

TENDER FORM**NORTH CENTRAL RAILWAY****निविदा सं० AGC-EL-C-T-01-2026-27****Tender No. AGC-EL-C-T-01-2026-27**

उत्तर मध्य रेलवे के आगरा डिवीजन में 'डी' श्रेणी के स्टेशन को 'बी' श्रेणी के स्टेशन में परिवर्तित करने के संबंध में बटेश्वर (बीएसआर) स्टेशन के ओएचई विद्युतीकरण का डिजाइन, आपूर्ति, स्थापना, परीक्षण और कमीशनिंग।

Name of work: Design, Supply, Erection, Testing and Commissioning of OHE Electrification Bateshwar (BASR) station in connection with coversion of 'D' class station into 'B' Station in Agra Division of N.C. Railway.

Tender Estimated Cost	- As uploaded on IREPS.
Validity Period	- 60 Days
Completion Period	- 06 Months

Note: For complete details and submission of tender please see Indian Railway's website <http://www.ireps.gov.in>.

Issued by:

उप मुख्य विद्युत

अभियंता/(निर्माण)ए

उत्तर मध्य रेलवेए आगरा

**Dy. Chief Electrical Engineer/ (Const.),
North Central Railway, Agra**

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TENDER DOCUMENT

1. Tender No.: AGC-EL-C-T-01-2026-27

2. Name of work: Design, Supply, Erection, Testing and Commissioning of OHE Electrification Bateshwar (BASR) station in connection with conversion of 'D' class station into 'B' Station in Agra Division of N.C. Railway.

3. Estimated Cost: As Uploaded on IREPS

4. Completion Period: 06 Months from the date of issue of Acceptance Letter

5. Type of Tender: Open Tender

6. Mode of The Tender: Online tender

NOT TRANSFERABLE

Issued by :

Issued to : _____

IMPORTANT NOTE FOR INTENDING TENDERERS

PLEASE ENSURE THAT:

1. Accept the validity period prescribed by the Railway in **Clause No. 1.1.7 at Page 8 of Tender Document.**

2. The Tenderer should normally not stipulate any special conditions while submitting his tender. In such eventuality, North Central Railway reserves the right to summarily reject such tenders without assigning any reasons whatsoever.

3. Any condition not acceptable may be indicated in a separate deviation statement and may be submitted with offer as per **Annexure- T9** (as per GCC April-2022). Any condition/ deviation from tender conditions stated by the tenderer/s along with his tender shall be deemed to be part of the contract only to such extent as have been explicitly accepted by the Railway.

4. (a) Tenderer must submit requisite Bid security in the acceptable form. Tenders submitted on the strength of Standing Bid Security with any organization/ Department, even of North Central Railway, will be dealt as without Bid Security.

(b) Tenderer must submit required document in support of fulfilling minimum eligibility Criteria along with tender.

5. The Tenderers should please note that the item and rates of Scheduled Items are based on Schedule of Rate (North Central Railway) & Non-Scheduled Items rate as mentioned in schedule.

6. "GCC" means Indian Railway Standard General Conditions of Contract, April 2022, i.e., GCC April'2022 issued by Railway Board.

7. PRECAUTIONS TO BE OBSERVED:

(a) No document in support of Minimum Eligibility Criteria will be accepted/ entertained after closing of tender.

(b) The work will have to be carried out in such a manner as to cause least obstruction to the Railway's traffic. The work also must be carried out in such a manner so as not to jeopardize the safety and/ or movements of trains. The Tenderers will be required to make good at his cost any damage caused to the Railway property or travelling public arising out of his work at site.

(c) The work should be so planned as not to cause any infringement of the moving dimensions laid down in the Standard Schedule of Dimensions for B.G. 2004 with up to date Correction Slip during any stage of construction.

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8. The tenderer(s) must submit along with his/ their Tender a statement showing similar works executed by him/ them and also certificates from the party with whom they worked for the successful completion of his/ their work. The Tenderers should also submit a list of their Technical Organization and equipment, construction tools and plants available with them.

9. The end of tender document is indicated by "**End of Tender Document**" marker. Tenderer/s should carefully see that above marker appears on the last page of downloaded tender document to ensure that downloaded document is complete.

10. The Tenderer/s shall keep them self updated about any modification in tender notice and tender document, issued by Railway through newspapers, website or e-mail or any other means and shall act accordingly. It is the responsibility of the Tenderer to check any correction or any modifications published subsequently in Website and the same shall be taken into account while submitting the tender. Tenderers offer is liable to be rejected if they have not enclosed all the corrections/ corrigendum along with their offer.

11. The Tenderer/s are requested to kindly carefully go through the relevant instructions/ conditions/ requirements contained in Tender documents/ Bid documents/ IRS Conditions of contract, as the case may be, before submitting the offer. Various conditions/ instructions will be taken as read and agreed if not specifically indicated to be disagreed/ deviated.

12. Tenderer/s must sign all the pages of tender booklet and the documents which should be uploaded. However not signing the document or tender conditions/ booklet will be treated as agreed by the tenderer/s and will be treated as signed.

PART - I

CHAPTER - I

Preamble and General Instructions to Tenderers

1.1 Applicability: as per GCC April-2022.

1.1.1 Order of Precedence of Documents: as per GCC April-2022.

1.1.2 Interpretation: as per GCC April-2022.

1.1.3 Definition: as per GCC April-2022.

1.1.4 The following documents form part of Tender/Contract:

- (a) Special Conditions.
- (b) Specifications, drawings, explanatory notes and annexure.
- (c) Bill(s) of Quantities.
- (d) Indian Railway Standard General Conditions of Contract, Regulations for Tenders and Contracts-2022.

The tenderer shall study the General Conditions of Contract Regulations for Tenders & Contracts-2022 along with other tender documents of the tender before submission of the tender.

If there is varying or conflicting provisions in the documents forming part of the contract, the **Dy.CEE/C/AGC/NCR** shall be deciding authority with regard to the intentions of the provisions and decision shall be final and binding on the contractor.

1.1.5 OMISSIONS & DISCREPANCIES: as per GCC April-2022.

1.1.6 Completion Period: The works are required to be completed within a period of 06 **Months** from the date of issue of acceptance letter/ letter of intent including monsoon period.

1.1.7 Validity Period: Offer shall be kept open for 60 **Days (Sixty Days)**.

1.1.8 (1) Bid Security: as per GCC April-2022.

(2) (i) REFUND OF SECURITY DEPOSIT: as per GCC April-2022.

(2) (ii) FORFEITURE OF SECURITY DEPOSIT: as per GCC April-2022.

(3) PERFORMANCE GUARANTEE: as per GCC April-2022.

Note:- Performance Guarantee should be submitted in favour of Dy.FA&CAO/C/AGC/NCR.

1.1.9 Care in Submission of Tenders: as per GCC April-2022.

1.1.10 FORCE MAJEURE CLAUSE: as per GCC April-2022.

1.1.11 (A) EXTENSION OF TIME IN CONTRACTS: as per GCC April-2022.

1.1.11 (B) Extension of Time for delay due to Contractor: as per GCC April-2022.

1.1.11 (C) Bonus for Early Completion of Work: as per GCC April-2022.

1.1.12 (A) Illegal Gratification: as per GCC April-2022.

1.1.13 CONSIDERATION OF TENDERS: as per GCC April-2022.

1.1.14 Electronic Reverse Auction (e-RA): *(Ref: RB L No. 2017/ Trans/ 01/ Policy/ Pt-S dated 28.03.2018 or latest guidelines issued by Railway.)*

Note:- Process of Electronic Reverse Auction (e-RA) shall be adopted for Works tenders valued more than Rs. 50 Cr. in each case.

1.1.15 Execution of Contract Document: as per GCC April-2022.

1.1.16 Tender Form: Tender Forms shall embody the contents of the contract documents either directly or by reference and shall be as per specimen form, **Annexure-I** of GCC April-2022. e-Tender Forms shall be issued free of cost to all tenderers.

1.1.17 Form of Contract Document: Every contract shall be complete in respect of the document it shall so constitute. Not less than 2 copies of the contract document shall be signed by the competent authority and the Contractor and one copy given to the Contractor (there would be no need of signing two copies if agreement is signed digitally).

