are kept.
- 4) Imposition of speed restriction and other Caution orders, OEHS, WF instruction etc.
- 5) Giving information to concerned department supervisors i.e., Eng. Elect. And S&T of open Line.
- 6) All safety measure for protecting the existing embankment such as shoring, micro piles etc. must be ensured wherever required as per site condition/approved GAD/Plans.
- 7) No work shall be started without approved plans, L-sections, ESP, GADs etc. as required. Plans should be cleared by open line within timeline given vide Railway Board Vide Letter No -2017/CE-I/CT/13 Procedure Simplification dated 20.10.2017

2. While executing the work of excavation adjoining the track, the engineer in Charge of executing agency shall ensure following:

- a. The excavation does not cause any damage to existing formation/cess, disturbance or settlement to the running track, or obstruction to the drainage.
- b. There is no infringement to the maximum moving dimensions.
- c. There is no damage to equipment & cables or any other installation.
- d. In case of deployment of mass labour, the caution order of, observe engineering hand signals and whistle freely (OEHS & WF) shall be issued for the duration of the work apart from other precautions.
- e. The concerned Open Line supervisors (i.e., Engineering, S&T, TRD etc.), shall be advised to depute their staff as and when required.
- f. The supervisor of contractor and railways supervisor in charge of work of executing department should visit the site to assess the precautions to be taken while working. The details planning of work including protection of track and safety measure proposed to be adopted for ensuring safe running of trains should be listed out.
- g. A register shall be maintained at the site regarding "Safety Measure" to be taken at site and all the precaution being taken shall be logged. Inspecting officials, shall check various safety measures being taken during their inspections and record their observations.
- h. Contractors certified supervisor shall not be changed without prior permission of Engineer in charge. Necessary provisions should be available in the contract.
- i. Before the start of work, the land strip adjacent to running track where road vehicle. Machinery are to ply for the work shall be prominently demarcated by a thick line in advance at an appropriate distance from the center of existing track in consultation with railway supervisor of open line as per sketches given in Annexure-I
- j. Barricading of corrugated PPGT sheets of 0.45mm thick barbed wire fencing as per drawing and design given in Annexure I, shall be provided in the complete length of the work area along the track, and also watchmen shall be posted by the executing department.

3. The supervisors at all work site, irrespective of whether the work is being done under traffic blocks or without traffic blocks shall inform to the respective Engineering Control Office of the division giving conformation of the compliance of the precautions stipulated for protection at the work site including required traffic block or C.O as per the provisions of IRPWM.

B.Measures for carrying out Earth Work in Embankment, Digging/Excavation involving Movement/Operation of Vehicles/Equipment's.

After ensuring the above the Engineer in Charge of the executing department shall ensure following site preparations, before permitting the execution of works.

1.The engineer in charge of the work shall personally examine and certify the road vehicles/equipment, counselling of the drivers, Protection men supervisors and shall give written permission to contractor giving number and types of road vehicles drivers and supervisors to be deployed on the work location period and timing of the work. The contractor shall not be allowed to work at site without prior written permission from the Engineer In charge.

2.Contractors shall depute trained and competent supervisors at work sites duly certified by Engineer In charge of the work. Drivers of Vehicle shall be briefed about the safety precautions to be observed while moving/working close to traffic and their assurance obtained.

3.Contractor shall be allowed to ply road vehicles Only between Sunrise and Sunset. In case of emergency where it is necessary to work beyond sunset, sufficient illumination shall be ensured in the entire work area. Also, necessary additional staff shall be posted for night working including information to the respective Engineering Control Office of the division giving conformation of the compliance of the precautions stipulated for protection at the work site including compliance of provisions as per provision of IRPWM.

4.Check list given in Annexure-II shall be used to check that all the requisite measure have been ensured before start of the work.

5.The Engineer in charge of the work shall following site precautions as applicable.

a.Where, work is planned to be executed beyond 6.0 meters form center line of the nearest running track the adjacent land strip where road vehicle. Machinery are to ply for the work shall be prominently demarcated by 150 mm wide line with lime in advance, at a distance of 6.0 mts from the center of existing track and acknowledge by the contractor so that the vehicle/machinery do not cross this line and come towards the track.

b.Where, work is planned to be done between 6.0 meters to 3.5 meters, form center line of track, it shall be ensured that.

I. Clear demarcation of the area is done by erecting a continuous barricading of corrugated PPGI sheets of 0.45mm thick/barbed wire fencing on 1200mm high concrete posts fixed at a spacing of 2.5 meters at minimum distance of 3.5 meters from centerline of nearest running track as per sketch shown in Annexure-I

II. An authorized railways representative must be present to closely supervise plying of vehicles or working of machinery.

III. Suitable caution order to whistle freely is issued to Loco Pilots for approaching train about road vehicles plying or machineries working near the running tracks. Whistle boards shall be provided for the train drivers.

IV. Wherever provided, engineering indicator boards shall retro-reflective type only.

V. Look out man shall be deputed along the track at a distance of 1200 M form the location of work with red flag, detonators and whistle to warn the road vehicles regarding approaching trains and for protection in case of necessity.

c.Where, work is planned to be done within 3.5 m of center line of running track, it shall be ensured that the work is allowed, under block protection only, and all the necessary safety precautions for protection or track as per Paar No. 806 and 807 of IRPWM 9copies are enclosed as Annexure -IV, V for ready reference) are taken.

d. The presence of competent Railways supervisor shall be ensured at work site. Competency certificate given by concern Dy Chief Engineer (Construction) has to be ensured at the work of site.

e. The worksite shall be suitably demarcated to keep public passengers away from work area, Necessary signage boards such as “Work in Progress” etc. shall be provided at appropriate locations to warn the public/passengers.

6. In unusual circumstances where operator apprehends infringement to track vehicle working the trucks or any other machinery near running track following action shall be taken:

I. The contractor/supervisor/Vehicle operator must immediately advise the situation to railway officials at site and assist him in protecting the track.

II. Protection shall be done as per Para 806 and 807 of P Way Manual and Para 15.09 of G& SR as the case may be.

7. No vehicle or any other machinery shall be left unattended near the track. If it is unavoidable and become necessary to stable the road vehicle/Machinery and plant bear the running track, these be properly secured against any likely roll-off towards running track there shall always be manned except during non-working hours.

8. When a road vehicle is reversed, do ensure the following:

I. The location where vehicle is to take a turned/reversed, are clearly and prominently demarcated.

II. The road vehicle drivers should face the railway track during the course of turning or reversing the vehicle.

III. Presence of an authorized railways representative must be ensured at such location.

9. While inspecting the worksite, checklist given in Annexure III shall be used to ensure that all the requisite measures have been taken during the execution of work.

C. Undertaking the work on the Running Track/Existing Lines or Requiring Traffic Block.

1. Any work which may infringe the moving dimensions shall be started only after traffic block is imposed and track is protected as per Para 806 & 807 of P. Way Manual and Para 15.09 of G& SR, as the case may be.

2. Wherever the Engineering work such as insertion of turnout sleepers laying of glued joints etc. is done on the running tracks, such portion of the track shall be taken over temporary by the Engineer in Charge of the work executing organization and the same shall be handed over back to the sectional engineer in charge of open line in good fettle after relaxing the caution order. During this period, the Engineer in Charge of works site shall ensure safety of the Track.

3. At locations where working at night is unavoidable, proper illumination must be ensured.

4. Before closing the work the release sleepers, fittings and all other materials shall be properly stacked away from the track and kept clear of moving dimensions in such a manner that these cannot shift towards track and cause infringement to moving dimensions.

5. Block shall be cleared only when all the temporary arrangements, machineries, tools, plant etc have been kept clear of moving dimensions.

D. Additional Precautions to be Taken While Working in or on top of Cutting

1. Shifting of machine within Railway Boundary should be carried out under Railway supervision, with proper track protection/traffic block wherever required.

2. No movement of earth handling machine, tippers, dumpers trucks etc should be permitted once the train enters the block section and till the train passes the work site,

3. No loose boulders on slope, having potential of slipping down shall be allowed to be left before permitting the train to pass the work spot.

E. Safety Aspects to be Observed While working in OHE Area.

1. No electrical work close to running track shall be carried out without permission of railway representative.

2. A minimum distance of 2.0 m has to be maintained between live OHE wire and body of worker or tools or metallic support etc. as per para 183 (2) (I) of IRPWM.

3. No electric connection etc can be tapped from OHE.

4. Authorized OHE staff should invariably be present when relaying work or any other major work is carried out.

5. Power block is correctly taken and “Permit to work” is issued.

6. Structure boards, track bonds, cross bonds, longitudinal rail bonds etc. are not disturbed, and if disconnected for the work they are reconnected properly when the work is completed.

7. The track level is not raised beyond the permissible limit during the work.

F. Stacking of Material Along Railway Track.

1. The site for material stacking shall be selected in advance ensuring that no part of the material would infringe the standard moving dimensions. A plan of proposed stacking locations be made and signed jointly by an authorized Railway representative and the contractor’s representative.

2. The selected locations shall be prominently marked-by lime in advance.

3. The material shall be stacked to such a height that it does not lead to infringement of SOD in case of accidental roll off.

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:

[Indian Railways Permanent Way Manual, Indian Railway Bridge Manual, Indian Railway Schedule of Dimensions & relevant IRS Specifications referred in the Manual, Indian Railway Signalling Engineering Manual, Indian Railway Telecom Manual, & relevant IRS/RDSO Specifications referred in the Manual, AC Traction Manual, Rules for Opening Railways]

The Railway project including Project Facilities shall confirm to design requirements set out in the relevant codes and manuals as mentioned in AnnexI:

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 ['Inspector', 'AEE', 'DE'] 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

(i) IR Specifications

(ii) Bureau of Indian Standards (BIS)

(iii) Any other specifications/standards proposed by the Contractor and reviewed by the Authority Engineer.

(iv) Euro Codes or British Standards or American Standards

- (v) Any other specifications/standards proposed by the Contractor and reviewed by 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 the 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.

Annex - I

*(Schedule-D)***Specifications and Standards for Construction¹⁹****1 Specifications and Standards**

All Materials, works and construction operations shall conform to the following manuals:

1.1 For civil works:

- (a) Indian Railways Permanent Way Manual
- (b) Indian Railway Bridge Manual
- (c) Indian Railway Schedule of Dimensions
- (d) The relevant IRS Specifications referred to in the above documents listed at (i), (ii) and (iii)
- (e) Specifications of Works of concerned zonal railway
- (f) In case of any contradiction in the various codal provisions, the order of precedence shall be as follows:-
 - aa) Provisions of this Annex I.
 - bb) IRS Codal provisions
 - cc) IRC Codal provisions
 - dd) IS (BIS) Codal provisions.

Sl. No	Name of the Code/Manual
P.WAY	
1	Indian Railway Permanent Way Manual.
2	Manual For Fusion Welding Of Rails By Alumino – Thermic Process
3	IRS T19: Specifications for Fusion Welding of Rails
4	Manual for Flash Butt Welding of Rails.
5	Indian Railway Track Machine Manual.

¹⁹The contents of this Annexure-I may be suitably modified to reflect project specific requirements.

6	Indian Railway Small Track Machine Manual.
7	Manual For Ultrasonic Testing of Rails And Welds
8	Manual for Glued Insulated Rail Joints
9	GE/0001: Specification for Track Ballast
10	Specifications for H-Beam sleepers and fittings
BRIDGES	
1	IR Bridge Manual
2	IRS Bridge Rules
3	IRS Concrete Bridge Code
4	IRS Bridge Sub-Structure and Foundation Code
5	IRS Steel Bridge Code
6	IRS Welded Bridge Code
7	Seismic Code for earthquake resistant design of Railway Bridges
8	IRS Arch Bridge Code
9	IRS Specification for Fabrication and Erection of Steel Girders Bridges and Locomotive Turn Table (IRS B -1)
10	IRS Well and Pile foundation code
11	RBF-16 & 22 for Estimating Waterway Calculations
12	IRC:83 Standard specifications and Code of practice for Road Bridges - Bearings for road bridges.
13	BS-S-7.5.3.1-10 Specification and Schedule of Technical requirements (STR) for Manufacturing and Supply of Elastomeric bearing to Indian Railways for use on Railway Bridges/ROBs
14	BS-S-7.5.3.1-12 Specification and Schedule of Technical requirements (STR) for Manufacturing and Supply of POT-PTFE bearing to Indian Railways for use on Railway Bridges/ROBs
15	Schedule of Technical requirements for fabrication of steel girders issued by RDSO
GENERAL	
1	Indian Railways Schedule of Dimensions (BG) revised in 2022

2	Engineering Code.
3	Rules for the Opening of a Railway for the Public Carriage of Passengers
4	General & Subsidiary Rules, Pt I & II.
WORKS	
1	Indian Railway Construction Manual, Dec 2023 .
2	IR Unified standard specifications (Formation works, Bridge works, P. Way works) - 2021
3	IR Works Manual
4	GE: IRS-0004 (Sept 2020): Comprehensive Guidelines and Specifications for Railway Formation along with other Specifications mentioned therein.
5	GE: G-2: Guidelines for Cuttings in Railway Formations
6	GE: G-0016: Guidelines for safety in Tunnels during Construction
7	GE: G-0017: Guidelines for Design & Construction of Tunnels
8	GE: G-0022: Guidelines for application of Coir Geo-textiles in railway embankments and natural hill slopes & cuttings
9	IS:456-2000 Plain and reinforced concrete code of practice
10	IS:875 Code for Loads & Weights of Materials
11	IS:2062 Code of Practice for Structural Steel
12	IS:800-1984 Code of practice for General construction in Steel.
13	IS:269-1989, Ordinary Portland Cement 33 Grade Specifications.
14	IS:12269-1987, Specification for 53 Grade Ordinary Portland Cement
15	IS:516-1959 Method of testing for strength of cement.
16	IS:516-1959 Method of Testing for Strength of Cement
17	IS:2386 Method of Tests for Aggregates for Concrete.
18	IS:10500-2012 for Potable Water
19	IS:4103 Specification for Concrete Admixtures.
20	IS:10262 for Concrete Mix Design.
21	IS:1383-1980 Code of practice for pre-stressed concrete.

22	IS:14268 Code of Low Relaxation Steel.
23	IS:2770, Code for Testing Bond in Reinforced Concrete.
24	IS 1786-2008 Specification for Thermo Mechanically Treated Steel (TMT) and Wires for Concrete reinforcement & HYSD Bars.
25	IS:1948-1970 Classification & Identification of Soils for General Engineering Purposes.
26	IS:6403 Code for Safe Bearing Capacity of Soil
27	IS:1893-2002 Earthquake Resistance Structures
28	IS:2911-2010 Code of Practice for Piles
29	RDSO Report No.GE-R-73 for RE Structures
STATIONS	
1	Manual for Standards and Specifications for Railway Stations issued by RDSO.
2	Comprehensive Instructions for Provision of Passenger Amenities and User Facilities at Stations – Issued by Rly Bd. On 09.04.2018 Along with Corrigendum dt 14.02.2022
3	Notification of Guidelines on accessibility of Indian Railway Stations and facilities at stations for differently abled persons () and passengers with reduced mobility (Rly.Bd.Lr.Dated.26.11.2023)
4	Standard Signages at Stations on Indian Railways April-2023 (issued vide Rly.Bd.Lr. Dated.15.05.2023).

B & S Reports Issued BY RDSO:

Sl. No.	Report No.	Title	Month & Year
1	BS-134	Guidelines on Pipe Pushing by Microtunnelling Technique for Railway Bridges	Sep-23
2	BS-132	Compendium for Road Over Bridges on Indian Railways.	Feb-22
3	BS-131	Guidelines for Selection of Bridge Bearings for Railway	Nov-21

Sl. No.	Report No.	Title	Month & Year
		Bridges & ROBs.	
4	BS-130	RDSO Guidelines for Fabrication Inspection of RDSO Standards Spans-Composite I-Section Steel Girders for Road Over Bridges(ROBs)	Jun-21
5	BS-128 (R-2)	Guidelines for carrying out load deflection test of Steel plate & open web & Steel-Concrete composite girders	Feb-23
6	BS-127 (R-1)	Guidelines on type of foundations for Railway Bridges	Jun-21
7	BS-126	Guidelines for continuation of LWR/CWR over ballasted deck bridges on Indian Railways	Jul-18
8	BS-125	Method statement for fabrication of 45.7m through type open web girder for 25t loading drawing no. B-17181 series	Jun-18
9	BS-115	Guidelines for Composite Construction including Stud Shear Connectors (Revision 1)	Apr-16
10	BS-122 (R-1)	Guidelines for Approval of Design Basis Report for Important Bridges	Aug-22
11	BS-114	Guidelines for Carrying out Rail-Structure Interaction for Railway Bridges (Revision 2)	Aug-16
12	BS-121	Guidelines for Provisions of OHE MAST for Electrification at New and Existing Bridge Pier/Abutment with A&C1 dated 09/07/2020.	Oct-15
13	BS-120	RDSO Guidelines for Construction of Limited Height Subway (LHS) by Cut and Cover Method	Apr-15
14	BS-118	RDSO Guidelines on Seismic Design of Railway Bridges (Revision 1)	Nov-15
15	BS-113	Guidelines for Providing Arrangements for Bridge Inspection	Nov-14
16	BS-112	Guidelines for Planning of Road Over Bridges	May-14
17	BS-117	Scour Depth estimation, counter measures & monitoring at bridge crossing. Guide for engineers.(Revision 1)	Jun-15
18	BS- 111 ('R)	Guidelines for Use of High Strength Friction Grip (HSFG) Bolting assemblies on Bridges on Indian Railways	Jul-23

Sl. No.	Report No.	Title	Month & Year
		(Revision- 7)	
19	BS- 110 ('R)	Guidelines on Fabrication of Steel Girders for Construction/Field Engineers (Revision 1) with Addendum & Corrigendum	Jul-17
Sl. No.	Report No.	Title	Month & Year
1	BS-134	Guidelines on Pipe Pushing by Microtunnelling Technique for Railway Bridges	Sep-23
2	BS-132	Compendium for Road Over Bridges on Indian Railways.	Feb-22
3	BS-131	Guidelines for Selection of Bridge Bearings for Railway Bridges & ROBs.	Nov-21
4	BS-130	RDSO Guidelines for Fabrication Inspection of RDSO Standards Spans-Composite I-Section Steel Girders for Road Over Bridges(ROBs)	Jun-21
5	BS-128 (R-2)	Guidelines for carrying out load deflection test of Steel plate & open web & Steel-Concrete composite girders	Feb-23
6	BS-127 (R-1)	Guidelines on type of foundations for Railway Bridges	Jun-21
7	BS-126	Guidelines for continuation of LWR/CWR over ballasted deck bridges on Indian Railways	Jul-18
8	BS-125	Method statement for fabrication of 45.7m through type open web girder for 25t loading drawing no. B-17181 series	Jun-18
9	BS-115	Guidelines for Composite Construction including Stud Shear Connectors (Revision 1)	Apr-16
10	BS-122 (R-1)	Guidelines for Approval of Design Basis Report for Important Bridges	Aug-22
11	BS-114	Guidelines for Carrying out Rail-Structure Interaction for Railway Bridges (Revision 2)	Aug-16
12	BS-121	Guidelines for Provisions of OHE MAST for Electrification at New and Existing Bridge Pier/Abutment with A&C1 dated 09/07/2020.	Oct-15
13	BS-120	RDSO Guidelines for Construction of Limited Height	Apr-15