Note:- All Annexure applicable as per GCC April-2022 with latest amendment.

PART - I

CHAPTER –

II

SPECIAL CONDITIONS OF CONTRACT

1.2 INTRODUCTION: This chapter deals with **conditions of contract** necessary for execution of this contract and not covered under general conditions of contract. If conditions in this chapter are in variance with general conditions of contract, the conditions given in this chapter will prevail.

1.2.1 Scope of work: Design, Supply, Erection, Testing and Commissioning of OHE Electrification Bateshwar (BASR) station in connection with conversion of 'D' class station into 'B' Station in Agra Division of N.C. Railway

1.2.2 Items to be supplied by Railways free of cost: deleted.

1.2.3 ELIGIBILITY CRITERIA:

1.2.3.1 Technical Eligibility Criteria: as per GCC-April-2022.

The meaning of similar work for the above work is: "Design, Supply, Erection, Testing & Commissioning of 50 Hz, Single Phase, 25 kV/ 2X25kV, AC Over Head Equipment (OHE)".

1.2.3.2 Financial Eligibility Criteria: as per GCC-April-2022.

1.2.3.3 Bid Capacity: as per GCC-April-2022.

1.2.3.4 Technical Capacity of JV partners: as per GCC April-2022.

1.2.3.5 Financial Eligibility Criteria: as per GCC April-2022.

1.2.3.6 No Technical and Financial credentials are required for tenders having value up to Rs 50 lakh.

1.2.4 (a) The tenderer(s) must be an established, experienced and reputed construction firm and have regularly undertaken works of the similar type tendered for and have adequate technical knowledge and practical experience in field.

(b) The tenderer (s) must have adequate financial resources to meet the obligations under the contract.

(c) The successful tenderer shall furnish the names and particulars of the certificate of competency of supervisor and workmen to be engaged for carrying out this work.

(d) By a Gazetted notification, Govt. of India has appointed Principal Chief Electrical Engineer, North Central Railway to be the Electrical Inspector and has directed that he shall exercise the powers and perform the functions of an Electrical Inspector under the **Indian Electricity Act-2003** and latest

version. The inspecting officers for this contract shall be nominated by the Railways as indicated in the technical specification.

1.2.5 JVs shall be considered as per GCC-2022.

1.2.6 QUALITY OF WORK AND MATERIAL:

(a) Material: All materials used in the work shall be procured from approved sources of RDSO/ CORE/ PCEE (N.C. Rly). Items for which approved sources are not available, should be ISI marked. Items for which ISI is not available should be got approved before procurement.

The material will either be inspected by Railway or got inspected by third party i.e. RITES/RDSO etc. as per the latest guidelines issued by Railway. Inspection charges payable to third party shall be borne by Railway.

Note- In case of any change in inspecting authority for any reason, alternative arrangement shall be made with approval of Dy. CEE/C/AGC.

(b) Erection: All erection work shall be carried out as per established engineering practice. It should be maintenance friendly, environmentally friendly and should not endanger safety of public/ operator.

(c) No form **C & D** will be supplied by Railway.

1.2.7 Non-compliance with the instructions/directives of the Engineer's representative:

(a) The contractor shall always comply with the instructions/ directives issued by the Engineer's representative from time to time. In the event of any non- compliance with such instructions/directives, apart from and in addition to other remedies available to the Railway as specified herein above the Engineer's representative may employ at the works Railway's workmen with necessary equipment as considered appropriate and adequate by him to provide the requisite conditions for the safe and unhampered movement of Railway traffic. The decision of the Engineer's representatives in regard to the need of appropriateness and adequacy of the deployment of the Railway Workmen with necessary equipment shall be final and conclusive.

(b) When the Railway workmen with necessary equipment are deployed in the above manner, recovery at the following rate shall be made from the contractor's dues under this contract or any other money of the contractor available with the Railway under this contract. The recovery for the total Railway Workmen Hours employed will be at the rate of Rs. 200/- (Rupees Hundred only) per Workmen-Hour irrespective of the type and grade of the Railway Employee actually employed. The aggregate period of the Workman- Hours for the above recoveries shall be reckoned from the time the Railway Workmen are actually deployed at the work site till the work is completed to the satisfaction of the Engineer's Representative whose decision in this regard shall be final and conclusive.

(c) If the contractor or his authorized representative/ deployed personnel persistently does not comply with the instruction/ directives of the Engineer's representative, apart from and in addition to the remedies available to the

Railway as specified herein above without prejudice to the Railway's rights in this regard, the Engineer's representative, which for the purpose of this clause shall include the inspector of Electrical (Construction) department, appointed by the Railway, can require removal and replacement of contractor's personnel/ representative and/ or suspend the contractor's work till the Engineer's Representative is satisfied that the contractor has taken necessary steps and is in a position to comply with the instructions issued by the Engineer's representative.

(d) The decision of the Engineer's representative in this regard shall be final, conclusive and binding on the contractor. The contractor shall not have any claim whatsoever against the Railway for such suspension of the work.

(e) During the above-mentioned period of suspension of work, the contractor shall not in any manner attempt to carry out any work at the work site. Any such attempt of the contractor shall be deemed to be an unauthorized work on the work site. For such acts, the contractor shall then be liable for further appropriate action under the relevant provisions of the Indian Railway Act.

1.2.8 Occupation and Use of Land: as per GCC April-2022.

1.2.9 Electric & Water Supply: as per GCC April-2022.

1.2.10 Materials and Plant: as per GCC April-2022.

1.2.11 Inspection Registers and Records: The contractor shall maintain accurate records, plans and charts showing the dates and progress of all main operations and the Engineer shall have access to this information at all times. Records of tests made shall be handed over to the Engineer's representative after carrying out the tests. The following registers will be maintained at site, by the Railway's representative and contractor or his representative will acknowledge and promptly comply with the orders/instructions given through entries in these registers:

(a) Site Order Register: The contractor shall promptly acknowledge orders given therein by the Engineer or his representative or his superior officers and comply with them. The compliance shall be reported by the Contractor to the Engineer in good time so that it can be checked.

(b) Labour Register: This register will be maintained to show daily strength of labour in different categories employed by the contractor. A separate column should be provided in this register for technical staff degree/ diploma holder where this technical staff will sign in token of his presence.

(c) Log Book of Events/ Hindrance register: All events are required to be chronologically logged in this book, shift wise and date-wise. Any hindrance to the work beyond the control should be clearly indicated in this register.

(d) Material Passing & Testing Register: Register will show material brought at site, passed, rejected etc. with quantity, specifications and test

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results etc.

(e) Cube Testing Register

(f) Plant & Machinery Register

(g) Any other register required as per Work Plan/Method Statements/ QAP etc.

All the registers mentioned as above or ordered by Engineer's representative during execution of work will be signed by the representative of the Engineer and the contractor or his representative. Any other register considered necessary by the Engineer shall be maintained at site in which the representatives of the Engineer and the contractor will have to sign. Registers as mentioned above will have to be maintained depending on the scope of work as prescribed by the Engineer at site.

1.2.12 Contractor's Drawings etc:

(a) Any calculations, designs, drawings, schedules, information data, progress charts etc. required by the Purchaser's Engineer in connection with the contract, shall be furnished by the Contractor at his own expenses. The contractor will not be required to furnish drawings, designs and calculations etc. for basic designs and employment schedules provided by the Purchaser in case no modification/deviation is proposed by the contractor for a particular basic design/employment schedule.

(b) Adherence to Specification and Drawings: The site and the detailed drawings shall be made available to the contractor commensurate with the accepted programme of work submitted under clause 19(3). The whole of the works shall be executed in perfect conformity with the specifications and drawings of the contract. If Contractor performs any works in a manner contrary to the specifications or drawings or any of them and without such reference to the Engineer, he shall bear all the costs arising or ensuing therefrom and shall be responsible for all loss to the Railway.

(c) Drawings and Specifications of the Works: The Contractor shall keep one copy of Drawings and Specifications at the site, in good order, and such contract documents as may be necessary, available to the Engineer or the Engineer's Representative.

(d) Ownership of Drawings and Specifications: All Drawings and Specifications and copies thereof furnished by the Railway to the Contractor are deemed to be the property of the Railway. They shall not be used on other works and with the exception of the signed contract set, shall be returned by the Contractor to the Railway on completion of the work or termination of the Contract.

(e) Compliance with Contractor's Request for Details: The Engineer shall furnish with reasonable promptness, after receipt by him of the Contractor's request, additional instructions by means of drawings or otherwise, necessary for the proper execution of the works or any part thereof. All such drawings and instructions shall be consistent with the Contract Documents and reasonably inferable there from.

(f) Meaning and Intent of Specification and Drawings: If any
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ambiguity arises as to the meaning and intent of any portion of the Specifications and Drawings or as to execution or quality of any work or material, or as to the measurements of the works the decision of the Engineer thereon shall be final subject to the appeal (within 7 days of such decision being intimated to the Contractor) to the CEE or Dy. Chief Electrical Engineer/ Con/ NCR who shall have the power to correct any errors, omissions, or discrepancies in aforementioned items and whose decision in the matter in dispute or doubt shall be final and conclusive.

1.2.13 Contractor's Responsibility for Discrepancy: All designs and drawings submitted by the Contractor shall be based on a thorough study and shall be such that the Contractor is satisfied about their suitability. The Purchaser's approval will be based on these considerations. Notwithstanding approval communicated by the Purchaser, during the progress of the contract for designs and drawings, prototype samples of components, materials and equipment after inspection of materials, after erection and adjustments to installations, the ultimate responsibility for correct design and execution of work shall be with contractor unless the Purchaser insists on adoption of his own designs in spite of the Contractor not being agreeable to it.

1.2.14 Training of Purchaser's Staff: The contractor shall impart training to Railway staff free of cost. Contents of training and number of staff will be decided by Dy.CEE/C/AGC.

1.2.15 Work by Other Agencies:

(a) Any other works undertaken at the same time by the Purchaser or the Railway direct or through some other agency at the same time or section where the contractor is carrying out his work will not entitle the contractor to prefer any claim regarding any delays or hindrances he may have to face on this account but the Purchaser shall grant a reasonable extension of time to the contractor. The contractor shall comply with any instruction which may be given to him by the Purchaser in order to permit simultaneous execution of his own works and these undertaken by other contractors or the Railway without being entitled on this account on any extra charge.

(b) The contractor shall not be entitled to any extra payment due to hindrance resulting from normal Railway operations, such as delay on account of adequate number of and duration of shut-down etc. not being granted.

(c) If the purchaser is unable to supply materials to the contractor as specified in the contract, in time, the contractor shall not be entitled to any extra payment on account of such delay in supply. However, such delays in supply will be reasonable ground for extension of completion date/s for the work.

(d) In the course of checking/ finalizing of layout plans and general arrangement drawings for modified Transmission Line, the contractor shall prepare a list of infringements if any exist and advise the purchaser in time.

1.2.16 Infringement of Patents:

(a) The Contractor is forbidden to use any patents or registered drawings,

process or pattern in fulfilling his contract without the previous consent in writing of the owner of such patent, drawing, pattern or trade mark, except where these are specified by the Purchaser himself. Royalties where payable for the use of such patented processes, registered drawings or patterns shall be borne exclusively by the Contractor. The contractor shall advise the Purchaser of any proprietary right that may exist on such processed drawings or patterns which he may use of his own accord.

(b) In the case of patent taken out by the Contractor of the drawings or patterns registered by him, or of those patents, drawings, or patents for which he holds a license, the signing of the Contract automatically gives the Purchaser the right to repair by himself the purchased articles covered by the patent or by any person or body chosen by him and to obtain from any sources he desires the component parts required by him in carrying out the repair work. In the event of infringement of any patent rights due to above action of the Purchaser, he shall be entitled to claim damages from the contractor on the grounds of any loss of any nature which he may suffer e.g. in the case of attachment because of counterfeiting.

(c) Indemnity by Contractors: as per GCC April-2022.

1.2.17 Inspection & Testing: The contractor will ensure that equipment used have been type tested. The routine and acceptance tests shall be conducted by the firm in the presence of purchaser's representative/inspecting Officer. The contractor shall furnish three copies of manufacturer's routine and type tests certificates.

1.2.18 Safety Measures:

(a) The contractor shall take all precautionary measures in order to ensure the protection of his own personnel moving about or working on the Railway premises, but shall then conform to the rules and regulations of the railway. When the work is on/near Railway Track, he shall provide for flagman for protection as per the directives of the purchaser. The purchaser shall remain indemnified by the contractor in the event of any accident occurring in the normal course of work, arising out of failure of the contractor or his men to exercise reasonable precaution at all places of work.

(b) The contractor and his representatives shall abide by all Railway regulations in force.

(c) While working within station limits, especially on passenger platforms, the contractor shall ensure that at all time sufficient space is left for free movement of passenger traffic. He must cover and/or barricade the excavations carried out in such areas and continue to maintain these, till the work is completed, with a view to avoid any accident to public or to Railway staff.

(d) The works must be carried out most carefully without any infringement of the Indian Railway Act or the General and Subsidiary Rules in force on the Railway, in such a way that they do not hinder Railway operation or affect the proper functioning of any Railway equipment, structure or rolling stock.

(e) If safety of track or track drainage etc. is affected as a consequence of works undertaken by the contractor, the contractor shall take immediate steps to restore normal conditions. In case of delay, the purchaser shall,

after giving due notice to the contractor in writing, take necessary steps to complete the job and recover the costs from the contractor.

(f) Contractor shall provide yellow jackets to workers working near Railway Tracks. He should also provide helmets and other safety equipment to his workers.

(g) The contractor shall be responsible for safe custody of all equipment till provisional acceptance.

Note:- Other safety measures will be applicable as mentioned in GCC April-2022.

1.2.19 Provisional Acceptance:

(a) Immediately on completion of work, the contractor shall test the installation to ensure that installation is as per the specifications. Along with the test results, the contractor shall inform the purchaser in writing that installation is complete and ready for commissioning.

(b) The test as stipulated in the specification shall be jointly conducted. On the basis of the test results, if found satisfactory, the installation shall be commissioned. Provisional acceptance shall not be withheld for rectification of minor defects.

(c) Should the result/s of inspection and test/s be not satisfactory, an extension of one month will be granted to the contractor to make good the defects and deficiencies pointed out by the purchaser. Fresh inspection and test will then be carried out after the contractor has attended to the defects and deficiencies. If these tests are also not satisfactory, the purchaser may proceed at the contractor's expenses by all means deemed expedient, to have the installation made satisfactory until they comply with the specifications and approved drawings and designs.

(d) In such a case, or in case of delay in completing the work under this contract within the time limit, the purchaser reserves the right if deems it possible to use in a reasonable manner any section or any part of the section even if some installations of the section are not completely erected. The purchaser will give to the contractor for this purpose seven days previous notice. The contractor shall then take at his own expenses all necessary steps to complete the works in accordance with the provision of the contract. In case it becomes impossible to proceed with the above mentioned taking over tests for reasons other than for which the contractor is responsible, the "Provisional Acceptance Certificate" shall be issued at or within a mutually agreed reasonable period not exceeding three months after completion of the relevant sections as directed in sub-para/s above.

Note:

1. Acceptance Certificate for each section will be issued immediately after all tests (excluding power collection tests) are completed to the satisfaction of the purchaser. Should the purchaser be unable to complete the tests and energization of the line within a reasonable time which shall not exceed one month from the date of contractor's notification, the issue of provisional

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acceptance certificate shall not be delayed and shall be issued within a maximum time of 3 months after notification has been issued. The power collection tests shall normally be carried out for the entire section within three months of the date of energization of the section.

2. The issue of Provisional Acceptance Certificate shall not be withheld for rectification of minor defects which may reasonably be considered not essential for energization and operation of installation. In such cases, only the value of materials and cost of rectification of minor defects shall be withheld from the payments of provisional acceptance until rectification is completed.

1.2.20 Guarantee:

(a) The tenderer shall guarantee the equipment/ installations for satisfactory performance for a period of **12 months** from the Date of Commissioning against any defect. The contractor should promptly attend complaint and replace/repair the defective equipment/ parts free of cost promptly and satisfactorily. The equipment/ parts so replaced by the contractor, shall be further guaranteed for a period of **12 months** for satisfactory service from the date of such replacement.