Sl. No.	Report No.	Title	Month & Year
		Subway (LHS) by Cut and Cover Method	
14	BS-118	RDSO Guidelines on Seismic Design of Railway Bridges (Revision 1)	Nov-15
15	BS-113	Guidelines for Providing Arrangements for Bridge Inspection	Nov-14
16	BS-112	Guidelines for Planning of Road Over Bridges	May-14
17	BS-117	Scour Depth estimation, counter measures & monitoring at bridge crossing. Guide for engineers (Revision 1)	Jun-15
18	BS- 111 ('R)	Guidelines for Use of High Strength Friction Grip (HSFG) Bolting assemblies on Bridges on Indian Railways (Revision- 7)	Jul-23
19	BS- 110 ('R)	Guidelines on Fabrication of Steel Girders for Construction/Field Engineers (Revision 1) with Addendum & Corrigendum	Jul-17
20	BS-105	Guidelines on pipe line crossings under railway track with a&c 1 to 7	24.11.2017
21	BS-104	Guidelines on use of acoustic emission technique (AET) on railway bridges	Oct-09
22	BS-103	Guidelines on non-destructive testing of bridges	August, 2009
23	BS-102 ('R)	Guidelines for installation, inspection & maintenance of bridge bearings (revision 1)	June, 2015
24	BS-89 ('R)	Guidelines for the use of High-Performance Concrete including self-compacting concrete in bridges	Dec-22
25	BS-88 ('R)	Literature on corrosion protection in concrete structures	Aug-18
26	BS-82	Guidelines on Use of Core Cutter and Other Miscellaneous Tools on Railway Bridge	Nov-06
27	BS-80	Guidelines for design of POT-PTFE Bearing for Railway Bridges	Sep-06
28	BS-53	Guidelines on use Ultrasonic Instrument for Monitoring of Concrete Structure. (Provisional).	Apr-03
29	BS-45	Guidelines on Fabrication of Steel Channel Sleepers	2004

Sl. No.	Report No.	Title	Month & Year
30	BS-42	Guidelines on use of Micro Cover Meter	Oct-01
31	BS-41	Guidelines for Integrity Testing of Piles	Oct-01
32	BS-37	Guidelines for Under Joint detailing using steel hollow section RHS/SHS in foot-over bridges (to be read with drawing No.CBS-0021/1-7)	Aug-01
33	BS-36	Instrumentation Techniques to Monitor loss of Pre-Stress and Corrosion of Steel in Pre-Stressed Concrete	Jun-01
34	BS-33	Effect of Vibrations due to Rail Traffic on Structures located along Railway Track	Mar-01
35	BS-32	Study on Noise Level on Railway Bridges	01-12-'2000
36	BS-28	Master List of Drawings of Bridges and Structures Directorate ('R)	Aug-23
37	BS-25	Guidelines on use of Admixtures in Concrete	Dec-99
38	BS-24	Report on Investigation for dynamic Augment on Ballasted Deck Concrete Bridges	Dec-99
39	BS-23	Guidelines on use of Ready-mix Concrete	01-08-'2000

**A. POLICY LETTERS / CIRCULARS ISSUED BY RAILWAY BOARD,
RDSO and ZONAL RAILWAY (PCE/CAO):**

GADs AND APPROVALS				
SN	Letter Issued By	Dated	Subject	Letter No.
1	Rly. Bd.	08.05.2024	Provision of Red line along with Warning board/Notice board at subways / LHS / RUBs	2017/CE-IV/RI IB/88
2	Rly. Bd.	06.04.2024	Preventing water-logging at Subways /	2017/CE-IV/RUB/88

			RUBs	
3	RDSO	28.05.2024	Designing all future ROB superstructures considering Special vehicle loading / non-SV loading with Congestion Factor as prescribed in IRC:6-2017.	CBS/ROB/Arch
4	Rly. Bd.	21.06.2024	Standardized layout of station building the station operations centre (SOC)	2024/I&Trans. Cell/ SOC C
5	Rly. Bd.	08.05.2024	Joint-less box construction for LHS/RUB	2017/CE-IV/LX/Misc/244 (LC's)
6	RDSO	06.08.2024	Revision-2 of ROSO Report on 'Transition System on Bridge Approach No. GE: R-50, 2024- Provisional Transition system at New Bridge Approach.	CE/Gen/ 112-Transition
7	Rly. Bd.	19.09.2023	Implementation of "Rail-Road Crossing GAD Approval System" for State Governments & UTs	2015/CE-IV/ROB/78 (RORACS)
8	Rly. Bd.	21.04.2022	Standard Procedure Order for ESP, SIP & GAD approval in Zonal Railways	2017/CE-I/CT/13/Procedure Simplification
9	RDSO	04.02.2022	Checklist for preparation of GAD of Railway Bridges (Revision- I).	CBS/DBR/IMP/Policy
10	Rly. Bd.	19.07.2021	Approval of GADs and Design of Bridges being constructed by PSUs	2021/2/CE/If/BR/1/Bridge Policy
11	Rly. Bd.	17.05.2021	Approval of Bridge Drawings/Designs for Bridge works being executed by Railway and Other PSUs/Organizations.	2021/12/CE/III/BR/1/Bridge Policy
12	Rly.Bd.	09.03.2017	Approval of Design Basis of Important Bridges by RDSO.	2014/CE/III/BR/1/Bridge Policy.
13	Rly.Bd.	21.04.2015	Span arrangement of Railway Bridges	2014/CE/III/BR/1/Bridge Policy.
14	Rly.Bd.	17.05.2013	Definition of "Affecting Existing Bridges"- CBE approval.	99/CE-1/Misc/239 (IRBM) Pt I
BRIDGE PLANNING, DESIGN & CONSTRUCTION				
SN	Letter Issued By	Dated	Subject	Letter No.
1	Rly. Bd.	12.11.2021	Construction of new Bridge during doubling	2021/ED(ProjM)/Misc/Committee
2	ESO-87	21.05.2020	Bridge Planning and	Engineering Standard Order

	PCE/WR		Construction- Policy	No.87
3	Rly. Bd.	12.02.2020	DBR and TAG for new important bridges	2014/CE-III/BR/Bridge Policy
4	Rly. Bd.	11.11.2019	Approval of design basis of important Bridges by RDSO.	2014/CE-III/BR/Bridge Policy
5	Rly. Bd.	05.07.2018	Policy Guidelines - Execution and Alignment of 3rd Line Projects.	2013/PL/19/1(Policy)
6	Rly. Bd.	03.08.2017	Construction of Bridges during Doubling	2017/29/CE-III/BR/Br 588/ECOR
7	RB	9/10.3.2017	Approval of design basis of important bridges by RDSO	2014/CE-III/ BR/ Bridge policy
HYDRAULIC PARTICULARS - WATERWAY, DISCHARGE etc.				
SN	Letter Issued By	Dated	Subject	Letter No.
1	Rly.Bd.	18.05.2016	Inland Navigation Channels passing through Railway Bridges on Indian Railways.	2016/21/CE-III/BR/Inland Waterways
2	Rly.Bd.	04.02.2015	Calculation of Waterways, Foundation Design etc.	2014/CE-III/BR/Bridge Policy
3	Rly.Bd.	21.04.2015	Span Arrangement of Railway Bridges	2014/CE-III/BR/Bridge Policy
4	Rly.Bd.	07.06.2010	Para 4.2 of IRS-Bridge Sub-Structure and Foundation Code-Regarding Estimation of Design Discharge.	2007/CE-I/BR-III/3
SUB STRUCTURE - FOUNDATIONS FOR BRIDGES				
SN	Letter Issued By	Dated	Subject	Letter No.
1	Rly.Bd.	17.06.2013	Loss due to Defective Investigation of Soil	2004/BC/AP/3.3/2002-03
PILE FOUNDATION				
SN	Letter Issued By	Dated	Subject	Letter No.

1	RDSO	08.08.2013	Design of Pile Foundation for Railway Bridges.	CBS/DWF
			Pile Load / Integrity Testing.	
			CHUM Testing	
WELL FOUNDATION				
SN	Letter Issued By	Dated	Subject	Letter No.
1	RDSO	15.07.2019	Centre to Centre distance of Deep Foundations of Existing and New Bridges.	CBS/DWF
2	Rly.Bd.	15.11.2016	Type of Foundation for Railway Bridges.	2014/CE-III/BR/Bridge Policy
BEARINGS				
SN	Letter Issued By	Dated	Subject	Letter No.
1	RDSO	28.02.2023	Standard QAP for Elastomeric bearing, POT- PTFE bearing & Expansion Joint.	CBS/PBEJ/Reg.
2	Rly. Bd.	31.07.2017	Use of Spherical Bearings for Long Span Bridge Girders.	204/CE-III/BR/Bridge Policy
SUPER STRUCTURE - RCC / PSC / OPEN WEB GIRDER / PLATE GIRDER				
SN	Letter Issued By	Dated	Subject	Letter No.
1	RDSO	24/29.04.2015	Guidelines on Residual Camber in Open Web Girders	CBS/DOW
2	RDSO	17.04.2014	Adoption of Aluminium Metalizing on all New Steel Bridge Girders.	CBS/MPP/Meeting
3	Rly.Bd.	11.08.2014	Use of Standard drawings (Superstructure) on Railway system	2013/CE-III/BR/RDSO/Misc.
4	Rly.Bd.	21.09.2010	Provision of Man Refuge on Through Open Web Girder Bridges.	2008/CE-I/BR/PCE.Conf

5	RDSO	23.09.2010	Man Refuge on Through Open Web Girder Bridges.	CBS/PATHWAY
6	Rly.Bd.	28.05.2009	Adoption of Steel Super Structure of Bridges for Spans more than 24.4m.	2005/CE-I/BR-II/8.

RCC BOX BRIDGES				
SN	Letter Issued By	Dated	Subject	Letter No.
1	Rly.Bd.	19.01.2022	Construction of RCC Boxes for Railway Bridges	2015/CE III/BR/Structure Code
2	Rly.Bd.	19.07.2018	Construction of RCC Boxes for the Railway Bridges.	2015/ CE-III/BR/Structure Code
3	RDSO	27.04.2017	Suitability of RCC Boxes for Major Bridges.	CBS/DBC.
ROBs				
SN	Letter Issued By	Dated	Subject	Letter No.
1	Rly.Bd.	08.11.2023	Safety Audit of Grade Separator/ROBs - Provision of Safety Fencing over NH-Corridors.	2015/CE-IV/ROB/78 (Pt.1)
2	RDSO	17.08.2022	Suitability of RDSO Standard Composite Girder ROB drawings for Skew angle >20 Degree and < 30 Degree.	CBS/DRO.
3	Rly.Bd.	16.02.2021	Skew angles to be adopted in the Road Over Bridges (ROBs).	2017/CE-IV/ROB/164(Policy)
4	Rly.Bd.	12.02.2021	Design of Non –Standard composite Girder for ROB	2016/54/CE-III/BR/RDSO/Misc.

5	Rly.Bd.	15.01.2020	Design procedure for Non-Standard spans in construction of ROB on Indian Railways.	2015/CE-IV/ROB/78 (Pt.)
6	RDSO	31.08.2020	Checking of Non-Standard Composite Girder ROB	CBS/DRO.
7	Rly.Bd.	21.09.2020	Design of Non –Standard composite Girder for ROB	20 16/54/CE-III/BR/RDSO/ Misc.
8	Rly.Bd.	04.06.2019	Failure of Non-Standard Bow String Girder bridge (ROB).	2015/CE-IV/ROB/78 (Pt.)
9	Rly.Bd.	17.01.2011	Headroom clearance under ROB & FOBs on Indian Railway routes, excluding DFCCIL.	2006/RE/161/4/Vol.II(FT S-776).
10	Rly.Bd.	27.10.2009	Safety precautions & measures of ROB/RUB Works	2006/CE-I/AC-I (Pt.).
RUBs / LHS / SUBWAYS				
SN	Letter Issued By	Dated	Subject	Letter No.
1	Rly.Bd.	09.09.2022	Preventing water-logging at Subways/RUBs.	2017/CE-IV/RUB/88
2	CPD/BW	25.07.2022	Provision of weep holes in mass concrete retaining walls provided at Waterway Bridges, RUBs and in cuttings of formation or elsewhere due to space constraints, needing Earth retention on one side - The reasons behind and the instructions for closure of weep holes provided at RUB location.	352/BR/Policy/Subways.
3	Rly.Bd.	18.02.2021	Water logging & drainage problem in RUB/Subways.	2017/CE-IV/RUB/88
4	Rly.Bd.	24.09.2019	Drainage in LHS/RUB/Subway - Executive Summary.	2017/CE-IV/RUB/88

5	Rly.Bd.	04.10.2017	Important issues related to Construction of RUB/Subways including drainage.	2017/CE-IV/RUB/88
6	Rly.Bd.	01.12.2015	Protection Arrangements for RCC Box culverts & RUB/LHS.	2015/CE-III/BR/RDSO/Misc.
7	Rly.Bd.	29.05.2015	Construction of RUBs- Approval of PCE/CAO, for adopting Box Pushing Technique.	2014/CE-III/BR/Bridge Policy.
FOBs (FOOT OVER BRIDGES)				
SN	Letter Issued By	Dated	Subject	Letter No.
1	Rly.Bd.	21.10.2022	Development of RDSO's standard drawings of 6m wide FOB for span 25m to 30m with composite I-Girder & Tubular sections.	20221 3/CE-III/BR/CBE Conference
2	Rly.Bd.	18.12.2018	Fabrication of Road Over Bridges (ROBs) girder for Railway span and Foot Over Bridge (FOB) girders.	2017/50/CE-III/BR/FOB
3	RDSO	23.04.2013	Provision of Ramp on FOBs at the end of Platforms	WKS/35/Phy.Disa
FABRICATION OF BRIDGES				
SN	Letter Issued By	Dated	Subject	Letter No.
1	Rly.Bd.	23.02.2023	Outsourcing of fabrication of structural steel work for bridge girders for various projects.	2022 I CE-III/BR/Fabrication (E-F ile -3 40 17 28)
2	RDSO	01.03.2023	RDSO Model QAP's for Fabrication Inspection of RDSO Standatd Steel Girders.	CBS/Bridge Insp/Genl Matters.
3	Rly.Bd.	07.09.2022	Fabrication of Girders through Bridge Workshops (W.R.T. EPC Contract)	2022/ CE-II/BR/Bridge Workshop Policy
4	Rly.Bd.	16.09.2022	Fabrication of Steel Bridge	20 17 I I 6 I CE-III/BR/Girder

			Girders.	Inspection
5	Rly.Bd.	17.11.2022	Inspection and Certification of structural steel fabrication and erection works for Infrastructure projects in India and Abroad.	20 1 7/1 6/CE-III/BR/Girder Inspection
6	Rly.Bd.	09.05.2019	Supply of Steel Girders.	2016/54/CE-III/BR/RDSO/Misc
7	Rly.Bd.	18.12.2018	Fabrication of Road Over Bridge (ROB) Girder for Railway Span and Foot Over Bridge (FOB) Girder.	2017/50/CE-III/BR/FOB
8	RDSO	23.02.2018	Use of Parallel Flange Steel Sections (NPB/WPB) for use in Railway Bridges and Structures.	CBS/DOW
INSPECTION ARRANGEMENTS FOR BRIDGES				
SN	Letter Issued By	Dated	Subject	Letter No.
1	RDSO	24.04.2019	Provision of Side Pathways on Girder Bridges	CBS/DPG/1.
2	Rly.Bd.	02.07.2018	Inspection of Railway Bridges/ROBs before commissioning.	2013/CE-III/BR/IRBM
3	RDSO	01.01.2018	Provision of Side Pathways on Girder Bridges	CBS/DPG/1.
4	RDSO	28.06.2016	High Level Safety Review Committee's (HLSRC) recommendations-Regarding Camber.	CBS/ROB/ARCH
5	Rly.Bd.	09.10.2014	Providing necessary Inspection arrangements for New Bridges.	2014/CE-III/BR/Bridge Policy
SPECIFICATION OF MATERIALS				
SN	Letter Issued By	Dated	Subject	Letter No.
1	RDSO	16.03.2023	Generic Technical specifications for Self Locking	CBS/Self Locking Nuts.

			Steel Nuts to be used in Hook Bolts of steel girder bridges over Indian Railways.	
2	RDSO	20/22.06.2016	Avoiding use of Pitted/Corroded Steel Plates and Surface preparation of Steel for Fabrication and Painting for Railway Bridges.	CBS/Insp/WBG
3	Rly.Bd.	04.11.19	Stainless Steel for Structural Application	2017/50/CE-III/BR/FOB
LAUNCHING SCHEMES / TEMPORARY ARRANGEMENTS				
SN	Letter Issued By	Dated	Subject	Letter No.
1	RDSO	03.02.2015	Launching Scheme for Bow String Arch Girders.	CBS/ROB/ARCH
2	Rly.Bd.	15.02.2016	Special Conditions for Working of Road Cranes.	2015/CE-IV/RUB/206
PLATFORM CONSTRUCTION				
SN	Letter Issued By	Dated	Subject	Letter No.
LOAD TESTING, INSPECTION OF BRIDGES AND CRS MATTERS				
SN	Letter Issued By	Dated	Subject	Letter No.
1	RDSO	21.01.2021	Guidelines for Load Testing of Bridges	CBS/Load Testing.
2	Rly.Bd.	24.07.2019	Inspection of new steel Bridge Girders.	2017/16/CE-III/BR/Girder Inspection
BALLAST LESS TRACK (BLT)				
SN	Letter Issued By	Dated	Subject	Letter No.
1	Rly.Bd.	22.11.2023	Construction of Escape Tunnel during Tunnelling Works over Indian Railways.	2023/W-I/Genl/Misc (E-3434089)
2	Rly.Bd.	09.03.2022	Provision of Ballastless Track (BLT) in Tunnels.	2019/W-1/Genl./Policy Pt.1

3	Rly.Bd.	30.05.2018	Track Structure on Rail Fly Overs (RFOs).	2018/29/CE- III/BR/RFOs.
4	RDSO	08.09.2021	Construction of Washable Aprons at Busy Yards.	CT/EF/TSC
INFRASTRUCTURE AND SAFETY				
SN	Letter Issued By	Dated	Subject	Letter No.
1	Rly.Bd.	27.09.2022	Use of Permanent Shuttering in Bridges.	2017/07 I CE-IIIBNSafety
2	Rly.Bd.	12.03.2021	Execution of Bridge, ROB, RUB, FOB & Rail Flyover works affecting running lines	2016 /52 /CE/III/BR/Safety
TRACK				
SN	Letter Issued By	Dated	Subject	Letter No.
1	Rly.Bd.	13.02.2023	Flash Butt welding of Free Rails by Railways and PSUs in Construction projects.	2018/Track-I/11/1/A.T.WeldingVoll
2	Rly.Bd.	05.05.2015	AT Welding Rail in Construction projects	Track/21/2009/0110/7
3	Rly.Bd.	04.08.2011	Welding of Rails in Construction projects.	Track/21/2009/0110/7
4	Rly.Bd.	08.03.2021	FB Welding of free rails by Railways and PSUs in Construction Projects.	2018/Track-I/11/1/A.T.WeldingVoll

NOTE:

The above-mentioned codes, manuals and Policy letters issued by Railway Board can be accessed in respective directorates in www.indianrailways.gov.in

1.2 For signalling and telecommunication works:

- (a) Indian Railway Signal Engineering Manual for signalling; and
- (b) Indian Railway Telecom Manual for telecommunication works.

- (c) Latest IRS / RDSO specifications

1.3 For electrification works:

- (a) Indian Railways Manual AC Traction, Volume-II Part-I and Volume-II Part-II.
- (b) Manual of Standards & Specification for Railway Electrification
- (c) Indian Railways Standards of Dimension
- (d) RDSO Instruction No. TI/IN/0043 Rev.01 with latest amendments- PSI guideline for 2 x 25 KV system
- (e) Design Manual for Electric Traction issued by IRIEEN.
- (f) Indian Railways Schedule of Dimension (revised 2022)
- (g) CEA Regulations-2010.
- (h) Electricity Act-2003
- (i) ECBC-2017& NBC
- (j) RITES Design Manual Vol-I to Vol-IV
- (k) Other relevant EN, IEC, IEEE, UIC guidelines related with Railway Electrification.
- (l) In case of any contradiction in the various codal provisions/ schedules in this document, the order of precedence shall be as follows: -
 - Provisions given in this EPC document.
 - Electricity Act, 2003, National Electric code, ECBC & NCBC codes.
 - National lighting code
 - IRSOD
 - Railway Board guidelines / manuals.
 - RDSO guidelines.
 - ACTM 2022 with latest A&C slips.
 - Design manual for electric traction.
 - RITES design manual.
- (m) Galvanization of all steel outdoor works

Steel structure for outdoor, TSS, SSP, AT (if any), SP and those required for support of Overhead equipment's, all small part steelworks (SPS) shall be hot deep galvanized as per RDSO's specifications no. ETI/OHE/13 (4/84) A&C-4 i.e. minimum coating of zinc shall be 1000 gm/m². The polluted area shall be identified as a result of pollution mapping by the contractors and approved by engineers, where zinc coating shall be 1000 gm/m².

- (n) The RDSO Guideline/Specifications/Drawings applicable for 2x25kV (differing from existing 25 KV system) system are as under: These specification & drawings shall be taken as latest as on 30 day prior to opening of the tender.

Sl. No.	Description
1	Indian Railway Code, for the Engineering Department
2	Indian Railway Permanent Way Manual
3	Indian Railway Works Manual
4	Rules for the opening of a Railway for the Public Carriage of passengers
5	General & Subsidiary Rules, Pt.- I & II
6	Schedule of Dimensions
7	Manual of Instruction of fabrication, installation and maintenance of glued insulated rail joint
8	Code of practice for Flash Butt Welding of rails
9	Code of practice for welding of rail joints by Alumino Thermit Process
10	Indian Railway Bridge Manual
11	IRS Concrete Bridge Code
12	IRS Code of practice for The design of substructures and foundation of bridges
13	Bridge Rule 1964
14	IRS Specification (IRS B-1 and BS-110), BS -111
15	IS:1786-1985, Specification for high strength deformed steel bars and wires for concrete reinforcement
16	IS:875 (Part 1 to 5) Code of Practice for Wind loads
17	IS:456-2000, Plain and reinforced concrete code of practice
18	IS:383-1970, Specification for coarse & fine aggregates for concrete
19	IS:269-1989, Ordinary Portland Cement 33 grade specification
20	IS:8112-1989, 43 Grade Ordinary Portland Cement
21	IS:12269-1987, Specification for 53 Grade Ordinary Portland Cement
22	IS:516-1959, Method of testing for strength of cement
23	IS:1383-1980, Code of practice for pre-stressed concrete
24	IS:1948-1970, Classification & Identification of soils for general engineering purposes
25	IS: 226 or IS: 2062 (2011) (GR-A) “Hot Rolled Medium and High Tensile Structural steel”.
26	Comprehensive guidelines and Specifications for Railway Formation specification No. RDSO/2020/GE: IRS-0004, Sept.-2020
27	IRS: Code of practice for plain, reinforced & prestressed concrete for General

Sl. No.	Description
	Bridge Construction
28	RDSO Station Manual on Indian Railway
29	IS:800-1984, Code of practice for General construction in Steel
30	USFD Manual
31	Codes, Indian Railways Standard for Bridges, structures and other subjects
32	Signal Engineering Manual Part-I
33	Signal Engineering Manual Part-II
34	ACTM Volume – I, II & III
35	Indian Railway Electricity Rules
36	Indian Railway Standard Code of Practice ForThe Design of Steel or Wrought Iron Bridges Carrying Rail, Road or Pedestrian Traffic (Steel Bridge Code) Adopted –1941 with latest correction slips
37	IS:808 Dimensions for hot rolled steel, Beam, Column and channel Section.
38	IS: 813 (1986) or its latest version “Scheme of Indian standard of symbols for welding”
39	IS: 802 (1995) or its latest version “Use of structural steel in overhead transmission line towers – code of practice”.
40	EN: 50119 “Fixed Installation-Electric Traction Overhead Contact lines”.
41	IS: 1080 latest version “Code of practice for design and construction of shallow foundation”.
42	IS: 2720 latest version “Method of test of Soil”.
43	IS: 2911 latest version “Design and construction of pile foundations — code of practice”.
45	IS: 1904 latest version “Code of practice for design and construction of foundation requirement”.
46	IS: 6403 latest version “Code for determination of bearing capacity of soil”.
47	IS: 4091 (2011) “Code of Practice for Design and Construction of Foundations for Transmission Line Towers and Poles”.
48	TI/IN/0035 “Instruction for testing of OHE structure’s foundation” issued by RDSO.
49	Design Manual for Electric Traction Vol.-III Traction Over Head Equipment (RITES).
50	RDSO Instruction No. TI/IN/0043 Rev.01 with latest amendments- PSI guideline for 2 x 25 KV system

Sl. No.	Description
51	National Electric Code of India, 2023
52	Energy Conservation Building Code (ECBC) 2017

Sl. No.	Report No.	Title	Month & Year
01	BS-121	Guidelines for Provisions of OHE MAST for Electrification at New and Existing Bridge Pier/Abutment with A&C1 dated 09/07/2020.	Oct-15
02	BS-105	Guidelines on pipe line crossings under railway track with a&c 1 to 7	24.11.2017

(o) 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

(p) Electrical TRD

- (i) IRSOD
- (ii) I.E.ACT 2003
- (iii) AC Traction Manual (ACTM)
- (iv) Research, Designs and Standards Organisation (RDSO)
- (v) I.E. Rules 1956
- (vi) CEA rules/guidelines
- (vii) Central Public Works Department (CPWD)
- (viii) Bureau of Indian Standards (BIS)
- (ix) Euro Codes or British Standards or American Standards
- (x) Any other specifications/standards proposed by the Contractor and reviewed by the Authority Engineer.

(q) Eletrical General

- (i) IRSOD
- (ii) I.E.ACT 2003
- (iii) I.E. Rules 1956
- (iv) National Electric Code

- (v) National Building Code (NBC) and Energy Conservation Building Code (ECBC)
 - (vi) Manual for GS works by Railway Board
 - (vii) Central Public Works Department (CPWD) specifications.
 - (viii) Bureau of Indian Standards (BIS)
 - (ix) Euro Codes or British Standards or American Standards
 - (x) Any other specifications/standards proposed by the Contractor and reviewed by the Authority Engineer.
- (r) Alternative Specifications and Standards
- (s) 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.
- (t) 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 the 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.
- (u) Procurement of items; -:
 - (i) All the item to be utilised in 2x25 Power Supply system through RDSO/CORE approved Source / Supplier only.

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:

2.1 Electrical /TRD

The following drawings/specifications/reliability measures may be partially / fully deviating from RDSO/Rly. Bd. specifications/standards or new items not in standard drawings/specifications/ACTM, but to be followed based on WR practice and experience to achieve a safe, reliable and quality aesthetic OHE/PSI installations and deemed to be included in Schedule-G.

- a. Provision for cable trench at SSPs & SP shall be as per RDSO/PCEE/WR's Guidelines.
- b. All Auxiliary Transformers to be erected as per joint procedure order between Electrical (CON) and S&T (CON) No. E.CN.77/2/Policy (JPO-1) dated: 30.01.2019 or latest. Auxiliary Transformer Bonding arrangement should be as per PCEE office letter No. E.252 /Tr. D/Policy/Vol.VII dated.23.03.2023.
- c. Instructions for improving reliability of the TRD assets issued vide PCEE letter no.E.219/RE- RVNL-CON/Vol.V dated.29.04.2023 and E.252/Tr.D/RE. Plg/2X25 kV system dated:01.11.2023 & 06.11.2023 shall be followed.
- d. Outrigger arrangement for isolators shall be as per PCEE/WR's WR Guidelines.
- e. Buried rail arrangement at switchyard shall be as per Hqrs letter No.E.252/Tr.D/Policy/ Vol.VII Dated:24.03.2023.
- f. In station area, implantation of 4.75m shall be provided for mast/portals beyond platform upto starter signal.
- g. On platforms, double chair arrangement shall be provided to avoid live OHE on platform.
- h. A separate CLS panel junction box as per CECE/WR Guidelines shall be provided.
- i. AT junction box arrangement shall be as per PCEE/WR's Guidelines.
- j. Stencilling on OHE mast shall be as per PCEE/WR Guidelines.
- k. Earth electrodes at various Tr.D installations shall be as per PCEE/WR's Guidelines.
- l. Auxiliary transformer bonding arrangement shall be provided as per Hqrs. Letter No. E.252/Tr.D/Policy/Vol.VII Dated:23.03.2023.
- m. Layout of Control & Battery room shall be as per PCEE letter No: E.252/Tr.D/Policy/Vol.VII Dated:07.11.2023.
- n. RT dropper of 7mm to be used instead of 5mm dropper at Curves, Bridges and AT.
- o. Battery room of SSP/SP shall be as per WR Battery room/Drg.
- p. 9-ton adjuster to be provided for both Contact and Catenary wire for all BWA location.
- q. Any other deviation to standards given in schedule-B or DB.

2.2 For OHE & PSI works, the following instructions to be followed for design & drawings (As designed & As Erected)

- a. For electrification design drawings, the Contractor shall prepare and submit, with reasonable promptness drawings as per schedule - D & H, 2 (two) 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. In case of bridge masts, special drawings, critical profile drawings at FOB/ROB etc, Authority Engineer may require additional drawings for its review in accordance with Good Industry Practice.
 - b. After the review & approval of Authority Engineer, contractor shall submit 08 (eight) copies of approved set of design drawings. If additional number of drawings required by Authority Engineer, same to be supplied by Contractor.
- 2.3 For electrification completed project, contractor shall submit set of draft 'As Erected' drawings 2 (two) copies to Authority Engineer for review and approvals.
- 2.4 After Authority Engineers approval of draft As Erected set of drawings, contractor shall submit set of 08 (eight) hard copies to Authority Engineer, Along with Hard Copies, digital form external hard disk to be submitted along with 01(one) copy of Non- tearable Tracing paper for all set of drawings.

2.5 Design criteria for 2x25 KV Sectioning post (SP) and sub-sectioning post (SSP) works with SCOTT connected Transformers.

- 2.5.1 Design covers physical survey of proposed SSP/SP as per location plan, obtain soil sample for geo-technical investigation and arrive safe bearing pressure of soil for designing of foundations. The soil to be collected in the presence of authority engineer and to be tested in a NABL approved laboratory or contractors LAB certified by NABL. Location plan, GAD and other relevant drawings of SSP/SP to be prepared keeping the site location & OHE and submit to authority engineer / authority for approval in 2 sets.
- 2.5.2 While designing, fencing uprights to be shown on retaining wall as per RDSO drawings to avoid drilling of holes later.
- 2.5.3 All RDSO drawings for double line only to be followed as SP/SSP design is for two lines (double line) even though OHE is erected for second line. RDSO drg No. TI/DRG/ PSI /AT/ RDSO/ 00036/20/01 Mod B and TI/DRG/PSI/AT/RDSO/ 00037/20/01 Mod B or latest to be followed. For avoidance of doubt, all equipments required for functioning of SSP/SP for two lines (double line) to be supplied and erected.
- 2.5.4 Earth filling or cutting wherever is required to cast retaining wall or foundation or building is in the scope of contractor.
- 2.5.5 Blasting of stones if encountered at the location is also in the scope of contractor.
- 2.5.6 In case of black cotton soil or any slushy / loose clay soil, design to be done accordingly.
- 2.5.7 Retaining wall shall be of RCC type on all sides of switch yard.
- 2.5.8 In control room, cable trench with chequered plates to be planned.

- 2.5.9 In case of RCC floor where building is erected on pile foundations due to black cotton soil or other such soils, cable trench trough shall be part of the floor.
- 2.5.10 The battery room shall have two steps of 30 cm width and height of each step as 40 cm for placement of battery cells.
- 2.5.11 The floor of steps & room shall be provided with anti-acidic tiles. The wall on three sides shall be provided with anti-acid tiles upto 1.50 m height.
- 2.5.12 The ventilators shall be as per PCEE drawing No. E.252 /Tr.D/Policy/Vol.VII dated: 07.11.2023 (layout of equipment at SP/SSP). All ventilators to be covered with wire mesh to avoid entry of insects / rats etc. . All equipments in control room shall be located as per the above drawing.
- 2.5.13 The steps to SSP/SP or at door of battery and control room – RCC rods of 12 mm every 15 cm between column and near step & between steps to be provided to avoid cracks later.
- 2.5.14 Compaction of earth filling inside switch yard shall be done every 30cm or as per RDSO drawings whichever is lower.
- 2.5.15 For earth filling, morrum soil to be used.
- 2.5.16 Trench in switch yard shall be WR/HQ drawings enclosed vide PCEE letter No. Guidelines to be followed.
- 2.5.17 For laying of cables from trench to BM/CB/AT sub trench shall be laid as per RDSO drawings. Where, pipe to be used, only HDPE pipe of PE 80 & PN 4 grade shall be used underneath ground and GI/HDPE pipe of minimum 100 mm can be used from foundation top to bottom of BM/CB/AT etc.
- 2.5.18 Drain outlet in trench shall have mesh to prevent waste clogging drain outlets.
- 2.5.19 6” HDPE pipe to be provided on two walls of control building to draw S&T cables / earth mat as per directions of authority engineer.
- 2.5.20 All S&T cables to be drawing through concealed PVC pipes of appropriate dia. For drawing EC socket cables, concealed PVC pipe of suitable dia to be provided on building entrance side and upto 1.2m from ground level where EC socket box is erected on the wall near the main entrance gate.
- 2.5.21 Fencing panels should rest on retaining wall so that gap is less than 20 mm to avoid entry of insects/reptiles etc.
- 2.5.22 The drain outlet on roof of building should face away from track.
- 2.5.23 Before erecting structure of BM/CB, bus bar clearances from metal to be calculated as per dimensions of particular make of BM/CB and if necessary, adopter of channels to be laid to get minimum 3.80m clearance from live to ballast.
- 2.5.24 Care should be taken to lay pipes in BM/CB/AT etc foundations during casting of foundation itself to avoid breaking later.

- 2.5.25 Foundation of BM/CB/isolator etc to be laid such that no person on back side of BM/CB can stand which will affect clearance between bus bar and metal bar earth on which a person likely to stand.
- 2.5.26 During physical survey of location of SSP/SP, nearest approach road to be identified and marked on the GAD and location plan of SSP/SP.
- 2.5.27 At SSP/SP 4 Nos. of public caution boards, Fire bucket with canopy & 4 buckets, 2Nos of 5Kg DCP fire extinguisher, SSP key box, SSP/SP equipment data board, Earth values and battery data board to be provided as per WR drawing.
- 2.5.28 Buried rail earthing station with copper bolts on buried rail side. GI flat of 75x8 mm only to be used. Rail/cut mast for buried rail earthing will be provided by railway.
- 2.5.29 Any S&T / power cable shifting as per location plan is in the scope of contractor.
- 2.5.30 Tenderer is advised to do physical survey and ascertain the availability of cables before quoting tender.
- 2.5.31 Shifting to be done as per SEM manual of chapter-15 and as given in S&T scope.
- 2.5.32 Specification of building portion is given below:
 - a. Size of service building at SP/SSP (control cubicle & battery room) as per the drawing No. TI/DRG/PSI/AT/RDSO/00036/20/01 Mod B and TI/DRG/PSI/AT/RDSO/00037/ 20/01 Mod B or latest to be followed.
 - b. Size of service building at TSS (control cubicle & battery room) as per the TI/DRG/PSI/AT/RDSO/ 00009/20/1 Mod E or latest to be followed.
- 2.5.33 Irrespective of the nature of soil building to be constructed with columns/piles foundations. Where floor is slab, trough for trench of cables to be made during floor casting itself.
- 2.5.34 Foundation for BM/CB/Isolator/Gantry mast/AT mast etc.. shall be embedded in natural/parent soil for atleast 1m to avoid leaning later. Similarly Retaining wall for switch yard on 3 sides (4th side is Building wall) shall be of RCC type irrespective of soil condition. Size of RCC wall to be designed as per SBC of soil and nature of soil.
- 2.5.35 Calculation for buildings of SSP/SP based on SBC of soil to be submitted and will be verified by CE/Plg or Dy.CE/Design.
- 2.5.36 List of T&P as per inventory detail.

3. Important aspects to be considered while designing/execution of bridges:

- 3.1 Pipe Culverts are not be permitted for Water way bridges.
- 3.2 Minimum Deck width of 5.15m shall be provided for ballasted decks on bridges to facilitate deep screening by BCM. Standard drawings issued by CBE/WR shall be used for the same. If adoption of above-mentioned Standard drawings is not feasible, as per site condition, the Contractor can use his own design and drawing, with approval of Authority.

- 3.3 Suitable inspection arrangements for all bridges have to be made in the form of steps, ladders, trolley refuges, man refuges, side pathways/footpaths. In this connection, provisions in RDSO BS113, Railway Board Lr No. 2008/CE-I/BR/PCE Conference Dt. 21.09.2010, RDSO Lr No. CBS/DPG1 Dt. 24.04.2019 shall be referred.
- 3.4 In order to facilitate inspection of the bridge bearings, suitable RCC inspection platform of not less than 1m wide shall be provided all around the bed blocks.
- 3.5 All the bridges shall be designed to facilitate laying of LWR. Bearings in case of ballasted deck bridges as well as non-ballasted deck bridges should be suitably designed to facilitate continuation of LWR over the bridges. Rail Structure Interaction (RSI) analysis should be carried out using MIDAS software. In case laying LWR over bridges is not technically feasible, the Agency shall obtain approval from Authority Engineer after submitting RSI analysis.
- 3.6 Drains shall be constructed in the cuttings at the locations as mentioned in Annexure-I of Schedule-B. The following general principles shall be adopted in design and construction of these drains:
- The section of drains shall be adequate to carry required discharge.
 - Minimum Bottom width shall be 600mm (In Side-Clear Opening).
 - Minimum Grade of Concrete -M15 with 20mm size coarse aggregate.
 - Longitudinal slope of drains shall ensure development of Self-Cleaning Velocity.
 - Drain shall have off-side earthen berm of 300mm width to prevent materials rolling down the slope into the drain and also provide space to keep the muck during their cleaning.
- 3.7 Load test on piles shall be carried out as per Para No. 416 of IRBM, para 2.7.7 of IRUSS and as per the provisions mentioned in IS 2911 (Part-IV). Each bridge with pile foundations and each building with pile foundations is considered as a structure while interpreting para-No.2.7.7 of IRUSS. Pile integrity tests shall be done on minimum 50% of the piles at each structure.
- 3.8 Each bridge pier shall be designed for providing OHE Mast on it, irrespective of span and even in non-electrified sections.
- 3.9 Abutments, Piers, Wing wall, return wall and Retaining wall: As far as possible, RCC shall be used for construction of all above structures. In any case, if the heights of the above structures are more than 4 meter (above ground level) they shall be with RCC only.
- 3.10 Exposure condition:
- a) For Bridges (As per IRS CBC): The entire Vadhavan Port Rail Connectivity Project area falls under “Severe” exposure condition due to its proximity to coastal and saline environment. However, in case any bridge is located in comparatively less aggressive/non-coastal environment within the project influence area, the exposure condition of that particular bridge may be considered as “Moderate” with the approval of the Authority. Decision of the Authority is final in this regard.