(b) During the period of guarantee the contractor shall keep available an experienced engineer and necessary equipment to attend to any defective installations resulting from defective erection and/ or defects in the equipment supplied by the contractor. This engineer shall not attend to rectification of defects which arise out of normal wear and tear and come within the purview of routine maintenance work. The contractor shall bear the cost of modifications, additions or substitutions that may be considered necessary due to faulty materials, design or workmanship for the satisfactory working of the equipment. The final decision shall rest with the CEE/ C/ NCR or Dy. CEE/ C/AGC.

(c) During the period of guarantee, the contractor shall be liable for the replacement at site of any parts which may be found defective in the equipment whether such equipment be of his own manufacture or those of his sub- contractor whether arising from faulty design, materials, workmanship or negligence in any manner on the part of the contractor provided always that such defective parts as are not repairable at site are promptly returned to the contractor if so required by him at his (Contractor's) own expenses. In case of any defects in contractor's equipment and components detected during guarantee period, contractor should replace all such items irrespective of the fact whether all such items have failed or not. The contractor shall bear the cost of repairs carried out on his behalf by the purchaser at site. In such a case, the contractor shall be informed in the advance of the works proposed to be carried out by the purchaser.

(d) If it becomes necessary for the contractor to replace or renew any defective portion of the equipment under the para-aforesaid then the provision of the said para shall also apply to the portions of the equipment so replaced or renewed until the expiration of **Twelve (12)** months from the

date of such replacement or renewal or until the end of the above-mentioned period whichever is later. Such extension shall not apply in case of defects of a minor nature. If any defect might not remedy within a reasonable time during the aforesaid period, the purchaser may proceed to do the work at contractor's risk and expense but without prejudice to any other rights and remedies which the purchaser may have against the contractor in respect of such defects or faults.

(e) The repaired or renewal parts shall be delivered and erected on site free of charge to the purchaser.

(f) In the case of materials, components, fittings and equipment supplied by the purchaser, no liability will rest on the contractor for failures on account of defective materials or workmanship and for any consequential damages. Such defective materials, if not yet erected on line, will be returned by the contractor to the purchaser and such quantities will be considered for the purpose of the final reconciliation.

1.2.21 Availability of breakdown/maintenance staff: During the period of guarantee the Contractor shall keep available an experienced engineer and necessary equipment to attend any defective installations resulting from defective erection and/or defects in the equipment supplied by the Contractor. In case of any dispute, the final decision shall rest with Dy.CEE/C/NCR.

1.2.22 Failure to Attend the Defects:

(a) Notwithstanding the issue of Provisional Acceptance Certificate and partial or full use of any equipment, if the completed equipment or any portion thereof before it is finally taken over at the end of the guarantee period be found to be or to have become defective in course of usage by the Railway due to faulty material, design or workmanship or otherwise fails to fulfill the requirement of the contract and/or its purpose, the purchaser shall normally give the contractor prompt notice setting forth the particulars of each defects or failure and the contractor shall forthwith make the defects good or modify or replace the equipment, as may be directed by the purchaser's engineer, at his own cost in all respects to make it comply satisfactorily to with the said requirements. Should the contractor fail to do within a reasonable time the service of the said notice upon him or should time not permit of service of such notice, the purchaser may repair or reject and replace the whole or part of such defective equipment as the case may be, at the cost of the contractor. The contractor's full liability under this clause shall be satisfied by the payment to the purchaser of the extra total cost, if any, of such replacement delivered and erected as provided for in original contract, such extra cost being the ascertained difference between the price paid by the purchaser under the provisions above mentioned for such replacement and the contractor's price for the plant so replaced plus the sum if any paid by the purchaser to the contractor in respect of such defective equipment. Should the purchaser not so replace the rejected equipment within the reasonable time, the contractor's liability under this clause shall be satisfied by the repayment by the contractor of all moneys paid by the purchaser to him in respect of such rejected equipment. Rejected/ Defective materials shall be returned to contractor to the extent possible.

(b) All defects and deficiencies advised to the contractor shall be attended by him promptly. If contractor fails to respond and arrange repair/rectification within reasonable time, the purchaser shall be free to get the repairs done through departmental labor or through any other sources at contractor's expenses without prejudice to the other remedies available under the contract.

(c) In the event of such rejection as aforesaid, the purchaser shall without prejudice to his other rights and remedies and in particular, without prejudice to his rights under the clause just preceding be entitled to the use of the rejected equipment for a time reasonably sufficient to enable him to obtain other replacement equipment. During such period, if the rejected equipment is used commercially, the contractor shall not be entitled to the payment on energization until such rejected equipment is rectified and/or replaced but the purchaser shall not be entitled to claim any damages arising out of rejected equipment in respect of such period.

1.2.23 Maintenance Manuals: On successful completion of work, the contractor shall hand over five copies of the detailed drawings and maintenance manuals of equipment duly bound in booklets. Two copies shall be given in the form of CD/floppy/pendrive to the purchaser prior to release of final payment to the contractor.

1.2.24 Final Acceptance:

(a) The final acceptance of the entire installation shall be from the date of expiry of the guarantee period and after contractor's obligation has been fully met under the contract.

(b) The purchaser shall not be liable to the contractor for any matter arising out of or in connection with the contract or execution of the work unless the contractor shall have made a claim in writing in respect thereof before the issue of final acceptance certificate under this clause. Notwithstanding the issue of final acceptance certificate, the contractor and the purchaser shall remain liable for fulfillment of any obligation incurred under the provision of contract prior to the issue of final acceptance certificate which remains unperformed at the time such certificate is issued and for determining the nature and extent of such obligation the contract shall be deemed to remain in force between the parties hereto.

1.2.25 Survey & Planning of work: Before starting of the work, Contractor should assess the quantity of materials of the work and submit his planning to Railway Engineer for approval before placing of the order for materials. Similarly, before manufacturing of Panels etc., the drawings should be got approved by the Railway.

1.2.26 Site Office: The contractor shall establish an office headed by a competent engineer at the site convenient to purchaser for planning, designs, co-ordination and progressing the works and for finalization of designs and drawings. A qualified engineer should head the office whose credentials shall be approved by the purchaser's engineer. In addition, the contractor would have to establish field construction offices at convenient

and approved location for co-ordination and progressing of fieldwork.

1.2.27 Communication with site:

1.2.27.1 Site Inspection: The work at entire stretch will be supervised by railway supervisor & Site officer. Contractor shall provide & maintain proper transport facilities for efficient transport of men and material including railway personal associated with the work. When there is visit of officer adequate transportation facility in the form of well-maintained road vehicle e.g., Ertiga/ Scorpio/ TUV 300/ Innova or similar (not older than 3 years) with fuel and driver for 24 hours must be provided by the contractor during visit/inspection of the work by Railway Officers.

NOTE: Nothing will be paid extra on this account and no dispute/claim will be entertained on this account. The conveyance is to be provided by the contractor at suitable place for the use of above purposes so that the work can be tackled without loss of significant time & to provide timely technical aid at site. If the contractor fails to provide this suitable and acceptable conveyance facility, the **recovery of Rs. 2000 (Two thousand only) per day** or actual expenditure borne by the railways on this account, whichever is higher, will be deducted from contractor's running payments and no claims from the contractor what so ever on this account will be admissible and this will be treated as excepted matter. Any dispute on suitability of the conveyance required to be provided by the contractor, the decision of the Engineer-in charge will be final and binding upon the contractor. This provision of conveyance is additional to that given in Non schedule item of Tender schedule.

1.2.27.2 Clearance of Site on Completion: as per GCC April- 2022.

1.2.28 Deployment of Qualified Engineers at Work Sites by the Contractor:

(i) The contractor shall also employ one Qualified Graduate Engineer, if the value of the contract is more than Rs. 2 Crore and one Qualified Diploma Holder Engineer when cost of contract is more than Rs. 25 lakhs but less than Rs. 2 Crore.

(ii) In case the contractor fails to employ the Engineer, as aforesaid in para above, he shall be liable to pay penalty of Rs. 50,000/- and Rs. 30,000/-, respectively, for each month or part thereof for the default period for the provisions, as contained in Para above.