- b) For Buildings & Structures (As per IS 456): The entire Vadhavan Port Project area falls under “Very Severe” exposure condition considering the coastal, humid and aggressive environmental conditions. However, in case any building/structure is located in relatively less aggressive environment within the project limits, the exposure condition of that particular building/structure may be considered as “Severe” with the approval of the Authority. Decision of the Authority is final in this regard.
- 3.11 Drains shall be constructed in the cuttings at the locations as mentioned in Annexure-I of Schedule-B. The following general principles shall be adopted in design and construction of these drains:
- The section of drains shall be adequate to carry required discharge.
 - Minimum Bottom width shall be 600mm (In side-Clear Opening).
 - Minimum Grade of Concrete -M15 with 20mm size coarse aggregate.
 - Longitudinal slope of drains shall ensure development of Self Cleaning Velocity.
 - Drain shall have off-side earthen berm of 300mm width to prevent materials rolling down the slope into the drain and also provide space to keep the muck during their cleaning.
- 3.12 Load test on piles shall be carried out as per Para No. 416 of IRBM, para 2.7.7 of IRUSS and as per the provisions mentioned in IS 2911 (Part-IV). Each bridge with pile foundations and each building with pile foundations is considered as a structure while interpreting para No. 2.7.7 of IRUSS. Pile integrity tests shall be done on minimum 50% of the piles at each structure.
- 3.13 Each bridge pier shall be designed for providing OHE Mast on it, irrespective of span and even in non-electrified sections.
- 3.14 Abutments, Piers, Wing wall, Return wall and Retaining wall:
- As far as possible, RCC shall be used for construction of all above structures. In any case, if the heights of the above structures are more than 4 meter (above ground level) they shall be with RCC only.
- 3.15 Exposure condition:
- (a) For Bridges (As per IRS CBC): For major bridge the exposure condition shall be taken as extreme as the major bridge is located in creek area & very severe for other bridges.
- (b) For Buildings & Structures (As per IS 456): Exposure condition shall be taken as very severe
- 3.16 Painting of Rails: While interpreting the contents of Para No. 613(b)(i) of IRPWM regarding painting of rails, letter issued by CAO/C/WR read along with ESO59 shall be followed.

Annexure – 1B

(Schedule -D)

REFERENCE DRAWINGS AND INSPECTING AGENCIES FOR P.WAY MATERIALS

S. No.	Item	Drg no.	Inspection Agency
1	PSC main line sleepers	T-8746	Zonal Railway/ Consignee
2	ERC	T-5919	Consignee
3	CGRSP	T-8747	RDSO
4	Metal Liners	T-8748 to T-8750	TPI Agency
5	GFN Liners	T-8751 to T-8753	RDSO
6	PSC 1 in 12	T-4218	Zonal Railway/ Consignee
7	TWS 1 in 12	T-6155	TPI AGENCY
8	CMS Xing 1 in 12	T-4220	RDSO
9	GRSP 1 in 12	T-4218	RDSO
10	PSC 1 in 8.5	T-4865	Zonal Railway/ Consignee
11	Switch 1 in 8.5	T-6279	TPI Agency
12	CMS Xing 1 in 8.5	T-4967	RDSO
13	GRSP 1 in 8.5	T-4865	RDSO
14	PSC 1 in 16	T-5691	Zonal Railway/ Consignee
15	TWS 1 in 16	T-7076	TPI Agency
16	CMS Xing 1 in 16	T-5693	RDSO
17	GRSP 1 in 16	T-5691	RDSO
18	PSC DS	T-5836	Zonal Railway/ Consignee
19	Derailing switch	T-6068	Consignee
20	GRSP DS	T-5836	RDSO
21	PSC SEJ	T-4149	Zonal Railway/ Consignee
22	ISEJ	T-6902	TPI AGENCY
23	GRSP SEJ	T-4159	RDSO
27	ERC J	T-8258	Consignee
28	Glued Joints	T-2572	TPI Agency
29	Fish plates	T-1898	TPI Agency
30	Fish Bolts & Nuts	T-1899	TPI Agency
31	PSC Guard Rails	T-8970	TPI Agency
32	PSC Bridge approach	T-8971 to 8978	Zonal Railway/ Consignee
33	PSC LC sleepers	T-8969	Zonal Railway/ Consignee
34	PSC Curve sleepers	T-8621 to 8624	Zonal Railway/ Consignee
35	Rail Screw	T-10675	TPI Agency
36	Plate screw	T-3913	TPI Agency

S. No.	Item	Drg no.	Inspection Agency
37	Single coil washer	T-10773	TPI Agency
38	Fish plate 1M	T-5916	TPI Agency
39	Joggled FP	T-5849	TPI Agency
40	Combination FP 60/52Kg	T-696 to 699	TPI Agency
41	SEJ Clamps	T-4168	TPI Agency
42	JFP with clamps	T-4016	TPI Agency
43	Any other P.Way material	As per latest drawing	As per extant guidelines
** TPI - Third party inspection Agency			

Annex - II
(Schedule-D)

(See Clause 10.2.7(c))

Time Schedule for Review of Drawings by the Authority:

Sl. No.	Item	Preparation	Authority's Review with time limit	Review by Open Line/RDSO
1.	Alignment plan	-	-	Tentative (partially approved) Alignment plan enclosed.
2.	L Section	-	-	Tentative (partially approved) L section sheets (5 nos) enclosed
3.	LWR Plans	Contractor	CE/C (45 days)	Copy to CTE to give remarks in 30 days, if any.
4.	Design basis report for important bridges	NA		
5.	GAD of important bridges	NA		
6.	GAD of major and minor bridges, affecting the existing bridge (requiring load sharing or imposition of SR during construction)	Contractor	CE/C (45 days)	Copy to CBE to give remarks in 30 days, if any.
7.	GAD of major and minor bridges (without any reduction in waterway/ vertical clearance and not affecting the existing bridge)	Contractor	CE/C (30 days)	
8.	Structural drawings of important and major bridges	Contractor	CE/C (30 days)	
9.	Structural drawings of minor bridges	Contractor	Dy.CE/C (30 days)	
10.	GADs of RUBs	Contractor	CE/C or CE of Open Line and State Authority	Nil
11.	Structural Drawings of ROB/RUBs	Contractor	CE/C (30 days)	
12.	GADs of FOB	NA		
13.	Structural Drawings of FOBs			

14.	Engineering Scale Plans (ESPs)	-	-	Tentative (partially approved) ESPs (3 nos) enclosed
15.	Signal Interlocking Plans (SIPs)	-	-	NA
16.	Route Control Charts (RCCs)	Contractor	CSTE/C (14 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.	Cable Route Plan	Contractor	CSTE/C (45 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.
18	Interface and logic circuits (to be submitted within 30 days after receipt of approved RCCs).	Contractor	CSTE/C (30 Days for Both)	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	Station Working Rule Diagrams & Station Working Rules. (to be submitted within 21 days, after receipt of approved RCCs)	Contractor	CSTE/C (30 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.
20	Technical System Approval for EI	Contractor	CSTE/C (30 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.

21	Track circuit and traction Bonding plan (to be submitted within 21 days, after receipt of approved SIPs)	Contractor	CSTE/C and CEE/C. (21 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.
22	Power supply scheme (to be submitted 21 days, after receipt of approved SIPs)	Contractor	CSTE/C (21 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.
23	Cable Core Plan, (to be submitted within 21 days, after receipt of approved SIPs)	Contractor	CSTE/C (21 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.
24.	Building Plans	Contractor	CE/C or CE of Open Line and if require, State Authority	Nil
25.	Drainage Plans	Contractor	Dy.CE/C (30 days)	
26.	Protection Work Design and Drawings	Contractor	CE/C (30 days)	

Time Schedule for Review of Drawings by the Authority for electrification works:

Sl. No.	Item	Preparation	Authority's Review with time limit	Review by Open Line/RDSO
1.	Final Layout Plan based on Pegging Plan supplied by Railway	Contractor	CEE(C)/CPD/RE (21 days)	NIL
2.	Cross Sectioning Drawings	Contractor	CEE(C)/CPD/RE (21 days)	NIL
3.	Structure Erection Drawings	Contractor	CEE(C)/CPD/RE (21 days)	NIL
4.	Long Section drawings of OHE under over line structures and overhead crossings	Contractor	CEE(C)/CPD/RE (21 days)	NIL
5.	Other design and drawings where there is any deviation from RDSO standards	Contractor	CEE(C)/CPD/RE (15 days))	NIL
6.	As erected SED and CSD	Contractor	CEE(C)/CPD/RE (30 days)	NIL
7.	Any special arrangement, including bridge masts, FOB/ROB modification, or structural modifications.	Contractor	CEE(C)/CPD/RE (45 days)	CEE of the concerned Railway. CBE in case of bridge masts, FOB/ROB, engineering structure modification (CEE or CBE to review and return to CEE(C)/CPD/RE within 30 days)
8.	All PSI Drawings/Designs	Contractor	CEE(C)/CPD/RE (21 days)	NIL
9.	Relay setting calculation of TSS	Contractor	CEE(C)/CPD/RE (21 days)	Sr DEE (TRD) of concerned Division. (Review to be returned to CPM/RE within 14 days)
10.	HT Crossing and LT crossing modifications	Contractor	CEE(C)/CPD/RE (45 days)	Sr DEE(TRD) of concerned Division (Review and return to CPM/RE within 30 days).
11.	Bonding Plan of Yard Area	Contractor	CEE(C)/CPD/RE (28 days)	Sr DEE(TRD) of concerned Division (Review and return within 21 days to CEE(C)/CPD/RE)

12.	Signalling Plan for each interlocked station, including interlocked level crossings situated outside station limits and inter locked mid-section sidings.	-	-	Approved copy enclosed with RFP.
13.	Locking Table and locking diagrams for each interlocking frames, station master's slide control, frame, interlocking key box, power frame with mechanical locking.	Contractor	CSTE (45 days)	Divn/HQ of concerned Railway. (within 75 days to
14.	Selection Table for each EI/Relay Interlock Station	Contractor	CSTE (14 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	All other Signalling/Telecom Drawings/Designs	Contractor	CSTE (60 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.	All other drawings not mentioned above, where mandatory review by Railway is necessary to comply with provision of Manuals/Codes.	Contractor	21 days where CPD/RE is approving Authority. 45 days where approval has to be taken from Open Line Railway.	As per the case.

Note: All other drawings/designs which are not mentioned herein will fall under the review of Authority Engineer (Dy. CEE/ Dy. CE/ Dy. CSTE as the case may be) and the time limit thereof will be as per the terms and conditions mentioned in the Contract Document.

A. Time Schedule for Review of Drawings by the Authority: (for Civil Engg. and S&T Works)

While approving the Designs and Drawings, the following guidelines shall be followed:

1. As per ACS 38 to IRBM, all the GADs of bridges of Doubling & Tripling projects, which affect the adjacent existing bridges, requires approval of CBE/WR. The proposed bridge will be considered as affecting the existing bridge during construction, if it involves partial breaking of Wing walls of existing bridge, exposure of foundation of existing bridge, works relating to joining existing and proposed bridge etc., The affect during service may be in the form of partial sharing of load by existing structure etc., Decision of PCE/CBE in this regard shall be final.
2. As per ACS 38 to IRBM, GADs and Launching schemes of all ROB, RUBs, FOBs and Rail Flyovers which affect existing lines require approval of CBE.
3. As far as possible, standard drawings for superstructures issued by RDSO shall be followed. However, in case non-standard drawings are unavoidable, specific approval of concerned CAO(C)/PCE shall be taken for adoption of the same. (Ref: Rly board letter No.2013/CE-III/BR/RDSO/Misc Dated 11.08.2014)
4. As far as possible, Open Foundations are to be adopted for new bridges. However, SAG Officers/CBE can decide on comparative analysis and techno-economic considerations, for adoption of Open/Well/Pile foundations. (Ref: 2014/CE-III/BR/Bridge Policy Dated: 15.11.2016)
5. As far as possible, only RDSO approved spans for bow string girders will be adopted. In rare case, if it is unavoidable to use non-standard span, then the design should be finally cleared by RDSO only. Railway Board should be intimated for use of this non-standard design. (Ref: RB letter No. 2015/ CE-IV/ ROB/ 78 (pt) dt 4.6.2019)
6. ROB in SKEW should be avoided, as far as possible. If it is unavoidable, skew angle of the ROB should be less than 30 Degree. For skew angle beyond 30 and up to 45 Degree, CBE has to approve the GAD duly recording the reasons for the same. For skew angle beyond 45 Degree, approval of Rly Bd should be taken. (Ref: Rly Bd Lr.Dated 16.02.2021).
7. Design basis report (DBR) should be prepared as per BS 122 for important bridges. The same shall be approved by CBE. DBRs of those important bridges where use of special type of span/ use of new technology is envisaged or use of codes other than Indian codes due to peculiarity of the bridge is envisaged shall be submitted to RDSO for approval (Ref : RB letter No. 2014/ CE-III/ BR/ Bridge policy dt 12.2.2020).
8. Approvals for adoption of RCC Boxes for Railway Waterway Bridges and RUBs shall be as per Railway Board Lr. No. 2015/CE-III/BR/Structure Code Dt. 19.01.2022.
9. Sanction of PCE/WR is required for the following Bridge works (Minor Sanction):
 - a. Construction of ROB.
 - b. Construction of Minor Bridges.
 - c. Construction of Major Bridges.

Construction of Civil Works & Electrification for TSS/SP/SSP:**1.5.1 Site Surveys and Investigations:**

Prior to the Alignment verification and reviews of the various Reference Drawings by the Contractor, the Contractor shall carry out validation of the data as provided by the Authority and any additional surveys if considered necessary by the Contractor.

Validation of the data and any additional surveys as considered necessary by the Contractor is particularly important in this Contract which imposes on the Contractor a single point responsibility for the whole design and construction of the Works.

The Contractor shall plan and programme those validation and additional surveys if considered necessary and investigations required to commence the design of Works and develop them to the Survey Plan and Programme.

The Contractor shall summarize the results of Validation of Data and Additional Survey including all the site surveys and investigations in to different reports which shall form part of the Survey Report, and shall be submitted to the Authority Engineer for his consent. The Contractor shall continue to be solely responsible for the accuracy and entirety of all the site surveys and investigations including Traverse Survey, Topographic Survey, Centre Line Survey and Geotechnical Investigations etc. throughout the Contract. Any 'Notice of No Objection' from Authority Engineer does not absolve the Contractor from his responsibility for accurately designing Alignment and setting out the Works within the available Right of Way.

1.5.2 Traverse Survey:

The Contractor shall carry out Traverse Survey and establish the horizontal and vertical systems at Site. The Contractor shall summarize the Traverse Survey results with verification studies in the Benchmark Establishing Report.

1.5.3 Topographic Survey:

Upon review and 'Notice of No Objection' of the Benchmark Establishing Report by the Authority Engineer, the Contractor shall immediately carry out the validation of the data provided by the Authority including additional Topographic Survey, if considered necessary by the Contractor, and meeting all the requirements including verification of the Right of Way (ROW), details of which is provided by the Authority and submit the Site Location / Layout Maps and Structure Setting-out Maps etc., to the Authority Engineer for his review and consent.

It shall be the Contractor's sole responsibility to ensure that there are no obstructions to in the Right of Way for Permanent Works based on the validation of data and additional survey carried out by the Contractor. If any obstructions such as trees, structures or chartered / unchartered public utilities etc. exist, the Contractor shall locate the obstructions on the Site Location Maps or Structure Setting-out Maps with the procedure and method statement that addresses the handling of the obstructions, and submit to the Authority Engineer for consent. Such obstructions shall be dealt with as per the provisions of the Contract.

The Contractor shall summarize the results of validation of data and topographic survey and include the same in the Survey Report and submit to the Authority Engineer for his consent.

1.5.4 Building Works:

All items of building works shall conform to specification of works of concerned zonal railway. The building work shall include electrical internal wiring with allied

work, system electrical power supply arrangement with transformer/main distribution supply, sanitary fittings, sewerage system, water supply arrangement with water tank in TSS buildings and internal fittings, approach roads, street lighting, boundary wall, fencing, site levelling, landscape elements, water harvesting and other works incidental to buildings. Building works shall be deemed to include buildings required for installation of equipment for PSI/electrification works.

1.5.5 Service buildings:

Service buildings shall be constructed at each TSS/SP/SSPs as given in Schedule-B. The building works shall include design and construction of:

- (a) Architectural and Structural work including stairs/slope, etc.
- (b) Mechanical/ Electrical/ Plumbing (MEP) services.
- (c) Water supply system and sewage disposal system within the building premises.
- (d) Fire detection & alarm system (indoor and outdoor}.
- (e) Air-Ventilation.
- (f) Land boundary pillars all around the TSS/SP/SSP buildings.
- (g) Internal roads & footpaths connecting various facilities within the TSS/SP/SSP premises.
- (h) All other building services & equipment including all fittings and fixtures as necessary for functioning of the TSS/SP/SSP buildings
- (i) All signage, information boards and posts shall be provided which include, utility boards. Name board of TSS on gate and building to be of LED type.
- (j) Scope includes Construction of Mini-Stores depot in the premises of TSS only with racks.
- (k) Drip irrigation pipes to cover entire length of TSS for plants.
- (l) Display boards on acrylic sheet of suitable size for single line drawing, tools list, list of register, operator instructions etc. Numbered register(200pages) of 100 Nos to be supplied.
- (m) Building to be constructed as per specification for buildings of WR.

1.5.6 Additional criteria for buildings

- 1.5.6.1 All buildings, required to be constructed under this Contract, shall comply with the applicable Indian building, standards and codes. The functional and structural design of station buildings and service buildings shall conform to National building code and bye-laws of local authorities to the extent of their applicability.
- 1.5.6.2 For the service buildings, the design for the same should be done by the Contractor for approval of the Authority Engineer.
- 1.5.6.3 Architecture and profile of buildings shall conform to local aesthetic, cultural ethos, etc. and it shall be approved by Authority Engineer.
- 1.5.6.4 The foundations of buildings shall be designed for at least one storey more than the

requirement.

- 1.5.6.5 The plinth level of service buildings rooms, and other buildings shall be 900mm above the natural ground level. The ceiling height of station buildings and service buildings shall be 4.2 m above floor level.
- 1.5.6.6 The contractor shall develop the architectural plan and Elevation, detailed design and drawings and construct the Service building fully electrified and with proper toilet, water supply, sewerage, drainage facility, leakage proof roof etc.
- 1.5.6.7 All approach roads connecting to the TSSs, SPs and SSPs shall be made of asphalt.
- 1.5.6.8 Bore to be drilled at TSS to get water of 50 lpm with GI pipe of 150mm dia upto suitable depth.
- 1.5.6.9 The civil works will be supervised by PMS/Civil-SSE/WORKS.
- 1.5.6.10 Makes of Sanitary fittings: (This list prevails over any other list of WR/IR specs)
- 1.5.6.11 The sanitary fitting shall be of premium quality of approved brand make and manufacture as per approval of Engineer-in-Charge. All the urinals, taps shall be sensor based. Specification/brands names of materials to be used as per the scope of work are listed here. The efforts should be made by the agency to use indigenous products. The agency should also consider the availability of spares parts/components for maintenance purposes while proposing any brand/manufacture having service centres at or near place of work is important. The materials of any other brand/manufacture may be proposed for use by the agency in case the brands specified below are not available in the market and/or the agency intends to use some other brand better than the brands mentioned in WR's Guidelines. The alternate brand can be used only after the approval of Authority.
- 1.5.7 Electrification of TSS/SP/SSP
 - 1.5.7.1 Electrical work at TSS/SP/SSP buildings:
 - (a) Provision of the Light point, Fan point, Exhaust Fan, Tube light point in TSS/SP/SSP/stations buildings/ Quarters/ Camp offices/ Offices of officers etc..
 - (b) Provision of exhaust fans in battery room and toilets.
 - (c) Provision of 15Amp socket for battery room and S&T load.
 - (d) Supply & fixing of LED lights 20W inside building to get lux of 300.
 - (e) Provision of fan regulator electronic step type.
 - (f) Exhaust fan 300 mm for toilets and battery rooms.
 - (g) Provision of SPN DB as per need of SSP/SP/TSS.
 - (h) Selector switch for selecting phase.
 - (i) GI pipe earthing with connection with 8 SWG GI wire-core approved 3.1m earth electrode only to be used.
 - (j) Illumination Level under covered shed should be as per RB letter no- 2018/LM (PA)/03/06 dated 09.04.2018.
 - (k) Number of fans to be provided should be as per Railway Board letter no.2012/LM(PA)/3/5 dated 11.09.2012.

1.6 Design criteria for SCADA works

The scope of work includes design, supply, erection, testing & commissioning of complete standalone SCADA system along with Remote Terminal Unit (RTU) and necessary modification to existing SCADA system wherever required through SCADA approved vendors as per RDSO Specification No. TI/SPC/RCC/SCADA/0134 with latest amendments.

1.7 Electrical spares and tools & plants for maintenance of OHE, PSI, Electrical Maintenance depots: Tools & spares shall be supplied, erected/installed, tested for satisfactory performance and necessary training to the staff in operation and maintenance of the T&P. Handing over of guarantee certificates to the Authority. Spares and T&P has to be supplied at the location specified by the authority.

1.8 Explanatory Notes of Schedule – G (Electrical/ TRD):- Mention in Schedule -G

1.8.1 Overhead Equipment works

Item No. 1.1 of Electrical/ TRD Schedule – G: Completion of design and drawings including Stations and yards :

1. Pegging plan / LOPs preparation for new line is in the scope of the contractor.
2. 2 Contractor to undertake physical survey not only for new line but also take data of existing OHE for preparation of LOP incorporating existing OHE assets also. In LOP all existing assets will be shown in black. With new LOP existing LOP becomes null & void.
3. All new OHE assets will be shown in Red.
4. OHE assets getting dismantled to be shown in yellow or blue for visibility.
5. Wire run of existing OHE shall be shown clearly in cut-N-connection area for proper planning of execution of work.
6. Layout plan to include existing line, OHE assets and other assets at site like PLC, bridges, drainage walls, signals, culverts, retaining walls, LC gates, S&T boxes, engineering goomties etc.
7. LOP to be prepared by physical survey of new line section as well as existing line section.

Item No. 1.2 of Electrical/ TRD Schedule – G: Supply of steel (masts, portal components & SPS):

1. Steel to be ordered as soon as an LOP is approved.
2. In all Purchase Orders, guarantee period as per agreement or specification of item whichever is higher to be mentioned.
3. Consignee will inspect at contractor's store depot all steel items irrespective of RITES/RDSO inspection at factory and will give MRC (Material Receipt Certificate). Refer DPR/MRC guidelines in schedule-DC.
4. Based on MRC, quantity schedule to be submitted for every yard and open route and payment will be made on prorated basis in TKM.
5. Quantity schedule will have type of mast/SPS with quantity as per LOP and as per MRC.

6. All wastages will be to contractor's account.
7. In doubling, based on experience, at least 20% of Drop Arms shall be of long Drop Arm type (3.30 m length).
8. All steel items to be stacked on concrete floor or steel/wooden supports to avoid rusting/dirt.
9. For platform locations, uprights to be ordered as per length required to avoid cutting of uprights. In case cutting is done, a plate on upright bottom to be welded and cold galvanization to be done to give strength like original upright.

Item No. 1.3 of Electrical/ TRD Schedule – G: Completion of Steel erection (Mast and Portal), grouting, muffing and erection of SPS including stencilling and number plates.:

1. Erection of masts/uprights to be done manually as mast to be erected before track is laid to meet targets.
2. For booms, Railway diesel crane/ UTV based crane, will be spared on hire basis as given in the Schedule – P to the extent available. Contractor to arrange road cranes if UTV /cranes are not available/ sparable by railway.
3. No rusted / dirty steel items to be erected without cleaning.
4. DPR to be prepared daily for steel items erection.
5. Based on DPR, quantity schedule for erection of items is prepared for payment purpose.
6. Stage payment is admissible on completion of a yard and open route on prorata basis in TKM.
7. Masts to be erected away from track in core hole.
8. Masts to be grouted within 3 days of erection. Muff to be erected within 7 days of grouting.
9. Care should be taken while erecting / grouting in power block area i.e. power block shall be taken for erection and grouting.
10. Reverse deflection as per CSD (which are deflection on top of mast) to be ensured during grouting.
11. All number plate fixing angles to be of Galvanised Iron.
12. Sample approval of band of stencilling and letter to be taken to avoid non-uniform and wrong stencilling.
13. Number plates to be ordered in time to claim stage payment for steel erection.
14. Stencilling to be planned in time to claim stage payment for steel erection.
15. On platform, double chairs to be used to avoid live OHE equipment on platform.
16. Where double chair is not possible, say ACC, standard Bracket Tube to be inserted inside large bracket tube to give strength.
17. Both span between mast & implantation to be measured and mentioned in

grouting DPR.

18. Brackets to be manufactured based on implantation of grouted masts and not based on LOP.
19. Dropper for non-standard spans to be manufactured accordingly.
20. Pits shall be cleared of ballast, dirt etc. before masts are erected and grouted.
21. Stencilling to be done as per HQ/WR's Guidelines.
22. Muff- Height shall be uniform 20cm + 5 cm slope in open route and 15 cm + 5cm slope on platform including ATD muff.
23. ATD muff shall be cast along with other masts.
24. ATD muff on 'B' type foundations – Foundation along track to be increased to accommodate ATD muff from formation level to top of foundation.
25. Guy rod muffs to be cast after ATD adjustment.
26. Number plates: Retro-reflective number plates as Railway Board letter No. 2001/Elect (G)/170/1 Pt dated 07.05.2012 or latest to be followed.
27. Reversal of bottom attachment to get 5.80m height is not permitted.
28. On platform, short uprights as per platform height may be ordered to avoid cutting of uprights.
29. When clear span is more than 36m, special portal upright & boom pieces to be ordered in time as it takes time.

Item No. 1.4 of Electrical/ TRD Schedule – G: Completion of supply & erection of CL assembly, Protection screen & other components and erection of Guy Rods, anti-creep wires (Complete pre wiring activity).:

1. No joints in guy rods permitted.
2. At all existing over line structures (ROB/FOB etc.) where proposed lines are passing under ROB/FOB, parapet wall/protective screen of height 1.8m from floor / road level to be provided.
3. Protective screen shall be provided on FOB from column to column of FOB i.e. from stair case column to stair case column and not just above the OHE.
4. Parapet wall of RCC of 1.8m from path way / road way shall be provided on all ROB's covering all tracks (existing & proposed).
5. Protective screen shall be as per RDSO drawing no. ETI/C/0068/Mod. I or latest.
6. The mesh shall be galvanized for longer life. There shall not be any gap between protective screen / parapet wall.
7. In case of steel girder bridges, MS flat of 40x6 mm to be connected from girder bridge on either side of nearest track. In addition, one earth electrode to be provided on either side and MS flat to be connected from steel girder bridge to earth electrode.
8. For anti-creep wire, steel wire to be used except in BZA division a here copper

catenary wire to be used.

9. Protective screens to be continuous from one end to another on FOB. If existing protective screens are not continuous or non-standard, same shall be replaced. Tenderer to do physical survey before quoting.
10. Height gauges to be erected as per RDSO drawing.
11. Wire rope & rod insulators at LC gates covered under scope of contract for both lines.
12. Height gauge height to be maximum of 4.78m & minimum of 4.67 m.
13. Tree trimming of branches and stem up to 6m from centre of nearest track and tree cutting of tall trees of above 5m height within Railway boundary as per directions of authority engineer i.e. which are likely to fall under heavy winds. Other trees to be cut such that height is less than 5 m.
14. Profile drawing to be got approved for ROB/FOB before brackets are manufactured to avoid wastage of time in adjustment and joint check.
15. R.T. tube to project over contact wire in tangent / outside curves in case of pull of bracket. Care to be taken while fabricating cantilever assembly.
16. In polluted area, long creepage porcelain insulators to be used.
17. Any cable / pipe on the side of ROB / FOB above OHE to be relocated inside of ROB / FOB with the approval of owner of cable/pipe
18. ROB is having drain outlets shall be connected by 100mm dia HDPE pipe (PE 80/PN4) with clamps at every 60cm and the pipe to be taken to nearest column of ROB for downward discharge of rain water.
19. Thimble in RRA clamps to be provided.
20. Any telephone cables/ cables over OHE at ROB shall be cut.
21. Anti-Monkey climbing devices to be provided as per yardstick given in schedule-B

Item No. 1.5 of Electrical/ TRD Schedule – G: Supply of Contact wire, Catenary wire, feeder wire, AEC, BEC, isolators, section insulators, PTFEs, earth electrodes, caution boards & number plates, ATD, Guy rods, ACC wires, Jumpers & Dropper wires.:

1. Copper bus bar of 18mm dia to be used for all isolators.
2. All isolators For 2x25kV system, Single / double pole isolator of 25kV, 1600A (Manual / motorized) to be provided.
3. 160 sq. mm jumper wire to be used for overlaps & isolators or as per design..
4. Feeder wire size for both 2x25kV system and OHE feeder wire size is as per design or 234 mm²
5. Item No. 1.6 of Electrical/ TRD Schedule – G: Completion of wiring along with dropping, clipping & jumpering. Erection of termination, PTFE, isolators, section insulators, earth electrodes, number plates, erection of BEC, AEC and feeder wire, caution boards of all sorts, & adjustment of OHE including joint check with

TrD open line along with antitheft charging, security of OHE etc.:

1. BEC to be erected so that there is adequate clearance from S&T cables as per SEM manual provisions.
2. Coasting & powering boards as per list given Sr.DEE/OP of division to be provided.
3. Sigma boards: One board on second mast from every stop signal to be erected.
4. Earth electrodes erection process: River sand and salt to be mixed on top as one layer of 30 cm and one layer of 30 cm of charcoal to be done. All earth electrodes to be erected in presence of authority engineer.
5. Retro reflective structure number plate shall be provided as per latest Railway Board letter.
6. Bonding and Earthing code No. ETI/OHE/71(11/90) with latest correction slips and amendments shall be followed.

Item No. 1.7 of Electrical/ TRD Schedule – G: Energisation & commissioning including EIG documentation & sanction, attention to remarks of PCEE inspection given in EIG sanction, attention to PCEE sanction remarks and attention to remarks of division/HQ officials.:

1. EIG documents shall be prepared and submitted in 4 sets in the standard proformae as per PCEE/WR's Guidelines.
2. Joint check guidelines as per WR/HQRS Guidelines shall be followed.
3. Compliance to remarks given during SAG inspection, EIG sanction, divisional officers and PCEE sanction as per the time schedule issued by the authority.

1.8.2. Switching Posts (for SP & SSP): As per Annexure -Schedule -G.

1.8.3. General Services are as per Annexure-Schedule -G

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) Pollution control approval for installation of DG sets. Clearance from PCB for operation of DG sets.
 - (k) Approval for lifts/ escalators from state government where applicable.
 - (l) Clearance from DISCOM for setting up of solar power plant.
 - (m) Clearance from lift inspector of state for commissioning of lifts.
 - (n) Clearances for fire alarm, detection & Protection system from state fire services department.
- 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.
-

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

**Principle Financial Advisor,
Western Railway,
Mumbai**

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 construction of the new railway line between-..... in the Railway zone 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 for due and faithful performance of its obligations, under and in accordance with the Agreement, during the {Construction Period/ Defects Liability 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} under and in accordance with the Agreement, and agrees and undertakes to pay to the [mention Finance of 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 [***in the ***]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 ****^{\$}. 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.

^{\$} Insert date being 2 (two) years from the date of issuance of this Guarantee (in accordance with Clause 7.2 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.

SCHEDULE - F

(See Clauses 7.1.1, 7.5.3 and 17.2)

FORM OF INSURANCE SURETY BOND

Annex-IA

(See Clause 7.1.1)

Performance Security

Name of the issuer of surety bond:

President of India,
Acting through
Principle Financial Advisor,
Western Railway, Mumbai

Date:.....

.....

Surety Bond No:

Issue Date:.....

Amount of Bond:.....

Expiry Date:.....

WHEREAS, In consideration of the President of India acting through(*Designation & address of contract signing authority*),.....Railway,....., (hereinafter called “The Railway”) having accepted the bid of M/S XXXXX hereinafter called the contractor, for the work of XXX” under invitation for bids No XXXX Dated XXXXX, Vide Letter of Acceptance No.

AND

WHEREAS, the contractor is required to furnish Performance Security for the sum of **Rs. XXXX (Rupees XXXX Only)**, in the form of Surety Bond, being a condition precedent to the signing of the contract agreement

SBNNo:

Date:

WHEREAS, we, _____, (*Name of insurance company*) hereinafter called the Surety, acting through [*Designation(s) of the authorised person of the Surety*], have, at the request of the **M/s. XXXX** contractor, agreed to give Bond for performance security/ additional performance security as hereinafter contained:

1. KNOW ALL MEN by these present that I/We the undersigned [*Insert name(s) of authorized representatives of the Surety*], being fully authorized to sign and incur obligations for and on behalf of the Surety, confirm that the Surety, hereby, unconditionally and irrevocably Bond to pay the Railway the full amount in the sum of **XXXX (Rupees XXXX Only)** as above stated.
2. The Surety undertakes to immediately pay on presentation of demand by the Railway any amount up to and including aforementioned full amount without any demur, reservation or recourse. Any such demand made by the Railway on the Surety shall be final, conclusive and binding, absolute and unequivocal notwithstanding any disputes raised/pending before any Court, Tribunal, Arbitration or any Authority or any threatened litigation by the Bidder or Bank.
3. On payment of any amount less than aforementioned full amount, as per demand of the Railway, the Bond shall remain valid for the balance amount i.e. the aforementioned full amount less the payment made to the Railway.
4. The Surety shall pay the amount as demanded immediately on presentation of the demand by Railway without any reference to the contractor and without the Railway being required to show grounds or give reasons for its demand or the amount demanded.
5. The Surety Bond shall be unconditional and irrevocable.
6. The Bond hereinbefore shall not be affected by any change in the constitution of the Surety or in the constitution of the Contractor.
7. The Surety agrees that no change, addition, modifications to the terms of the Contract Agreement or to any documents, which have been or may be made between the Railway and the Contractor, will in any way release us from the liability under this Bond; and the Surety, hereby, waives any requirement for notice of any such change, addition or modification to the Surety.
8. This Bond is valid and effective from the date of its issue, which is [*insert date of issue*]. The Bond and our obligations under it will expire on **XXXX (Expiry Date)**. All demands for payment under the Bond must be received by us on or before that date.
9. The Surety agrees that the Railways right to demand payment of aforementioned full amount in one instance or demand payments in parts totalling up to the aforementioned full amount in several instances will be valid until either the aforementioned full amount is paid to the Railway or the Bond is released by Railway before the Expiry date.
10. The Surety agrees that its obligation to pay any amount demanded by the Railway before the expiry of this Bond will continue until the amount demanded has been paid in full.
11. The expressions Surety and Railway hereinbefore used shall include their respective successors, administrators and assigns.

SBNo:

Date:

12. The Surety hereby undertakes not to revoke the Bond during its currency, except with the previous consent in writing of the Railway. This Bond is subject to the Uniform Rules for Demand Bonds, ICCPublicationNo.758.
13. We, the Surety Insurer, further agree that the Authority shall be the sole judge to decide as to whether the Bidder is in default of due and faithful fulfilment and compliance with the terms and conditions contained in the Bidding Documents including, Inter alia, the failure of the Bidder to keep its Bid open during the Bid validity period set forth in the said Documents, and the decision of the Authority that the Bidder is in default as aforesaid shall be final and binding on us, notwithstanding any differences between the Authority and the Bidder or any dispute pending before any Court, Tribunal, Arbitrator or any other Authority.
14. The Bond shall be in addition to and without prejudice to any other security Bond (s) of the contractor in favour of the Railway available with the Railway. The Surety, under this Bond, shall be deemed as Principal Debtor of the Railway.

Notwithstanding anything to the contrary contained in these presents,

- a. Our liability under this Surety Bond shall not exceed **XXXX (Rupees XXXXX Only)**
- b. This Surety Bond shall be valid up **XXXX (being the date of expiry)**;
- c. Unless the bank is served a written claim or demand on or before **XXXX** all rights under this Bond shall be forfeited and the Surety shall be relieved and discharged from all liabilities under this Bond irrespective of whether or not the original Surety bond is returned to the Surety

Dated the day of 2024

15. The Insurance Surety Bond shall be verified by sending mail to [customer.care@sbgeneral.in]

Place.....

Bank's Seal and authorized signature(s)

[Name in Block letters]

[Designation with Code No.].....

[P/Attorney] No.

Witness

1.

2.

* * * * *

Note: All italicized texts are for guidance on how to prepare this Insurance Surety Bond and shall be deleted from the final document.

Annex – II
(Schedule - F)
(See Clause 7.5.3)

Form of Guarantee for Withdrawal of Retention Money
Principle Financial Advisor,
Western Railway,
Mumbai

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 construction of the new railway line between ****-**** in the **** Railway zone 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 [*** in the ***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

**Principle Financial Advisor,
Western Railway, Mumbai**

[Mumbai-400020]. 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 construction of the new railway line between ***in the ***Railway zone 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 installments 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 installment to remain effective till the complete and full repayment of the installment of the Advance Payment as security for compliance with its obligations in accordance with the Agreement. The amount of {first/second} installment of the Advance Payment is Rs.cr. (Rupeescrore) and the amount of this Guarantee is Rs. cr. (Rupees crore)(the “**Guarantee Amount**”)^s.
- (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.

^sThe Guarantee Amount should be equivalent to 110% of the value of the applicable installment.

2. A letter from the Authority, under the hand of an officer not below the rank of [***in the ***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 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 ****.^{\$} 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 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. The Bank hereby confirms that it is on the SFMS (Structured Financial Messaging System) and shall invariably send the advice of this Bank Guarantee to the following bank details –

IFSC CODE	SBIN000RAIL
IFSC TYPE	BRANCH
BANK NAME	STATE BANK OF INDIA
BRANCH NAME	RAIL
CITY NAME	NAVI MUMBAI
ADDRESS	SECTOR-11, CBD BELAPUR, NAVI MUMBAI
DISTRICT	NAVI MUMBAI
STATE	MAHARASHTRA
BG ENABLED	YES

12. 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

^{\$} 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).