1.2.29 Penalties Due to Unsafe Work:

(a) In the event of accident at the work site, a departmental enquiry shall be held and in case it is established that the accident has occurred on account of contractor's negligence or the negligence of his men, penalties up to an upper limit of 10% of the total cost of the work shall be imposed on the contractor.

(b) Railway administration reserves the right to terminate the contract with immediate effect if the contractor is found responsible for causing an accident without giving any further notice/ notices to the contractor.

(c) In the event of contractor not completing the work or leaving it

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unsafe at the end of day so they may serve speed restrictions if required to be imposed. Fault shall be attended by the railway immediately at the contractor's cost without any further notice. In addition to labour cost recoverable from the contractor, supervision charges @ 12.50% and train detention charges @ Rs.2000/- every half hour or part thereof shall also be recovered.

(d) In the event of contractor starting the job without proper supervision causing an accident, he may be prosecuted under railway act for lawfully interfering with the railway track in addition to the recovery of Rs. 20000/- or value of actual loss, whichever is less as penalty.

1.2.30 Safety of Public: as per GCC April-2022.

1.2.31 Display Board: The Contractor shall be responsible for displaying the details of works i.e. name of work, approximate cost, expected date of completion, name and address of the Contractor and address of Engineer on a proper steel Board of size not less than 1m x 1m.

1.2.32 Assistance by Railway for the Stores to be obtained by the Contractor: Owing to difficulty in obtaining certain materials (including Tools & Plant) in the market, the Railway may have agreed without any liability therefore to endeavour to obtain or assist the Contractor in obtaining the required quantities of such materials as may be specified in the Tender. In the event of delay or failure in obtaining the required quantities of the aforesaid material, the Contractor shall not be deemed absolved of his own responsibility and shall keep in touch with the day to day position regarding their availability and accordingly adjust progress of works including employment of labour and the Railway shall not in any way be liable for the supply of materials or for the non-supply thereof for any reasons whatsoever nor for any loss or damage arising in consequence of such delay or non-supply.

NOTE: If the contractor runs short of materials and such materials are available in Purchaser's stock, the material may be supplied by the Purchaser on loan to the contractor who will return these on receipt of supplies OR within ONE-year OR before the issue of last PAC whichever is earlier. The value of the loaned material would be computed by the Purchaser based on Scheduled rates and equivalent amount would be withheld from the subsequent progress payments due to the contractor immediately after loaning of material. In case, the contractor fails to return the material within the stipulated ONE-year period from the date of loaning of material OR before the issue of last PAC whichever is earlier, the material loaned earlier would be treated as sold. The recovery of the value of sold material would be on the basis of the issue rate or market rate prevailing at the time of supply whichever is higher, plus 5% freight charges and 2% incidental charges together with supervision charges at 12.5% of the total cost inclusive of material, freight and incidental charges OR Scheduled rates whichever is higher. The recovery would be made from any bill submitted by the contractor subsequently either ' On Account' or ' Progress' payment duly

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adjusting the above referred withheld amount.

1.2.33 Traffic Blocks/ Power Blocks/ Shut Down:

(a) The purchaser will make arrangement to obtain power block/ shut down (hereinafter referred to as blocks) for works to be carried out along or adjacent to the track.

(b) Blocks will be granted during day and night hours continuous. The contractor shall confirm that he will equip himself to carry out all construction during night blocks efficiently by suitable special lighting equipment without any extra cost.

(c) Block period shall be counted from the time, the TR-line/ OHE is placed at the contractor's disposal at the work-spot till it is cleared by the contractor.

(d) Blocks will be subject to normal operating conditions and rules of the Railway. All formalities of exchanging private no. etc. with the traffic control/ Traction Power Control will be carried out by the purchaser's staff and for this purpose the purchaser will depute a representative for each erection gang, who will be responsible for imposing power blocks/ shut down and also removing the same after men, material and equipment have been cleared by the contractor from running track and the same declared safe for traffic by the purchaser's representative in case of works involving safety of running tracks.

(e) Blocks required for carrying out works necessitated by the theft, pilferage, accident, or such other incidents shall be granted by the purchaser over and above the normal requirements of block.

1.2.34 Insurance:

(a) The contractor shall take out and keep in force a policy or policies of insurance against all liabilities of the contractor or the purchaser at common law or under any status in respect of accidents to person who shall be employed by the contractor in or about the site of the contractor's office for the purpose of carrying out the work on the site. The contractor shall also take out and keep in force a policy or policies of insurance against all recognized risks to their offices and depots. Such insurance shall in all respects be to the approval of the purchaser and if he so requires in his name.

(b) Insurance of Man, Materials and Installations: The contractor shall take out and keep in force a policy or policies or insurance against all liabilities of the contractor or the purchaser at common law or under any statute in respect of accidents to person's installation are provisionally handed over to the purchaser. For this purpose, the traction installation in a section shall be deemed to have been provisionally handed over when provisional acceptance certificate is issued for the section or the traction installation in the section or commissioned or on the expiry of three months after installation are given ready in all respect for handing over, whichever is earlier, for commercial use. The contractor shall not be liable for losses or damages to equipment erected, in the course of erection or in the stores at the contractor's depot in the consequence of mutiny or other similar causes

over which the contractor has no control and which can't be insured, such losses or damages shall, if required by the purchaser, be made good by the contractor at the cost of the purchaser.

(c) The contractor should, however, ensure the materials brought to site against risks in consequence of war and invasion as required under the emergency risks (goods) Insurance act, 1962 from time to time.

(d) The contractor shall take out all insurance covers in connection with the contract with the General Insurance Corporation of India or any other company.

Note:- It may be noted that the beneficiary of the insurance policy should be Railways or the policies should be pledged in favour of Railways. The contractor shall keep the policy / policies current till the installations are provisionally handed over to the purchaser. It may be noted that in the event of contractor's failure to keep the policy current and alive, renewal of the policy will be done by the purchaser, for which the cost of the premium will be recovered from the contractor.

1.2.35 Use of hoisting machines including their attachment anchorage and supports shall conform the following standards or conditions:

(a) These shall be of good mechanical construction, sound materials and adequate strength and free from patent defect and shall be kept in good repair and in good working order.

(b) Every Crane Driver shall be properly qualified and no person under the age of 21 years shall be in-charge of any hoisting machine.

(c) In case of a hoisting machine having a variable safe working load, each safe working load of the conditions under which it is applicable shall be clearly indicated. No part of any machinery or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

(d) In case of departmental machine, the safe working load shall be notified by the Engineer-in-charge. As regards contractor's machines, the contractor shall notify safe working load of the machine to the Engineer-in-charge whenever he brings any machinery to site of work & get it verified by the Engineer concerned.

1.2.36 Accident:

(a) The contractor shall, in respect of all staff engaged by him or by his sub-contractor, indemnify and keep the purchaser at all times indemnified and protected against all claims made and liabilities incurred under Workmen's Compensation Act, the Factories Act and the payment of Wages Act and rules made there under from time to time or under any labor and Industrial Legislation made from time to time.

(b) The contractor shall indemnify and keep the purchase indemnified and harmless against all actions, suits, claim demands, costs, charges or

expenses arising in connection any death or injury sustained by any person or persons within the Railway property sustained due to the acts or omission of the contractor, his sub-contractors, his agents or his staff during the execution of this irrespective of whether such liability arises under the Workmen's Compensation Act or Fatal accident Act or any other statute in force for the time being.

(c) The contractor's liability to meet third party claims of the type outlined above will be applicable only in cases where accidents have been caused by bad design, workmanship, material or negligence on the part of the contractor and further the liability of the contractor will be limited to Rs. 25 Lakh for any one accident.

(d) The contractor shall be responsible for all repairs and rectification of damages to traction installations erected due to Railway accidents, theft, pilferage or any other cause without delay to minimize or to avoid traffic detentions, in a section until the installation are provisionally handed over to the purchaser.

1.2.37 Additional Instructions to Tenderers:

1 Should the Railway decide to negotiate with a view to bring down the rates/ withdraw or modify tendered condition/s, the original offer will still be binding in case negotiated offer is not acceptable to Railway. A declaration to this effect should be submitted by the tenderer/s along with the negotiated offer in the prescribed Proforma.

2 Some or all the Documents which are being uploaded during submission of bid will have to be submitted in original, to the office of Dy. CEE/C/AGC after issuance of Letter of Acceptance (LOA). List of such documents will be intimated in LOA, e.g., MOU of Joint Venture/ Consortium, Certificate as per Annex-V of GCC etc. Tenderer must submit these documents within 15 days from date of issuance of LOA. Contract agreement will be executed only after submission of these documents. Delay in submission of such documents will be on part of contractor and contract is liable to be terminated. In such eventuality, EMD will be forfeited.

3 Make in India Policy: - Public Procurement preference to Make in India Policy 2017 issued by Government of India, with amended from time to time shall be followed for consideration of tenders.

4 Letter of Credit as Mode of Payment: (Ref: RB L No. 2018/CE-I/CT/9 dated 04.06.2018)

(i) For all the tenders having advertised cost of Rs 10 lakh or above, the contractor shall have the option to take payment from Railways through a letter of credit (LC) arrangement.

(ii) This option of taking payment through LC arrangement has to be exercised in IREPS (Indian Railway Electronic Procurement System the e-application on which tenders are called by Railways) by the tenderer at the time of bidding itself, and the tenderer shall affirm having read over and agreed to the terms and conditions of the LC option.

(iii) The option so exercised, shall be an integral part of the bidder's offer.

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(iv) The above option of taking payment through LC arrangement, once exercised by tenderer at the time of bidding, shall be final and no change shall be permitted, thereafter, during execution of contract.

(v) In case tenderer opts for payment through LC, following shall be the procedure to deal release of payment through LC:

(a) The LC shall be a sight LC.

(b) The contractor shall select his Advising/Negotiating bank for LC. The incidental cost towards issue of LC and its operation thereof shall be borne by the contractor.

(c) SBI, New Delhi, Main Branch will be the nodal branch for issue of LCs based on online requests received from Railway Accounts Units for tenders opened in financial year 2020-21. SBI branches where the respective Railway Accounts Office has its Account (local SBI branch) will be the issuance/reimbursing branch for LC issued under this arrangement. The Bank shall remain same for this tender till completion of contract. The incidental cost @0.15% per annum of LC value, towards issue of LC and operation thereof shall be borne by the contractor and shall be recovered from his bills.

(d) The LC shall be opened initially for duration of 180 to 365 days in consultation with contractor. The LC shall be extended time to time as per the progress of the contract, on the request of the contractor. The value of LC to be opened initially as well as extended thereafter shall be finalized by the engineer in consultation with the contractor on the basis of expected progress of work.

(e) The LC terms and conditions shall inter-alia indemnify and save harmless the Railway from and against all losses, claims and demands of every nature and description brought or recovered against the Railways by reason of any act or omission of the contractor, his ,agents or employees, in relation to the Letter of Credit (LC). All sums payable/borne by Railways on this account shall be considered as reasonable compensation and paid by contractor.

(f) The LC terms and conditions shall inter-alia provide that Railways will issue a Document of Authorization (format enclosed as Annexure-T1) after passing the bill for completed work, to enable contractor to claim the authorized amount from their bank.

(g) The acceptable, agreed upon document for payments to be released under the LC shall be the Document of Authorization.

(h) The Document of Authorization shall be issued by Railway Accounts Office against each bill passed by Railways.

(i) On issuance of Document of Authorization, a copy of Document of Authorization shall be posted on IREPS for download by the contractor. A digitally signed copy of Document of Authorization shall also be sent by

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Railway Accounts Office to Railway's bank (Local SBI Branch).

(j) The contractor shall take print out of the Document of Authorization available on IREPS and present his claim to his bank (advising Bank) for necessary payments as per LC terms and conditions. The claim shall comprise of copy of Document of Authorization, Bill of Exchange and Bill.

(k) The payment against LC shall be subject to verification from Railway's Bank (Local SBI Branch).

(l) The contractor's bank (advising bank) shall submit the documents to the Railway's Bank (Local SBI Branch).

(m) The railway's bank (issuing bank) shall, after verifying the claim so received w.r.t. the digitally signed Document of Authorization received from Railway Accounts Office, release the payment to contractor's bank (advising bank) for crediting the same to contractor's account.

(n) Any number of bills can be dealt within one LC, provided the sum total of payments to contractor is within the amount for which LC has been opened.

(o) The LC shall be closed after the release of final payment including PVC amount, if any, to the contractor.

(p) The release of performance guarantee or security deposit shall be dealt directly by railway with the contractor i.e., not through LC.

5 Price Variation Clause (PVC) (Clause 46A of GCC: - as per GCC April-2022.

6 Electronic Reverse Auction (e-RA): Please refer para 1.1.16 of the Tender Document.

7. No post tender submission of documents shall be permitted in respect of tender. However, only clarification can be called for by Railway in respect of any part / document submitted by the tenderer which shall be responded to by the tenderer within 10 working days of the date of issue of such letter for clarifications, failing which the offer shall be dealt with as per available documents.

1.2.38 Project Management: The successful bidder shall be responsible for the overall project management and supervision of works. A master network schedule in the form of PERT network based on the "Work break-down structure" for the project shall be submitted by the successful bidder. The network shall identify milestones of key events for each work package in the areas of engineering, procurement, manufacture dispatch, erection and commissioning.

The contractor shall provide highly skilled and experienced site supervisory personal to supervise all aspects of works to ensure that all site operations are called out in such a manner as to provide the owner with a high-quality

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system and that the operating and maintenance personnel of the owner are adequately trained to operate the system properly, safely and efficiently over the long term.

Annexure – T1

LCDA No. (18 DIGIT IPAS GENERATED NO.)

Dated:

DOCUMENT OF AUTHORIZATION**Reference: (i)** Works Contract/ Supply Contract No..... dated.....**(ii)** Inland Letter of Credit No..... Dated.....

This document is issued against Contract No..... (From IREPS)

.....

Dated..... For Work of (DESCRIPTION OF WORK
FROM IREPS)

The beneficiary of the aforementioned Letter of Credit M/s..... (NAME AND VENDOR CODE) (Vendor Code..... as per IREPS) is entitled to receive payment aggregating INR (FROM ABSTRACT OF BILL PASSED) Out of total LC amount of INR (FROM MASTER TABLE OF LC OPENED) against the first/second* commercial Invoice No. (FROM IPAS) Dated..... from IPAS..... for INR (FROM IPAS) raised against the above contract from State Bank of India..... (Branch) (FROM LC MASTER TABLE)..... on the strength of this Certificate.

The details of payment already made to the beneficiary under this Letter of Credit are as follows:

S. No.	Invoice No.	Invoice date	Invoice Amount (INR)	LCDA No.	LCDA date	Amount paid (INR)
Total Paid						

THIS PAYMENT: \$\$\$

LC balance after this payment:

(Signature of authorized Railway authority)

Name & Designation

(Official Seal)

(*Score out whichever is not applicable.)

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Annexure- T2**Procedure for Conduct and Reporting of R.A.**

1. The tendering authority shall solicit bids through an invitation to the electronic Reverse Auction to be published or communicated in accordance with the provisions similar to e-procurement.
2. Depending upon the nature of item/ work/ service and complexity of case on hand, following shall be indicated in the tender for e-RA itself:
 - (a) Initial e-RA period: This shall be the initial time interval for e-RA. e-RA shall be open for this duration.
 - (b) Auto extension period: In case any offer is received in the time period equal to auto extension period before close of initial e-RA period, the e-RA shall be extended for time equal to auto extension period from the time of last bid. There shall be no upper limit on number of auto extensions. When no offer is received in the last auto extension period, e-RA shall close.
 - (c) Minimum decrement in percentage of value of the last successful bid.
3. Date and time for start of e-RA shall be communicated to qualified tenderers by the convenor after evaluation of the Technical Bids.
4. After submission of Initial Price Bid, tenderers will not be allowed to revise the taxes and other levies.
5. During auction period, identities of the participating tenderers will be kept hidden.
6. Minimum admissible bid value will be last bid value minus minimum decrement as specified by the tendering authority before starting of reverse auction. Starting point for reverse auction shall be the lowest initial Price Bid of the Tenderer eligible for award of contract.
7. After close of the RA, tabulation of last (minimum) bids received from all the tenderers will be generated and made visible to Railways and participating tenderers.
8. Railway users can also view the bidding history in chronological order.
9. Bidders not be allowed to withdraw their last offer.
10. L-1 will be defined as the lowest bid obtained after the closure of
R.A. session for Goods, Works and Services tenders.