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[(For Lump sum value of this agreement)]

1.1 The Contract Price for this **schedule of** Agreement is Rs. 668.27 Crs(i.e 90.99% of the contract cost) .[It is assigned for different components of the Railway Project as follows:]

[For works consisting of civil works and railway electrification]

Civil and track works	91% of the Contract Price
Signalling works	0% of the Contract Price
Telecom works	0% of the Contract Price
Electrification works	9% of the Contract Price

1.2
1.2
1.2
1.2

1.2 Proportions of the Contract Price for different stages of Construction of the Railway Project shall be as specified below:

A. Civil Works

1. Civil and track works				
Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage	Payment Procedure
1	2	3	4	5
1.1 Earthwork	33%	1.1.1 Earthwork in embankment/ cutting including compaction up to H*/4 from ground level complete in all respects.	30%	(a) The unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a continuous length of minimum 50 m. (b) Provided that payment for the blanketing layer shall be made on completion of minor bridges including slab / RCC box (item no 1.4) in the length for which stage payment is claimed. For the avoidance of Doubt, payment for minor Bridges shall be payable separately in accordance with item 1.4. *H = Height of formation from ground level minus blanketing thickness Note :- The whole Project length may be divided in sections depending on
		1.1.2 Earthwork in embankment/ cutting including compaction from H/4 to H/2 from ground level complete in all respects.	30%	
		1.1.3 Earthwork in embankment/ cutting including compaction from H/2 to 3H/4 from ground level complete in all respects	20%	
		1.1.4 Earthwork in embankment/ cutting including compaction from 3H/4 level to H from ground level complete in all respects.	20%	

1. Civil and track works				
Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage	Payment Procedure
1	2	3	4	5
				average Formation Height/depth Upto 3 m, 3 to 6 m, 6 to 9 m and 9 m and above. In each section Km number shall be grouped according to average formation Ht. and separate EW payment milestone may be made as it is made for item No. 1.1. (i.e., 1.1A, 1.1 B, 1.1C, 1.1D)
		Total	100%	
1.2	12%	1.2.1 Blanketing work complete in all respect	60%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a continuous length of minimum 50 m.
		1.2.2 Slope Protection by Turfing of formation Slope	7%	
		1.2/3 Pitching of Formation Slope	3%	
		1.2.4 Retaining wall/toe wall and other misc. works.	30%	
		Total	100%	
1.3 Major Bridges	5%	1.3.1 Foundation: Completion of the foundation work including pile caps/ well caps and foundations for wing and return walls, and testing.		a. Cost of each bridge shall be determined on pro rata basis with respect to the total linear length of the Major Bridges. b. In case any component of bridge is not complete in full, then Cost of each
		1.3.1/a Foundation of pier/abutments	0%	
		1.3.1/b Foundations of return/ wing wall	0%	

1. Civil and track works				
Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage	Payment Procedure
1	2	3	4	5
		1.3.2 Sub-structure: Completion of abutment/piers including bed blocks (without bearings).		<p>component of individual bridge shall be determined on pro rata basis with respect to the total linear length of that bridge.</p> <p>c. Payment shall be made on completion of each component/stage of an Major Bridge as per the weightage given in this schedule.</p> <p>d. For item no 1.3.4 if a bridge is constructed using pre-cast concrete element/composite girders/plate girders/open web girders etc.: 70% payment shall be released upon finishing casting of concrete pre-cast elements/Assembled plate girders/ Assembled open web girders etc.& transportation to site.</p> <p>i. The supply of structural steel for fabrication of girders may be paid at the rate of 75% of cost of material on its delivery at a</p>
		1.3.2/a Pier/Abutment	20%	
		1.3.2/b Pier/Abutment cap	10%	
		1.3.3 Completion of the wing walls, return walls in all respects	25%	
		1.3.4 Super-structure: Completion of the super structure except deck slab and bearings	15%	
		1.3.5 Completion of the deck slab, bearings/ expansion joints and making bridge ready for track linking including Bearings.	5%	
		1.3.6 Miscellaneous works: Completion of the remaining works including hand rails, walls, all protection works, pitching, turfing, river training works, if any, tests, etc., complete in all respects and fit for use	25%	

1. Civil and track works				
Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage	Payment Procedure
1	2	3	4	5
				<p>RDSO's approved workshop on submission of BG/insurance surety bond of equivalent amount</p> <p>ii. If contractor sets up workshop at site, then BG/insurance surety bond shall not be insisted upon.</p> <p>The amount paid against the supply of structural steel shall in any case not exceed 75% of payment admissible under the stage.</p> <p>e It may be noted that payment of foundation is covered under relevant item of Sch G1.</p>
		Total	100%	
1.4. Minor Bridges	10%	1.4.1 On completion of the RCC boxes, Abutments, pier & slab for slab bridges including Wing wall and Return wall.	65%	(a) Cost of each bridge shall be determined on pro rate basis with respect to the total clear span of the Minor Bridges.
		1.4.2 On completion of the Wing wall and Return wall	15%	(b) Payment shall be made on completion of each component/stage of an Minor

1. Civil and track works				
Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage	Payment Procedure
1	2	3	4	5
		1.4.3 On completion of Balance works of apron, curtain wall, drop wall and other protection works in all respects	20%	Bridge as per the weightage given in this schedule. [For the purpose of calculation of quantity of item No. 1.4.1, the cost of each RCC boxes, Abutments, pier & slab for slab bridges shall be determined by dividing total cost of the RCC boxes, Abutments, pier & slab for slab bridges of the bridge by number of Minor bridges, for item No. 1.4.2, the cost of each Return /wing wall shall be determined by dividing total cost of the Return/wing wall of all bridges by number of Minor bridges and for item No. 1.4.3, payment shall be made on completion of the all stages of Bridge on prorata basis.
		Total	100%	
1.5. ROB	5%	1.5.1 Foundation: Completion of the foundation work including pile caps/ well caps and foundations for wing and return walls (in any), and testing.		(a) Cost of each ROB shall be determined on pro rate basis with respect to the total linear length of

1. Civil and track works				
Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage	Payment Procedure
1	2	3	4	5
		1.5.1/a Foundation of pier/abutment	0%	<p>the ROB.</p> <p>(b) In case any component of bridge is not complete full, then Cost of each component of foundation/substructure of ROB shall be determined on pro rate basis with respect to the total linear length of the individual ROB.</p> <p>(c) Payment shall be made on completion of each stage of a ROB as per the weightage given in this schedule.</p> <p>For item No. 1.5.2/a , 1.5.2/b and 1.5.2/c cost of each sub- structure shall be determined by dividing total cost of the sub-structure of all the bridges by number of piers and abutments/return wall of all the bridges , for item no 1.5.3/a and 1.5.3/b cost of each span shall be determined by dividing total cost of the super structure of all the bridge by number of spans of all the</p>
		1.5.1/b Foundation of return/wing wall	0%	
		1.5.2 Sub-structure: Completion of abutment/piers including bed blocks (without bearings).		
		1.5.2/a Pier/abutment shaft	30%	
		1.5.2/b Pier/Abutment cap	20%	
		1.5.2/c Return/wing wall	15%	
		1.5.3 Super-structure: Completion of the super structure		
		1.5.3/a Construction of Super structure except deck slab, expansion joint, bearings	15%	
		1.5.3/b Construction of deck slab, expansion joint, bearings and making superstructure fit for laying road carpeting	5%	
		1.5.4 Miscellaneous works: Completion of the remaining works including bearings, hand rails, walls, all protection works, pitching, turfing, load tests, etc., complete in all respects	5%	
		1.5.5 Completion of approaches in all respect and fit for offering the asset for CRS inspection.	10%	

1. Civil and track works				
Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage	Payment Procedure
1	2	3	4	5
				bridges, for item no 1.5.4 cost of misc. works shall be determined by dividing total misc. cost of the bridge of all the bridge by number of all the bridges, for item no 1.5.5 cost of approaches works shall be determined by dividing total approaches works cost of the bridge of all the bridge by number of all the bridges.
		Total	100%	
1.6 RUB / LHS	5%	1.6.1 On completion of the RCC boxes barrel/Abutments, pier & slab for slab bridges.	65%	(a) Cost of each RUB/LHS shall be determined on pro rate basis with respect to the total clear span of the RUB/LHS. (b) Payment shall be made on completion of each component/stage of an RUB/LHS as per the weightage given in this schedule For the purpose of calculation of quantity of item No. 1.6.1, the cost of each RCC boxes, Abutments, pier & slab for slab bridges shall be determined by dividing
		1.6.2 On completion of works of Wing wall/return wall and making bridge Fit for track linking	10%	
		1.6.3 On completion of Retaining wall of Approach Roads and Road works in all respect	15%	
		1.6.4 On completion height gauge, Roofing of approaches, drainage arrangement and all other ancillary works in all respects	10%	

1. Civil and track works				
Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage	Payment Procedure
1	2	3	4	5
				total cost of the RCC boxes, Abutments, pier & slab for slab bridges of all RUB/LHS by number of ROB/LHS, for item No. 1.6.2, the cost of each Return /wing wall shall be determined by dividing total cost of the Return/wing wall of all RUB/LHSs by number of RUB/LHS and for item No. 1.6.3, the cost of each Retaining wall of Approach Roads shall be determined by dividing total cost of Retaining wall of Approach Roads for all RUB/LHS by number of ROB/LHS and for item No. 1.6.4, the cost of each height gauge, Roofing of approaches, drainage arrangement and all other ancillary works shall be determined by dividing total cost of height gauge, Roofing of approaches, drainage arrangement and all other ancillary works for all RUB/LHS by number of ROB/LHS.

1. Civil and track works				
Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage	Payment Procedure
1	2	3	4	5
		Total	100%	
1.7 Track works	15%	1.7.1 Supply of ballast and staking	20%	<p>(a) Unit of measurement is cum for item No. 1.7.1 cum. [80%] payment will be released after taking indemnity bond. The unit of measurement of cum ballast is only for releasing interim payment. After completion of track work qty. of ballast will be reconciled on basis of minimum ballast cushion of [350] mm on main line and [300] mm on loop line.</p> <p>(b) Unit of measurement is linear length. For items from 1.7.2 to 1.7.4. Payment of each stage shall be made on pro rata basis on completion of a stage in a continuous length of minimum 100 m.</p> <p>(c) For item no 1.7.3 Payment shall be made on completion of a track work in block section on pro rata basis with reference to the total length of main lines.</p>
		1.7.2 Bed Ballast laying, compacting initial layer of 200 mm to facilitate mechanized track laying.	5%	
		1.7.3 Mechanized track laying in block section between station limits on PSC sleepers complete in all respects including laying [60 Kg] PSC sleepers at sleeper density of [1660/km], laying of rails, supplying and fixing switch expansion joints, glued joints, guard rails, check rails, along with welding of rails, supply and fixing all rail sleeper fittings etc. complete linkage of track as per track diagram.		
		1.7.3/a Skelton linking without supplying and fixing switch expansion joints, glued joints, guard rails, check rails, along with welding of rails, supply and fixing all rail sleeper fittings etc. complete linkage of track ,(including dismantling of MG track etc.)	30%	
		1.7.3/b Supplying and fixing switch expansion joints, glued joints, guard rails, check rails, along	5%	

1. Civil and track works				
Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage	Payment Procedure
1	2	3	4	5
		with welding of rails, supply and fixing all rail sleeper fittings etc. complete linkage of track		(d) For item no 1.7.4 Payment shall be made on completion of a yard on pro rata basis with reference to the total length of all loop lines in all the yards. (e) On supply of complete T/O sleepers sets payments of [15%] of item No. 1.7.4/a and 1.7.4/b will be released on prorata basis after taking indemnity bond. (f) On supply of T/O switches, Xings and fittings, payments of [35%] of item No. 1.7.4/a and 1.7.4/b will be released on prorata basis after taking indemnity bond. Note: In case option of item No. 1.7.1 is not operated, then this item will be added in item No. 1.7.2 and 1.7.5
		1.7.4 Mechanized Track laying in yards (within station limits) on PSC sleepers complete in all respects including supply of new [60 kg] PSC sleepers, laying of sleepers at sleeper density of [1660/km on main line and loop line], providing and laying points and crossings, switch expansion joints, glued joints, derailing switch in all lines in yards etc. complete to ensure continuous and complete linkage of track in the yard as per yard plan		
		1.7.4/a Skelton linking without providing and laying points and crossings, switch expansion joints, glued joints, derailing switch in all lines in yards etc. complete to ensure continuous and complete linkage of track in the yard as per yard plan, (including dismantling of MG track & point crossing etc.)	10%	
		1.7.4/b providing and laying points and crossings, switch expansion joints, glued joints, derailing	15%	

1. Civil and track works				
Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage	Payment Procedure
1	2	3	4	5
		switch in all lines in yards etc. complete to ensure continuous and complete linkage of track in the yard as per yard plan.		
		1.7.5 Ballast laying to facilitate lifting of track, making of full ballast cushion and profile, distressing of long welded rails, machine tamping of track.	15%	
		Total	100%	
1.8 Other Engineering works	10%	1.8.1(a) Construction of platforms including platform fencing/Wall but excluding items mentioned in item no 1.8.1(b) and (c) as per yard diagram	15%	
		1.8.1(b) Surfacing of platform with [kota stone/ CC] including passenger amenities.	2%	
		1.8.1(c) Provision of platforms including shelters	3%	
		1.8.2 Construction of railway station buildings and service buildings complete in all respects including fixing doors, windows, sanitary, water	30%	

1. Civil and track works				
Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage	Payment Procedure
1	2	3	4	5
		supply works, electrification, lifts, escalators and all other specified and incidental works		
		1.8.3 Construction of staff quarters complete in all respects including fixing doors, windows, sanitary, water supply works, electrification, lifts, escalators and all other specified and incidental works	15%	
		1.8.4 On completion of circulation area, parking area, boundary wall, internal roads, drainage, water supply works including bore well, pump house, landscaping and all other incidental works in railway station/colony area.	5%	
		1.8.5 Boundary walls, boundary pillars, fencing, roads, footpaths in block sections		
		1.8.5.1 Boundary walls	5%	
		1.8.5.2 Boundary pillars	3%	
		1.8.6 Signage, information boards and posts	2%	
		1.8.7 Construction of RCC Cable ducts for Electrical and S&T cables and Drainage along the railway line	10%	

1. Civil and track works				
Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage	Payment Procedure
1	2	3	4	5
		1.8.8 Compulsory afforestation and tree plantation	10%	
		Total	100%	
1.9 Inventory for civil & track works	1%	1.9 Supply of material as per the inventory	100%	On completion of supply of full inventory at least three months before the issue of the Provisional Certificate.
1.10 Integrated testing and commissioning.	4%	1.10 Successful completion of Integrated testing and commissioning.	100%	On issue of Completion Certificate. In case the Completion Certificate is for part of the Railway Project, the payment shall be made for the route km covered by the Completion Certificate pro rata to the total route km for the Project.
Total	100%			

B. ELECTRICAL ENGINEERING

em	Weightage in percentage to the Contract Price	Stage for Payment	Percentage	Item
1. ELECTRICAL COST (TRD+GS)	9.00%			
1. Overhead Equipment (OHE) Work	68.00%	1.1 Completion of Design & drawing and Foundation work for block sections including stations and yards.	10.54%	<p>Payment for each stage shall be made after completion of a previous stage for a Section and its yards, measured in track kilo metre (TKM) pro rata with reference to the total TKM.</p> <p>Note- In case completion of work in any yard is delayed on account of Authority, work of the yard may be delinked from the rest of the section with approval of CEE/C for the purpose of payment.</p> <p>For item 1.2 and 1.5 of stage payment, payment for supplies for additional sections, to the extent of maximum 10% of the total TKM, in addition to the payment admissible under item 1.0</p>
		1.2 Supply of steel (Mast and Portals components only)	22.80%	
		1.3 Completion of Steel erection (Mast & Portal) & grouting with painting of location Numbers	6.71%	
		1.4 Completion of erection of Bracket, Guy Rod, anticreep (Complete pre wiring activity), Height gauge & protection screen.	9.37%	
		1.5 Supply of Contact & Catenary wire only	28.9%	

		1.6 Completion of wiring along with erection of balance weight, dropping & clipping including anti-theft charging.	16.65%	above may be done. Payment against supplies under this item shall be made for quantities as per the approved layout, on receipt of material at contractor depot and production of inspection certificates and other documents and against BG of equivalent amount. For item No. 1.7 Stage payment will be released on completion of work and supply of T & P
		1.7 Commissioning & T & P items supply	5.03%	
		Total	100%	
2. Switching Posts	18.66%	2.1 Foundation for equipment erection and Supply of all material including steel except Auto-transformers.	20%	Payment will be made on completion of each schedule. Supply of material should be done after completion of foundation and Building construction. Payment of Next schedule will be done after completion of all previous stage
		2.2 Completion of Erection of Steel for all equipments and Erection all Equipments.	10%	
		2.3 Supply and Erection of Auto-Transformers.	30%	
		2.4 Completion of Testing and commissioning of	30%	

		all Equipments including all misc items SCADA and supply of inventory (T & P)		
		2.5 EIG Certification and charging of SSP.	10%	
		Total	100%	
3. Various electrical general services works	13.34%	3.1 Underground/modification of LT line - 28 Nos.(11 KV)	30%	Payment shall be made after the completion of all LT line
		3.2 Completion and commissioning of various electrical general services.	70%	Payment shall be made after the completion and commissioning of works under this items of work.
		Total	100%	
Total	100%			

Note – For inter se ranking of offers considering capitalization of Transformer losses:

- i. The inter se ranking of the offer will be arrived after adding the quoted rate for tender by the tenderers and present value of the losses of all transformers and auto transformers as per formula for capitalization of transformer losses given in RDSO specification.
- ii. As per Specification No. TI/SPC/PSI/TRNPWR/4200 (for V connected transformer), TI/SPC/PSI/TRNPWR/5200 (for Scott connected transformer) and Specification No. TI/SPC/PSI/AUTO TR/1201, formula for Capitalization of Transformer and auto transformer losses shall be used for the purpose of calculating the present worth of transformer after taking into account capitalization of its losses.

iii. The value of K which is capitalised value of transformer losses (the present value of transformer losses in Rupees as per formula given in RDSO specification) will be added to all-inclusive unit rates quoted by firm for ascertaining inter se ranking of the offers and for deciding the tender.

iv. Values of n (Life of Transformer) will be taken as [N] years, F (Load Factor) as [F] percent and T (Tariff) as Rupee [T] per Kwh.

v. Firm should indicate the value of parameters – Maximum No-Load Loss in watt (I) and Maximum Load Loss in watt (C) in their offer and shall compute the capitalised value of transformer losses (K) for all the transformers and furnish with the offer.

vi. In case the bidder fails to indicate the losses with their offer as explained in v above, maximum value of losses as per RDSO Specification No. TI/SPC/PSI/TRNPWR/4200 for V connected power transformer, RDSO TI/SPC/PSI/TRNPWR/5200 (for Scott connected transformer) and RDSO Specification No. TI/SPC/PSI/AUTOTR/1201 for auto transformer shall be considered for calculation of value of K.