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Annexure – T3**Performa of constitution of Firm**

1.	Full name of the firm	
2.	Registered Head Office Address	
3.	Branch Office in India (if any)	
4.	Constitution of firm (whether Sole proprietorship firm/ Partnership firm/ Limited Company/ Joint Venture (JV)/ Registered Society/ Registered Trust/ LLP/ HUF etc)	
5.	Bank account details of the firm, i.e., Account No., Name of bank and bank specific code number (MICR & IFSC) to facilitate electronic payment	
6.	Detail of PAN of the firm	
7	E Mail ID	

Note: 1. Please enclose attested copy of the constitution of firm.

2. Tender document must be signed by such person as may be legally competent to sign on behalf of the firm, company, association, trust or society as the case may be

Date:
seal

Signature of Tenderer/s with

Annexure – T4

**LIST OF AWARDED WORKS UNDER EXECUTION AND/ OR WORK
AWARDED BUT NOT YET STARTED TILL DATE OF OPENING OF TENDER**

(Mandatory for tenders more than Rs. 20 Cr value to evaluate Bid Capacity of tenderer)

S. No.	Name & place of work	Organization for whom work is being carried out	Date of award of contract, Contract Agreement No. & Date	Original cost of work/ Revised Cost (up to latest corrigendum)	Date of Completion (Original/ Extended)	Payment Received till Date of Opening of Present Tender	Balance amount of the work to be executed	Balance period of work to be executed	'B' Value of work to be done in 'N' years (See Note (d) below)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) = (5)-(7)	(9)	(10)
1									
2									
								Total	

(Signature of Chartered Accountant
Seal of firm

Date:

Registration No.:

e-mail:

Phone:

Fax:

Notes

(a) In case of no works in hand, a 'NIL' statement should be furnished duly verified by Chartered Accountant.

(b) In case of JV firm, the details of works with each member of JV is required to be submitted.

(c) In case, the tenderer/s failed to submit the above statement along with offer, their/ his offer shall be considered as incomplete and will be **rejected summarily**.

(d) 'N' for column 10 is Number of years prescribed for completion of work for which bids has been invited.

(e) 'B' is the value of existing commitments and balance amount of ongoing works with the tenderer to be completed in next 'N' years.

(f) For N equal or more than column (9), value of 'B' will be same as column (8)

(g) For contracts not having any defined part financial/ physical completion stages/milestones, and $N < \text{column (9)}$ then the value of 'B' will be as per formula $B = \text{Column (8)} * N / \text{Column (9)}$

(h) In case part financial / physical completion stages / milestone is defined in the contract, value of 'B' shall be calculated accordingly.

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Annexure – T5

**LIST OF PLANTS & MACHINERY AVAILABLE ON HAND AND PROPOSED
TO BE INDUCTED AND HIRED**

S. No.	Particulars of Plant/ Machinery	No. of Unit	Kind and Make	Capacity	Age & Condit ions	Owned by firm	Proposed to be Purchased/ Hired	
							Date of Placing Order	Likely Date of Receipt
1	2	3	4	5	6	7	8	9
1								
2								
3								
4								
5								
6								
7								

Signature of Tenderer/s

Dated: _____

CONTRACTOR

DY. CHIEF ELECTRICAL ENGINEER(CON)

Annexure – T6**LIST OF PERSONNEL/ ORGANIZATION AVAILABLE ON HAND AND
PROPOSED TO BE ENGAGED**

S. No.	Name Designation &	Qualification	Professional Experience	Remarks
1	2	3	4	5
1				
2				
3				
4				
5				
6				
7				
8				

Signature of Tenderer/s

Dated: _____

CONTRACTOR

DY. CHIEF ELECTRICAL ENGINEER(CON)

Annexure – T7

**Details of Works of Similar Nature Physically Completed in all respect
as per Contract Agreement during last Seven Years, Ending Last Day of
Month Previous to the one in which Tender is Invited**

S. No.	Name of work	Name of organization for whom work physically completed	Type of organization for whom work was executed	Contract Agreement No. & Date	Original value of contract agreement	Final value of contract as completed	Payment received till opening of present tender (On account/final bill)	Time taken for Completion of work		Principal feature of the work in brief
								Date of award of contract	Date of actual completion	
1	2	3	4	5	6	7	8	9	10	11
1.										
2.										

Date:

Signature of Tenderer/s with Seal

Notes:

- Above detail should be given only for works which have been physically completed in all respects. Part completed work shall not be considered.
- Certificate from Private individual for whom such works are executed shall not be considered for eligibility of tenderers.
- The tenderers should attach self-attested copy of certificate issued by the organizations for whom the work was carried out in the proforma as per Annexure-T11.
- In column 4 type of organization is to be mentioned viz. Central/ State Governments/ Public Sector Undertaking/ Public Funded Institutions/ Municipal Bodies/ Railways Siding owners/ Public listed company.
- In case of JV firm, these details are also required for all the members of the JV firm for one similar single work for a minimum of 10 % of advertised value of the tender (for works without composite components).

CONTRACTOR

DY. CHIEF ELECTRICAL ENGINEER(CON)

Annexure – T8

Details of Work of Similar Nature Successfully Completed during last Seven years, ending last day of month previous to the one in which Tender Invited and detailed in Annexure-T7 (bifurcated as per components of tender schedule) to be submitted by tenderer along with Annexure-T7 in case of tender having composite nature of work, having distinct components and having separate schedule for each component

S. No.	Description of components/ component as per tender schedule, executed in different contracts	Name of work under which components (mentioned in column II)	S. No. of Annexure-T7 where other details of this work mentioned	Payment received under these components till ending last day of month previous to the one in which tender is	Percentage of amount received under these components equal to advertised value of tender	Percentage of advertised value of tender amount required as per technical eligibility criteria under these components			Remark
						Three works costing not less than 30% of advertised value	Two works costing not less than 40% of advertised value	One works costing not less than 60 % of advertised value	
I	II	III	IV	V	VI	VII	VIII	IX	X
1	All components (A, B, C, D, E ...) executed in single contract								
2	More than one component executed in single contract								
3	Only one component executed in single contract								

Date:

Signature of Tenderer/s With Seal

Note: Component wise details mentioned above should be supported by completion certificate submitted under **Annexure-T11**. In case of JV firm, these details are also required for all the members of the JV firm any component of work in separate sheet (for work with composite components).

CONTRACTOR

DY. CHIEF ELECTRICAL ENGINEER(CON)

ANNEXURE – T9**STATEMENT OF DEVIATIONS FROM TENDER SPECIFICATIONS**

Item No.	Description	Particulars of Deviations

Signature and Seal of the Tenderer

CONTRACTOR

DY. CHIEF ELECTRICAL ENGINEER(CON)

Annexure – T10**A Information and Particulars in terms of Clause 16(a) of Tender Form (Second Sheet) Annexure-I (Contd. ...) of GCC-2022 regarding Retired Railway Engineer(s)/ Officer(s) of the Gazetted rank**

S. No.	Name of Retired Gazetted Officer/ Engineer with Designation	Date of Retirement	Details of Permission Obtained (wherever applicable)
1.			
2.			
3.			
4.			

Note: Details as per the above format shall be furnished by the tenderer. The format should not be left blank. In case of there being no such retired Gazetted Railway Officer/ Engineer, Nil to be furnished in the format.

B Information and Particulars in terms of Clause 16(c) of Tender Form (Second Sheet) Annexure-I (Contd. ...) of GCC-2022 regarding Relative(s) employed in Gazetted Capacity on North Central Railway

S. No.	Name of the relative who is employed in Gazetted Capacity on North Central Railway with Designation	Relation with Tenderer
1.		
2.		
3.		
4.		

Note: Details as per the above format shall be furnished by the tenderer. The format should not be left blank. In case of there being no such relative, Nil to be furnished in the format.

Signature of the tenderer.....

Name.....

Annexure – T11**COMPLETION CERTIFICATE**

Name of Organization
Postal address, Phone No., Email ID, Fax No.