Note – The Above list is illustrative and may require modification as per the scope of the work

2.0 Signalling and telecommunication works:

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage	Payment Procedure

2.1 Signalling works	[***%]	<p>2.1.1 Survey & Design of signalling works at wayside station</p> <p>2.1.2 Signalling works at wayside stations Supply, installation, testing, manuals for Signalling & telecommunication equipment installed for each place, supply of completion drawings, and commissioning of wayside stations except EI/ Underground Signalling Cable, Power Cable, 6Quad Cable/Axle Counters/Various types of Relays/IPS.</p> <p>2.1.3 Survey & Design works at major or Junction station</p> <p>2.1.4 Major or Junction stations Supply, installation, testing, manuals for Signalling & Telecommunication equipment installed for each place, supply of</p>	<p>[***%]</p> <p>[***%]</p> <p>[***%]</p> <p>[***%]</p>	<p>2.1.1 Payment shall be made on completion of Survey and Design of signalling works at wayside stations and approval of all drawings, designs and schemes. Unit of measurement shall be no. of way side stations. Payment shall be made on the pro rata basis for work completion with respect to total no. of way side stations.</p> <p>(fffff) —</p> <p>2.1.2 Unit of measurement shall be no. of stations. Payment shall be made on completion of signalling work at a wayside station on pro rata basis with respect to the total number of wayside stations.</p> <p>(sssss) —</p> <p>(ttttt) —</p> <p>(uuuuuu) —</p> <p>2.1.3 Payment shall be made on completion of Survey and Design works at major or junction stations and approval of all drawings, designs and schemes. Unit of measurement shall be no. of stations. Payment shall be made on the pro rata basis for work completion with respect to total no. of stations.</p> <p>(vvvvv) —</p> <p>2.1.4 Unit of measurement shall be major/junction station. Payment shall be made on completion of signalling work</p>
----------------------	--------	---	---	---

		<p>completion drawings, and commissioning of major/junction stations except EI/Underground Signalling Cable, Power Cable, Six Quad Cable/ Axle Counters /Various types of Relays/IPS.</p> <p>2.1.5 Survey & Design works for block signalling</p> <p>2.1.6 Block Signalling (BPAC/Token/Token less) Supply, installation, testing, manuals for Signalling & Telecommunication equipment installed for each place, supply of completion drawings, and commissioning of block signalling Underground Signalling Cable, Power Cable, Six Quad Cable/ Axle Counters /Various types of Relays/IPS.</p>	<p>***%</p> <p>***%</p>	<p>at a major or junction station on pro rata basis with respect to the total number of major or junction stations.</p> <p>(wwwwww)</p> <p>(xxxxxx)</p> <p>(yyyyyy)</p> <p>(zzzzzz)</p> <p>(aaaaaaa)</p> <p>(bbbbbbb)</p> <p>2.1.5 Payment shall be made on completion of Survey and Design works for Block signalling and approval of all drawings, designs and schemes. Unit of measurement shall be no. of block sections. Payment shall be made on the pro rata basis for work completion with respect to total no. of block sections.</p> <p>(cececece)</p> <p>(ddddddee)</p> <p>2.1.6 Unit of measurement shall be block station. Payment shall be made on completion of each block signalling work on pro rata basis with respect to the total number of block signalling work (BPAC/Token/Token</p>
--	--	--	-------------------------	---

		<p>2.1.7 Survey & Design works for Automatic Train protection system</p> <p>2.1.8 Automatic Train protection system Supply, installation, testing, manuals for Signalling & Telecommunication equipment installed for each place, supply of completion drawings, and commissioning of Automatic Train protection system except Axle Counter</p> <p>2.1.9 Survey & Design works at Sections</p> <p>2.1.10 Sections Supply, installation, manuals for new technology equipment installed for each place, supply of completion drawings, and</p>	<p>less/Automatic)</p> <p>(eeeeeee)</p> <p>(ffffff)</p> <p>(ggggggg)</p> <p>(hhhhhhh)</p> <p>2.1.7 Payment shall be made on completion of Survey and Design works for Automatic Train protection system after approval and submission of all drawings, schemes etc. on pro rata basis after work completion in at least one block section with respect to required work in total km of route length.</p> <p>(iiiiiii)</p> <p>2.1.8 Payment shall be made on completion of work on pro rata basis for each block section for track side equipments. For cab equipment, payment shall be made for [10%] locos on a pro rata basis.</p> <p>(jjjjjjj)</p> <p>(kkkkkkk)</p> <p>(lllllll)</p> <p>2.1.9 Payment shall be made on completion of Survey</p>
--	--	---	---

		commissioning of sections.		and Design works at sections
		2.1.11 EI system including various type of indoor Relays Supply and Installation.	[***%]	(mmmmmm)
		2.1.12 Signalling Underground Signalling Cable, Power Cable, 6 Quad Cable Supply and Installation	[***%]	(nnnnnnnn)
		2.1.13 Axle Counters Supply and Installation	[***%]	(oooooooo)
				(pppppppp)
				2.1.11 [70%] payment shall be made on completion of supply of EI system, [10%] payment shall be made on completion of supply of Various indoor Relays and [20%] payment shall be made on completion of installation and commissioning of work on pro rata with respect to total no. of EI. Supply may be planned as per Para 10.1.5 of EPC document.
				(qqqqqqqq)
				2.1.12 [80%] payment shall be made on completion of supply and [20%] payment shall be made on completion of installation of work on pro rata with respect to total no. of stations.
				(rrrrrrrr)

		<p>2.1.14 IPS Supply and Installation</p> <p>2.1.15 Commissioning of EI/Underground Signalling Cable, Power Cable, 6 Quad Cable/Axle Counters/Various types of Relays/IPS.</p>	<p>[***0%]</p> <p>[***0%]</p> <p>[***0%]</p>	<p>2.1.13 [80%] payment shall be made on completion of supply and [20%] payment shall be made on completion of installation and commissioning of work on pro rata with respect to total no. of stations.</p> <p>(sssssss)</p> <p>2.1.4 [80%] payment shall be made on completion of supply and [20%] payment shall be made on completion of installation and commissioning of work on pro rata with respect to total no. of stations/locations.</p> <p>Note:</p> <p>(ttttttt)</p> <p>1. [80%] payment against 2.1.11, 2.1.12, 2.1.13 and 2.1.14 shall not be more than 80% of percentage weightage against each item respectively.</p> <p>(uuuuuuu)</p> <p>2.1.15 payments shall be made on completion of Commissioning on pro rata with respect to total no. of stations.</p> <p>(wwwwwww)</p> <p>(zzzzzzz)</p> <p>(zzzzzzz)</p> <p>For item No. 2.1.11, 2.1.12, 2.1.13, and 2.1.14 payment</p>
--	--	--	---	--

			<div> <div>***%</div> <div>***%</div> </div>	<p>against supplies under these items shall be made for quantities as per the approved layout, on receipt of material at contractor depot and production of inspection certificates and other documents and against BG of equivalent amount. Note: payment made for supplies under these items shall not be counted for completion of Project milestone under schedule I.</p>
		Total	100%	(bbbbbbbbb)
2.2 Inventory : Supply of signalling spares	***%	2.1.1 Inventory for wayside stations 2.1.2 Inventory for Major or Junction stations	<div> <div>***%</div> <div>***%</div> </div>	<p>Payment for inventory (supply of signalling spares) for each stage shall be made on completion of works (item 2.1) and supply of entire quantity of spares. There will not be any payment for part supply of inventory.</p> <p>(iiiiiiiii)-</p>

		2.1.3 Inventory for block signalling (BPAC /Token / Token less)	[***%]	
		2.1.4 Inventory for Automatic Train protection system	[***%]	
		2.1.5 Inventory for Sections	[***%]	
		Total	100	(oooooooo)
2.3 Integrated testing and commissioning of signalling works	[***%]	Integrated testing and commissioning of the signalling works of railway project along with supply of all as made drawing of signalling works.	100%	On the issuance of Completion Certificate. In case the Completion Certificate is for part of the Railway Project, the payment shall be made for the route km covered by the Completion Certificate on pro rata basis with reference to the total route km for the Project.
2.4 Telecommunication works	[***%]	2.4.1 Optical fibre cable system including its survey, design, testing, manuals for new technology Telecommunication equipment installed for each place, supply of completion drawings, and commissioning.	[***%]	2.4.1 Unit of measurement is distance in track km between two stations. Payment shall be made on completion of work between two stations on pro rata basis with respect to the total track km length.
		2.4.2 6Quad telecom cable system		2.4.2 As in the case of 2.4.1 above (iiiiiiiiii)

		<p>including survey, design, testing, manuals for new technology equipment installed for each place, supply of completion drawings, and commissioning of 6 Quad telecom eable system.</p> <p>2.4.3 Mobile train radio communication system including survey, design, supply, installation, testing, manuals for each place, supply of completion drawings, and commissioning of mobile train radio communication system.</p> <p>2.4.4 Other locations including their survey, design, supply, installation, testing, supply of manuals for new technology equipment installed for each place, supply of completion drawings, and commissioning of telecommunication equipment at specified locations.</p>	<p>[***%]</p> <p>[***%]</p>	<p>(kkkkkkkkk)</p> <p>(lllllllll)</p> <p>(mmmmmm)</p> <p>(nnnnnnnn)</p> <p>(oooooooo)</p> <p>(pppppppp)</p> <p>2.4.3 Payment shall be made on completion of the entire work</p> <p>(qqqqqqqq)</p> <p>(rrrrrrrr)</p> <p>(ssssssss)</p> <p>(tttttttt)</p> <p>(uuuuuuuu)</p> <p>(vvvvvvvv)</p> <p>2.4.4 Work on five Locations on pro-rata basis with respect to total numbers of locations.</p>
--	--	---	-----------------------------	---

		<p>2.4.5 Other communication Equipment including the survey, design, supply, installation, testing, supply of manuals for new technology equipment installed supply of completion drawings, and commissioning of the other telecommunication equipment</p> <p>2.4.6 Supply and Installation of OFC</p> <p>2.4.7 Supply and Installation of 6 (six) Quad telecom cable</p>	<p>[***%]</p> <p>[***%]</p>	<p>(wwwwwwv</p> <p>(xxxxxxxxx</p> <p>(yyyyyyyyy</p> <p>(zzzzzzzzz</p> <p>(aaaaaaaaa</p> <p>(bbbbbbbbb</p> <p>2.4.5 Payment shall be made on completion of the entire work.</p> <p>2.4.6 [80%] payment shall be made on completion of supply and [20%] payment shall be made on completion of installation work between two stations on pro rata basis with respect to total track kilometre (TKM) length.</p> <p>(ccccccccc</p>
--	--	--	-----------------------------	---

			<p>[***%]</p> <p>[***%]</p>	<p>2.4.7 [80%] payment shall be made on completion of supply and [20%] payment shall be made on completion of installation work between two stations on pro-rata basis with respect to total track kilometre (TKM) length.</p> <p>(dddddddddd)-</p> <p>For item No. 2.4.6 and 2.4.7 payment for supplies, to the extent of maximum [10%] of the total quantity involved in scope of work may be done.</p> <p>(eeeeeeeeee</p> <p>Payment against supplies under these items shall be made for quantities as per the approved layout, on receipt of material at contractor depot and production of inspection certificates and other documents and against BG of equivalent amount. Note: payment made for supplies under these items shall not be counted for completion of Project milestone under schedule I.</p>
		Total	100%	(hhhhhhhh
2.5 Inventory : Supply of communication spares	[***%]	<p>2.5.1 Inventory for optical fibre cable system</p> <p>2.5.2 Inventory for six quad telecom cable system</p> <p>2.5.3 Inventory for Mobile train radio communication system</p>	<p>[***%]</p> <p>[***%]</p> <p>[***%]</p>	<p>Payment for inventory (supply of communication spares) for each stage shall be made on completion of works (item 2.4) and supply of entire quantity of spares. There will not be any payment for part supply of inventory.</p> <p>(uuuuuuuu)</p>

		2.5.4 Inventory for Other locations 2.5.5 Inventory for other communication equipment	***%] ***%]	
		Total	100%	(mmmmmm
2.6 Integrated testing and commissioning of communication works	***%]	Integrated testing and commissioning of the communication works of railway project along with supply of all as made drawing of communication works.	100%	On the issuance of Completion Certificate. In case the Completion Certificate is for part of the Railway Project, the payment shall be made for the route km covered by the Completion Certificate pro rata to the total route km for the Project.
2.7 Passenger Amenities	***%]	Supply, installation, testing and commissioning of various passenger amenities	100%	90% payment shall be made on completion of supply & installation & 10% payment shall be made on completion on testing & commissioning

Note : The above list is illustrative and may require modification as per the scope of the work.

“Note - For inter se ranking of offers considering capitalization of Transformer losses:

- The inter se ranking of the offer will be arrived after adding the quoted rate for tender by the tenderers and present value of the losses of all transformers and auto transformers as per formula for capitalization of transformer losses given in RDSO specification.

- ii. As per Specification No. TI/SPC/PSI/TRNPWR/4200 (for V connected transformer), TI/SPC/PSI/TRNPWR/5200 (for Scott connected transformer) and Specification No. TI/SPC/PSI/AUTOTR/1201, formula for Capitalization of Transformer and auto transformer losses shall be used for the purpose of calculating the present worth of transformer after taking into account capitalization of its losses.
- iii. The value of K which is capitalised value of transformer losses (the present value of transformer losses in Rupees as per formula given in RDSO specification) will be added to all-inclusive unit rates quoted by firm for ascertaining inter se ranking of the offers and for deciding the tender.
- iv. Values of n (Life of Transformer) will be taken as [N] years, F (Load Factor) as [F] percent and T (Tariff) as Rupee [T] per Kwh.
- v. Firm should indicate the value of parameters- Maximum No- Load Loss in watt (I) and Maximum Load - Loss in watt (C) in their offer and shall compute the capitalised value of transformer losses (K) for all the transformers and furnish with the offer.
- vi. In case the bidder fails to indicate the losses with their offer as explained in v above, maximum value of losses as per RDSO Specification No. TI/SPC/PSI/TRNPWR/4200 for V connected power transformer, RDSO TI/SPC/PSI/TRNPWR/5200 (for Scott connected transformer) and RDSO Specification No. TI/SPC/PSI/AUTOTR/1201 for auto transformer shall be considered for calculation of value of K.

(Amendment No.1; 17.11.25)

Annexure

Schedule G-1

Separate BOQ

for

Itemised Work

SCHEDULE-G1
Contract Price Weightages (For BOQ Items)

Contract Price Weightages (For BOQ Items)

²⁰If required, PHOD/(CAO/C/ZR) may APPROVE to attach this separate BOQ along with the ECP agreement documents i.e. Standard Agreement of EPC Tender Document for single stage Two Packet System No. 2018/CE-I/CT/36-EPC Contract Policy/Pt-1, dated 15.11.2021'

1. The Contract Price for this schedule (G1) of Agreement is Rs. 66,14,63195.97
2. Schedule G1 consists of three parts as under of which any or all schedules may be used as per the requirement. However, main schedule (G1A/G1B/G1C) may be bifurcated into item wise i.e. G1A - may be bifurcated broadly into foundation & sub-structure and further into pile, well and column, wall etc for clarity. Similarly G1B & G1C may also be bifurcated.
 - a. **Schedule G1A for Bridge Foundation (i.e Any work 700mm below from natural ground level) & utility shifting not listed in the scope of EPC work** is Rs. 66,14,63195.97
 - b. **Schedule G1B for Utility shifting- NIL**
 - c. **Schedule G1C for Unforeseen works- NIL**

3. Rate should be quoted (% above/Below/at par) for schedule of G1.
 No Separate rates should be quoted for schedule G1A, G1B & G1C.

Sr. No.	item No.	Description	Unit	Rate	Escl	Qty	Amount
		Schedule " A" (USSOR 2021 Items)					

²⁰Serially numbered footnotes in this separate BOQ items of Agreement are for guidance of the Authority and should be omitted from the draft EPC Agreement forming part of Bid Documents

Sr. No.	item No.	Description	Unit	Rate	Escl	Qty	Amount
1	22010	Earthwork in excavation by mechanical means (Hydraulic Excavator)/Manual Means for foundations and floors of the bridges, retaining walls etc. including setting out, dressing of sides, ramming of bottom, getting out the excavated material, back filling in layers with approved material and consolidation of the layers by ramming and watering etc. including all lift, disposal of surplus soil upto a lead of 300m, all types of shoring and strutting with all labour and material complete as per drawing and technical specification as directed by Engineer in charge. Note: This item will be used for excavation work in connection with other miscellaneous works also. like side drains, foundation for OHE masts and other miscellaneous structures in connection with Gauge Conversion, Doubling, New lines					
2	22011	All kinds of soils	Cum	213.47	-21.62%	20218.45	33,82,910.62
3	22012	Excavation in Rock (no blasting required)	Cum	443.05	-21.62%	2229.96	7,74,382.60
4	22013	Excavation in Rock (blasting required)	Cum	853.76	-21.62%	2229.96	14,92,237.94
	22030	Providing and laying in position Plain cement concrete of specified Nominal Mix for miscellaneous works like side drains, foundation for OHE masts and other miscellaneous structures excluding the cost of Cement, centering and shuttering - All work up to plinth level :					
5	22031	1:1½:3 (1 Cement: 1½ coarse sand (zone-III) : 3 graded stone aggregate 20 mm nominal size)	Cum	3,857.51	-21.62%	1615.33	48,83,976.10

Sr. No.	item No.	Description	Unit	Rate	Escl	Qty	Amount
6	22040	Providing and laying in position machine batched, machine mixed and machine vibrated Design Mix Cement Concrete of specified grade (Cast in-Situ) using 20mm graded crushed stone aggregate and coarse sand of approved quality in RCC raft foundation & Pile cap including finishing, using Admixtures in approved proportions (as per IS:9103), to modify workability & other properties without impairing strength and durability complete as per specifications and direction of the Engineer in charge. Payment for cement, reinforcement and shuttering shall be paid extra.	Cum	4,115.74	-21.62%	9360.69	3,01,96,809.00
	22120	Conducting load testing of a single pile upto following capacity in accordance with IS:2911 (Part-IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. with all labour, material, tool & plants, equipment, machinery, etc. complete as per drawing and specification, as directed by the Engineer					
7	22123	Initial load test above 100 ton capacity upto 250 ton capacity pile	Each	99,870.93	-21.62%	100.00	78,27,883.50
8	22124	Extra for every increase of 50 ton in pile capacity or part thereof over 250 ton	Each	5,559.25	-21.62%	70.00	3,05,013.80
	22080	Providing, Boring and installing Bored cast in-situ Reinforced Cement Concrete piles of specified diameter and length below pile cap of specified grade with Design Mix Cement Concrete, using 20mm graded crushed stone aggregate and coarse sand of approved quality, to carry a safe working load not less than specified, excluding the cost of steel Reinforcement, permanent casing pipe and length of pile to be embedded in pile cap etc. complete, concreting by machine batching, machine mixing,					

Sr. No.	item No.	Description	Unit	Rate	Escl	Qty	Amount
		scaffolding, using Admixture in approved proportion (as per IS:9103), placing with tremie pipe, chipping off of pile top to remove laitance concrete above cut off level etc., pumping and bailing out water with all labour material complete by percussion drilling using Direct Mud Circulation (DMC) or Bailer and Chisel technique by tripod and mechanical Winch machine including crossing of tracks if required, as per approved drawing, specification and direction of the Engineer in charge. Length of the pile for payment shall be measured upto the bottom of RCC pile cap. Payment for cement, permanent casing pipe (if any) & reinforcement shall be paid extra.					
9	22082	1200mm diameter	Metre	9,192.27	-21.62%	14700.00	10,59,12,044.70
	25030	centering and shuttering including strutting, propping etc. and removal of form for :					
10	25031	All types of bridge sub-structures, e.g. pier, abutment, wing wall, retaining wall, RCC box type foundations, Abutment cap, Pier Cap, Inspection Platform & Pedestal over Pier cap, Fender wall, Diaphragm wall etc. upto 5m above ground level	sqm	746.30	-21.62%	22832.16	1,33,55,671.99
11	25020	Providing and applying two coats of coal tar or bitumen conforming to IS:3117- latest version on the top and sides of RCC box/slabs @ 1.70 kg/sqm after cleaning the surface with all labour and materials complete job as directed by the Engineer.	Sqm	162.33	-21.62%	21470.00	27,31,713.98
	25070	Supply and using Cement at Worksite					
12	25072	Ordinary Portland Cement 53 grade	MT	9,275.03	-20.99%	8277.87	6,06,61,895.21

Sr. No.	item No.	Description	Unit	Rate	Escl	Qty	Amount
13	22100	Providing, fabricating and installing permanent casing pipe for bored piles for all diameters with specified thickness of steel plate including all labour, materials, pumping and bailing out water wherever required, complete as per technical specifications as directed by Engineer in charge. This will include the weight of plate only and no cognizance will be given for the fittings, i.e. rivets and welding etc.	MT	1,18,971.16	-20.71%	354.66	3,34,55,869.76
		Total of USSOR 2021 Items					26,49,80,409.20
		Schedule B (NS Items)					
1	1/NS	Supplying and fixing high strength deformed stainless steel bars reinforcement conforming to IS 16651-2017 for RCC work	kg	129.22		2978810.40	38,49,21,879.89
2	2/NS	Random rubble masonry with hard stone in foundation-Cement mortar 1:6 (1 cement : 6 coarse sand)	Cum	821.42		2217.28	18,20,386.88
3	3/NS	Providing fully furnished Portacabin with partition & urinal on hire of minimu size 6.1m x 3.0m fully wired, one table with chair, two visitors chair, small Almirah, one side table, AC, computer, printer, stationeries, etc in one side of partition and one big table with six chairs on other side of pertition as directed by Engineer. The Rate includes Contractor's material, labour, transportation, lead and lift, etc. complete. The cost also includes maintenance, security, electricity and cleaning during contract period.	Each Per Month	31,438.00		120.00	37,72,560.00

Sr. No.	item No.	Description	Unit	Rate	Escl	Qty	Amount
4	4/NS	Hiring of 1 Nos. Non AC vehicles i.e. Toyota Innova / Ertiga / Mahindra Mazarro / Renault Triberia/ Scorpio / Tata Safari or similar for a period of 24 months forG, Perfectly in good condition based at Mumbai area for 1500 Km distance per Month, as per special condition of contract and direction of Engineer in charge. Perfectly in good condition in Mumbai area. (One vehicle day implies hiring for 12 hours per day).	Per Months	49,733.00		120.00	59,67,960.00
		Total of Sch B					39,64,82,786.77
		Total of Sch G1					66,14,63,195.97

Note: 1) Before start of any sub-work(s) under Schedule G-1, Drawing, Method Statement, BOQ etc. shall be finalised and approved from Authority.

(2) *Items covered under Schedule G-1 shall be deleted from Schedule-G)*

The list of Articles of 'Standard Agreement of EPC Tender Document for single stage Two Packet System dated 15.11.2021' given below, shall be superseded by the Articles of this document in case G1 is to be made operational.

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.

(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 & Civil Engineering:

- a) General map of the country traversed by the Project, scale about 20 km to 1 cm
- b) Index map, scale about 1 km to 1 cm
- c) Index Plan and Sections prepared in accordance with the terms of Engineering Code
- d) ESPs
- e) General arrangement drawings of Structures; and
- f) River training/ Protection work.
- g) Details of level Crossing and RUB/LHS and RFOs.
- h) Station Yard Layout including details of connectivity with existing yards
- i) Station Building including cabins, approach connectivity etc as applicable.
- j) Details of Track Structure & its components.
- k) Details of Integrated Maintenance Depots (IMD & ISMD) if any.
- l) Details of existing utilities in Row and plan for their shifting.
- m) Completion Plans
- n) Any other Drawings/ Statements required by Railways for the commissioning of the project relevant to the work undertaken by the Contractor. These all drawings/statements will be scrutinised by the authority and necessary corrections as desired to be attended by Contractor. All final drawings/statements are to be submitted in both hard and soft copy to the authority for final submission to CRS/SCC.

2. ~~Signal Engineering:~~

- (a) ~~Signal interlocking plan (station/auto huts/gate huts)~~
- (b) ~~Route Control table (station/auto huts/gate huts)~~
- (c) ~~Panel/ VDU diagram (station/ gate huts)~~
- (d) ~~Cable Core Chart.~~
- (e) ~~Cable Route Plan (Separate for station & blocks sections)~~
- (f) ~~Power Supply Diagram (station/auto huts/ control)~~
- (g) ~~Equipment sizing (station/ auto huts/gate huts/control)~~
- (h) ~~Equipment lay out and details including cable troughs required(station/ auto huts/gate huts/control)~~
- (i) ~~Track circuit diagram (station/ auto huts/gate huts/control)~~
- (j) ~~Bonding plan (station/ auto huts/gate huts/control)~~
- (k) ~~Circuit Diagrams.~~
- (l) ~~Station/Gate working Rule/Rule diagrams~~
- (m) ~~Equipment Rack details~~
- (n) ~~Cable Termination Rack Diagram~~
- (o) ~~Fuse Details~~
- (p) ~~Location/junction boxes lay out & wiring details~~
- (q) ~~Lightening, surge protection & earthing plan.~~

1. ~~Telecommunication Engineering:~~

- (a) ~~Location and connectivity of all equipment's 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.~~

3. Electrical Engineering (Traction):

- a) General arrangement of the Traction substation for (2 x 25 KV) system single transformer and the double transformer with incoming as 220KV or 132 KV 3 phase. (These substations will be remotely controlled and operated)
- b) General arrangement of SP (Sectioning Post) with the autotransformer. (These substations will be remotely controlled and operated)
- c) General arrangement of the SSP (Sub sectioning post) with the autotransformer. (These substations will be remotely controlled and operated)
- d) Power supply arrangement for (2 X 25 KV) AT system and Sectioning drawing for the traction arrangement.
- e) Power supply arrangement for the signals at the stations (Auxiliary transformer and the arrangement of 230-volt supply)
- f) Typical layout of the control room at the traction substation SP, SSP.
- g) Typical layout of the remote-control centre.

- h) General arrangement of the implementation of the SCADA system.
- i) Earthing arrangement at the TSS, SP and SSP.
- j) Typical arrangement of the regulated OHE for (2 X 25 KV) system with the feeder arrangement i.e., LOP & Bonding diagram
- k) Power supply arrangement with other railway/division at interface point.
- l) Bridge OHE drawings
- m) Profile and clearance drawings
- n) All special design drawings.
- o) All calculations.

4. Electrical Engineering (General Power supply):

- a) SLD and General arrangement of the 11/33/66 KV substations for the station and the service buildings.
- b) General arrangement of the distribution of the 415 V 50 Hz supply to various loads i.e SLD.
- c) Wiring drawings of station buildings, quarters, service buildings.
- d) TDS & Drawings of BMS system, SCADA system, solar power plants, high mast, light poles, HVLS fans, HVAC system, UPS, DG sets, LT & HT panels, lightning power layout, lightning protection system.

5. Tabulated details which shall consist of important characteristics of the railway or a portion of railway to be constructed, which shall, as may be applicable, include, but not be limited to the following:

- a) Curve Abstract;
- b) Gradient abstract;
- c) Bridge abstract;
- d) Important bridges-particulars of waterway and construction;
- e) Ballast and permanent way;
- f) Station and station sites;
- g) Station accommodation;
- h) Station machinery;
- i) Level crossing abstract;
- j) Brief particular of tractions installations;
- k) Power supply installation abstract;
- l) Traction maintenance depot abstract;
- m) Restricted overhead equipment clearance abstract; and
- n) Electrical crossing over railway track abstract;

SCHEDULE - I
(See Clause 10.3.2)

PROJECT COMPLETION SCHEDULE

- A. All provisions & paras (1 to 7) in this Schedule - I have been enclosed in square parenthesis and may be modified by the tendering authority, if necessary as per specific project, before issuing the EPC Agreement forming part of Bid Documents.
- B. The cumulative damages against physical milestones as mentioned in clause 6 of this Schedule shall in any case remain limited to the overall limit of damages stipulated against Project milestone damages at each stage or overall

[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.

This project is proposed to be commissioned in **30 (Thirty) months** duration.

A penalty of delay in achieving each milestone will be imposed as prescribed in clause no. 10.3.2 (Article 10).

2 Project Milestone-I

- 2.1 Project Milestone-I shall occur on the date falling on the [240th (Two Hundred and Fortieth)] day from the Appointed Date (the “Project Milestone-I”).
- 2.2 Prior to the occurrence of Project Milestone-I, 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 10% (ten per cent) of the Contract Price.

3 Project Milestone-II

- 3.1 Project Milestone-II shall occur on the date falling on the [480th (Four hundred and Eightieth)] day from the Appointed Date (the “Project Milestone-II”).
- 3.2 Prior to the occurrence of Project Milestone-II, 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 35% (thirty-five per cent) of the Contract Price.

4 Project Milestone-III

- 4.1 Project Milestone-III shall occur on the date falling on the [700th (Seven hundredth)] day from the Appointed Date (the “**Project Milestone-III**”).
- 4.2 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 70% (seventy per cent) of the Contract Price.

5 Scheduled Completion Date

- 5.1 The Scheduled Completion Date shall be the [913th (Nine Hundred and Thirteenth)] day from the Appointed Date.
- 5.2 On or before the Scheduled Completion Date, the Contractor shall have completed construction in accordance with this Agreement.

6. Physical Milestones

In addition to Project Milestones as stipulated above in financial terms i.e., % of contract price, the Contractor shall also be required to achieve Physical Milestones Stipulated as tabulated below.

Recovery of damages for not achieving a physical milestone shall become due upon non completion of each deadline as mentioned in table below.

However, in case where a subsequent physical milestone, logically sequenced for completion of item/project component is achieved and the delay is contained in opinion of the Authority, Authority may release the damage imposed earlier.

A. A. Project Initiation Stage

A. Project Initiation Stage				
S. No.	Physical Milestone no.	Description of Physical Milestone	Deadline-Appointed Date (D) + Days	Damages per day after deadline
1	MI-1	Deployment of Contractors Authorized Representative (Project Director)	D+20	Rs. 10,000/ day (Subject to maximum of Rs. 3,00,000/month)
		Deployment of Design Director	D+20	Rs. 7500/ day (Subject to maximum of Rs. 2,25,000/month)
2	MI-2	Submission of Baseline Resource based project Implementation schedule on prime Vera (P- 6 or latest version)	D+30	Rs. 25,000/day
		DBR/DBN including design quality plan MTP, ITP etc	D+30	Rs. 25,000/day
		Environmental management plan	D+30	Rs. 10,000/day

		Method statements key items	D+30	Rs. 10,000/day per statement
		Monthly cash now forecast for the project	D+30	Rs. 15,000/day
		Resource development plan (men & machinery)	D+30	Rs. 10,000/day
		Procurement plan in conformity with project implementation schedule (Civil, Electrical S&T)	D+30	Rs. 10,000/day
3	MI-3	Proposal to engage design consultants and GT agency with three alternatives of qualified reputed and experienced design firms	D+30	Rs. 25,000/day
4	MI-4	Proposal to engage Proof check consultant with three alternatives of qualified reputed and experienced design firms	D+30	Rs. 25,000/day
B. Project Planning Stage				
S. No.	Milestone no.	Milestone Description	Deadline-Appointed Date (D) + Days	Damages after the deadline
1	MP-1	Setting up Project office, Site Laboratory	Project Office- D+30 Site Lab- D+45	Rs. 10,000/day
2	MP-2	Submission of Utility Survey & Utility Shifting Plan	D+45 days	Rs. 15,000/day
3	MP-3	Submission of Ground levels, cross sections, and validation report of tender data including alignment and L- section confirmation/modification.	D+60 days	Rs. 15,000/day
4	MP-4	Submission of duly proof checked drawings (including DBR/DBN) GADs each type of Bridges	D+75 days	Rs. 10,000/day
5	MP-5	Submission of Conceptual Plan for station and allied buildings and yard lay out	D+75 days	Rs. 10,000/day
6	MP-6	Submission of GT, Hydrological & Sub soil investigation Report- 50% Block sections. Test report should include Factual GT report, Interpretations and recommendations (in compliance to latest IS Code)	D+75 days	Rs. 15,000/day
7	MP-7	Submission of detailed sample design for each type of Bridges	D+90 days	Rs. 10,000/day
8	MP8	Submission of Route Control Charts & signaling	D+90 days	0.01% (zero-point-zero one percent) of

		interlocking plan		the Contract Price for each day of delay after the deadline
9	MP9	Submission of Formation Design including Slope protection	D+120 days	Rs. 10,000/day
10	MP-10	Submission of Procurement Plan & delivery Schedule	D+120 days	Rs. 10,000/day
11	MP-11	Submission of duly proof-checked Detailed Design for Station Buildings and allied buildings/Structures	D+120 days	Rs. 10,000/day
12	MP-12	Submission of Schematic Drawings – Signal Engineering	D+120 days	Rs. 10,000/day
13	MP-13	Submission of Schematic Drawings – Telecommunication Engineering	D+120 days	Rs. 10,000/day
14	MP-14	Submission of Schematic Drawings – Electrical (Traction)	D+120 days	Rs. 10,000/day
15	MP-15	Submission of Schematic Drawings – Electrical (General Power Supply) drawings	D+120 days	Rs. 10,000/day
16	MP-16	Submission of GT, Hydrological Investigation & Sub soil investigation report-100% Block sections. Test report should include Factual GT report, Interpretation and recommendations (in compliance to latest IS Code)	D+120 days	Rs. 10,000/day
17	MP-17	Submission of Formation Design including slope protection	D+120 days	Rs. 10,000/day
18	MP-18	Submission of duly proof-checked Detailed Design for all type of Bridges in one block section	D+180 days	Rs. 10,000/day
19	MP-19	Submission of duly proof-checked Detailed Design for all bridges & protection/miscellaneous works	D+270 days	Rs. 10,000/day
C. Project Construction Stage				
S. No.	Milestone no.	Milestone Description	Deadline for Achievement in Days	Damages after the deadline
1	MCn-1	Making arrangement of	FMI-1 (1/2)	Rs. 5,000/day

		Power, Water at site		
2	MCn-2	Mobilization and erection of plants and equipment	FMI-1 (1/2)	Rs. 5,000/day
3	MCn-3	Complete Utility Shifting	FMI-1	Rs. 5,000/day
4	MCn-4	Site clearance and preparation of Formation, including all the functional Station & Yards (if any) of 50% of the project length.	FMI-1	Rs. 5,000/day
5	MCn-5	Foundation of Bridges (Important Major/ ROB/ RUB/ Minor Bridges)	FMI-1+1/2 of (FMI-2- FMI-1)	Rs. 5,000/day
6	MCn-6	Station & Allied Building - Foundations	FMI-1+1/2 of (FMI-2- FMI-1)	Rs. 5,000/day
7	MCn-7	Sub- structure of bridges- 100% of each Bridge	FMI-2	Rs. 5,000/day
8	MCn-8	S&T Cable Trenching 100% Project Length	FMI-2	Rs. 5,000/day
9	MCn-9	Procurement (P-Way, OHE and S&T) in conformity to delivery schedule, an allowance of 15 days shall be made for transportation uncertainties	FMI-2	Rs. 5,000/day
10	MCn-10	Site clearance and preparation of Formation including all functional Stations & Yards (if any) 100%	FMI-2 + 1/2 of (FMI-3 – FMI-2)	Rs. 5,000/day
11	MCn-11	Ballast Spreading – 50% of total Block Sections	FMI-2 + 1/2 of (FMI-3 – FMI-2)	Rs. 5,000/day
12	MCn-12	Station & Allied Buildings – Superstructure	FMI-2 + 1/2 of (FMI-3 – FMI-2)	Rs. 5,000/day
13	MCn-13	Foundation of OHE Mast & Cable Laying	FMI-2+1/2 of (FMI-3- FMI-2)	Rs. 5,000/day
14	MCn-14	Ballast Spreading & Sleeper Laying – 100%	FMI-2 + 1/2 of (FMI-3 – FMI-2)	Rs. 5,000/day
15	MCn-15	Station and Allied Buildings – Finishing	FMI-2 + 1/2 of (FMI-3 – FMI-2)	Rs. 5,000/day
16	MCn-16	Bridges Placement of Bearing and Girder Launching/ Deck slab casting- 100%	FMI-2+1/2 of (FMI-3- FMI-2)	Rs. 5,000/day
17	MCn-17	Station & Allied Buildings – External Services & Connectivity	FMI-2 (1/2	Rs. 5,000/day
18	MCn-18	Mast Erection & Bracket fixing	FMI-3	Rs. 5,000/day
19	MCn-19	Station & Allied Buildings – Systems & Equipment	FMI-3	Rs. 5,000/day
20	MCn-20	Track linking – 100%	FMI-3	Rs. 5,000/day
21	MCn-21	OHE Wire fixing & Cable Laying – 100%	FMI-2 + 1/2 of (FMI-4 – FMI-3)	Rs. 5,000/day

22	MCn-22	Testing & commissioning	FMI-4	Rs. 5,000/day
23	MCn-23	CRS Inspection	FMI-4	Rs. 5,000/day
24	MCn-24	Demobilization & site clearance	FMI-4 + 30days	Rs. 5,000/day

7. Extention 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 [***].

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

2.3 Sanction of Commissioner of Railway Safety (CRS) is required before opening of track in terms of Chapter XIII of Indian Railway Permanent Way Manual.

2.4 [Riding quality of track and recording of various track parameters on electronic track recording car will be arranged and run by the Authority. This run will be scheduled after the floating parameters recorded are found to be within acceptable limits. The TGI value of this trial run shall be more than (specify value)].

2.5 Tests for bridges: All major and minor bridges shall be subjected to the tests as prescribed in Specifications and Standards in Schedule D.

- 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

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 has been obtained.

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 construction of the section (kmto km ...) in the State ofin-..... Railway (the “**Railway Project**”) 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 from km to km 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:
by:

(Signature)

SIGNED, SEALED AND
DELIVERED

For and on behalf of
AUTHORITY ENGINEER

(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 of thesection (km to km) ofin the State of in-..... Railway (the “**Railway Project**”) 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 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

- 1.1 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.

Annex – I
(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 route 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 15 (fifteen) 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 15 (fifteen) days may be extended up to 30 (thirty) days. 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.

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 Engineer thereon, shall be furnished by the Authority 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, 17.6.1, 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
 - (iii) Any amount towards deduction of taxes at source under Applicable Laws.
 - (iv) 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

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. 7 Crore.

- 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.

—

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 Power Blocks or Traffic Blocks or Power Blocks, or both, during day or night, as the case may be, to enable the Contractor to execute the construction works of overhead equipment, or such other work as may be determined by the Authority Engineer. The maximum aggregate duration of blocks for the Railway Project shall be [50] 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.10,000] 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 Signalling and Telecommunication installations.

—

SCHEDULE - P
(See Clauses 4.4)
Machinery and equipment

1. The Authority shall provide the following machinery and equipment to the Contractor at the daily rates shown against each machinery and equipment:

S. No.	Particulars of each type of machinery and equipment	Unit	Rate (unit) Without Diesel
1	3X	Rs./km	37738
2	HOT-S 3X	Rs./km	53089
3	CSM	Rs./km	41168
4	DUO	Rs./km	40096
5	UNIMAT	Rs./Tout	55389
6	MPT	Rs./km	47360
7	PQRS	Rs./km	198653
8	TRT	Rs./km	810288
9	T-28	Rs./Tout	116239
10	BCM	Rs./km	816635
11	FRM	Rs./km	185030
12	BRM	Rs./km	14477
13	DTS	Rs./km	30229
14	UTV	Rs./No	626
15	RBMV	Rs./No	952
16	MDU	-	314093
17	RGM	Rs./km	50801
18	Tower wagon 4W/8W with driver	Rs Per day	21246

Note- The rates are approximate and may change in the course of execution as decided by track machine organization of WR.

Note: For Machines and T&P whose hire charges on not mentioned above, the monthly rate for those machines/ equipment shall be equal to 2% (two per cent) of the cost of such machine or equipment, as published in the latest Pink Book of Ministry of Railways. If the cost of any machine or equipment has not been published in the latest Pink Book, then the last purchase price thereof, shall be applicable for determining the charges for such machine or equipment.

—

The End of Schedules.

Appendices

APPENDIX-I

LIST OF BID-SPECIFIC CLAUSES^s

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 (I) : 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)

^s 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.

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

APPENDIX-II

LIST OF PROJECT SPECIFIC CLAUSES²⁴

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)

²⁴This 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

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-IA : Form of Insurance Surety Bond for Performance Security
 - 30. Schedule-F, Annexure-II : Form of Guarantee for Withdrawal of Retention Money
 - 31. Schedule-F, Annexure-III : Form of Guarantee for Advance Payment
 - 32. Schedule-G : Contract Price Weightages
 - 33. Schedule-I : Project Completion Schedule
 - 34. Schedule-J : Tests on Completion
 - 35. Schedule-N : Insurance
- Schedule-O : Provision of traffic blocks and power blocks