Letter No:

Date:

1.	Name of work	
2.	Contract Agreement (C/ A) No. and date	
3.	Name of Firm with address	
4.	Nature of entity (Sole Prop/ Partnership firm/ company/ LLP/ Joint Venture firm/ Registered Society/ Registered Trust/ HUF etc.)	
5. (i)	In case of Partnership firm/ JV/ LLP, Name and % share of individual partners/ members	
(ii)	In case of Sole Proprietorship, the name of sole proprietor	
6.	Original value of contract agreement	
7.	Final value of contract as completed (If final bill paid)	
8.	Date of award of contract	
9.	Has the work physically been completed in all respect as per contract agreement?	(Yes / No)
10. (i)	If yes, then actual date of physical completion	
(ii)	Whether extension to DOC given with penalty or without penalty	
11.	Total payment made in above contract till the date of opening of present tender along with financial year-wise break-up	
12.	In case of composite work, (See Note 2 below), payment made for relevant distinct component of work out of total payment made under Sr. No. 11 above	
13.	Performance of Contractor (Satisfactory/ Unsatisfactory)	

Date:

(Signature)
Name and Designation of officer
Mobile No. of officer
Seal of officer

Notes:

- 1. Above format is for guidance only. Any certificate containing information asked for shall be considered.*
- 2. Only those works will be treated as composite works which consist of more than one distinct component of work such as Civil Engg. Works, S&T Work, Electrical work, OHE work etc. and there is separate schedule for each such distinct component in the tender documents.*
- 3. Payment made as indicated in above certificate (at S.No. 11/ S.No. 12) will be considered as value of completed work for the purpose of eligibility under Technical Eligibility Criteria.*

CONTRACTOR

DY. CHIEF ELECTRICAL ENGINEER(CON)

Annexure – T12

(ON THE LETTER HEAD OF CHARTERED ACCOUNTANT)
To Whomsoever It May Concern

Sub: Contractual receipts of M/s *(Name of firm)*

It is to certify that contractual receipts of M/s *(Name of the firm)* during current financial year and proceeding three financial years as extracted from audited balance sheets are as under:

S. No.	Financial Year	Contractual Receipts	*Extracted from Source document (Audited Balance Sheet/ Certificate issued by the Employer/ Client/ TDS Certificate)
1.	Current year (Say A)		
2.	A-1		
3.	A-2		
4.	A-3		

*In case the Audited Balance Sheet is not available for the current financial year and/ or immediately preceding financial year then the contractual receipts extracted from certificate issued by the employer/ client/ Tax deduction at source certificate, shall be considered for evaluation of the financial capacity of the tenderer.

Yours sincerely,

(Name & Sign. of authorized signatory)

Seal of firm

Date:

Registration No:

e-Mail:

Phone:

FAX:

Annexure – T13

(ON THE LETTER HEAD OF CHARTERED ACCOUNTANT)
(Mandatory and applicable for tenders valuing more than Rs 20 Cr)

To
 Chief Administrative Officer (C),
 North Central Railway, Prayagraj

Sub: Construction works executed and payment received

It is to certify that construction works executed and payment received through construction works of M/s *(Name of firm)* during current financial year and preceding three financial years as extracted from Balance Sheet/ certificate issued by the employer/ client, Form 16, Form 26 AS etc. are as under:

S. No.	Financial Year	Construction Works Executed and Payment Received through Construction Works
1.	Current year (Say A)	
2.	A-1	
3.	A-2	
4.	A-3	

Yours sincerely,

(Name & Sign. of Chartered Accountant)

Seal of firm

Date:

Registration No:

E-Mail:

Phone:

Fax:

Notes:

(a) In case of JV firm details of construction works executed by each member of JV is required to be submitted.

(b) In case, the tenderer/s failed to submit the above statement (for tenders valuing more than 20 Cr) along with offer, their/ his offer shall be considered as incomplete and will be **rejected summarily**.

CONTRACTOR

DY. CHIEF ELECTRICAL ENGINEER(CON)

Annexure – T14**SPECIAL POWER OF ATTORNEY**

(For Sole Proprietor Firm only)

BE IT KNOWN to all that I Sole Proprietor of the firm..... having its registered office at do hereby, for and on behalf of the said firm appoint Shri..... (Name & designation with full address) Special Attorney of the said firm and authorize the said Shri.....(name) whose specimen signature are appended below, to do all or any of the following acts deeds and/ or things on behalf of the said firm and to represent the firm in respect for the Tender No..... (Name of work)invited by North Central Railway.

1. To appear before office of North Central Railway related to the process of tendering for the above said tender.
2. To procure/ download the tender documents for the above saidtender.
3. To digitally sign the above said tender document and for uploading the offer on www.ireps.gov.in for the said Tender.
4. To attend meetings and submit clarifications including negotiations, if any, called by North Central Railway.
5. To sign the agreement and other relevant documents & receive payment on behalf of the firm.
6. To co-ordinate measurement through contractor's authorized engineer, witness measurement, sign measurement books on behalf of firm.
7. To compromise, settle, relinquish any claim(s) preferred by the firm, sign no claim certificate and refer all or any disputes to Arbitration Tribunal.

I have read the content of this Special Power of Attorney & accept the same and I hereby agree to ratify & confirm & do hereby ratify & confirm all acts, deeds & things lawfully done or caused to be done by our said Attorney.

(Signature with name of Power attorney Holder) (Name & signature of sole proprietor)

Dated.....

Place

(Seal of Firm)

Note: The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall be duly registered with registrar or notarized.

Annexure – T15**SPECIAL POWER OF ATTORNEY**

(For Partnership Firms only)

BE IT KNOWN to all that we (1) (2)
 (3).....(4).....(5) all the partners of
 the firm..... having its registered office at..... do hereby, for and on
 behalf of the said firm appoint Shri..... (Name& designation) Special
 Attorney of the said firm and authorize the said Shri (name), whose
 specimen signature are appended below, to do all or any of the following acts deeds
 and/or things on behalf of the said firm and to represent the firm in respect for the
 Tender No... (Name of work) invited by North
 Central Railway.

1. To appear before office of North Central Railway related to the process of tendering for the above said tender.
2. To procure/ download the tender documents for the abovesaid tender.
3. To digitally sign the above said tender document and for uploading the offer on www.ireps.gov.in for the said Tender. In case the offer is submitted by the person other than those who is appointed as above and there is difference between the name of the person authorized as above and the person who digitally submitted the offer then our offer shall be deemed to be summarily rejected.
4. To attend meetings and submit clarifications including negotiations, if any, called by North Central Railway.
5. To sign the agreement and other relevant documents & receive payment on behalf of firm.
6. To co-ordinate measurement through contractor's authorized engineer, witness measurement, sign measurement books on behalf of firm.
7. To compromise, settle, relinquish any claim(s) preferred by the firm, sign no claim certificate and refer all or any disputes to arbitration.

We/ I have read the content of this Special Power of Attorney & accept the same and
 We/ I hereby agree to ratify & confirm & do hereby ratify & confirm all acts, deeds &
 things lawfully done or caused to be done by our said Attorney.

(Signature of Shri.....)

Executants Partner
 (Name & signature)

Date.....

1.....

2.....

Place

3.....

4.....

Seal of Firm

Seal of Firm

Note: The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall be duly registered with registrar or notarized.

Annexure – T16

SPECIAL POWER OF ATTORNEY
(For Private/ Limited companies only)

BE IT KNOWN To all that (Name of firm) having its registered office at do hereby, for and on behalf of the firm appoint Shri (Name & designation) Special Attorney of the said firm and authorize the said Shri (name) whose specimen signatures are appended below, to do all or any of the following acts deeds and/or things on behalf of the said firm and to represent the firm in respect for the Tender No... (Name of work)..... invited by North Central Railway.

1. To appear before office of North Central Railway related to the process of tendering for the above said tender.
2. To download the tender documents for the above said tender.
3. To digitally sign the above said tender document and for uploading the offer on www.ireps.gov.in for the said Tender.
4. To attend meetings and submit clarifications including negotiations, if any, called by North Central Railway.
5. To sign the agreement and other relevant documents & receive payment on behalf of Company.
6. To co-ordinate measurement through contractor authorized engineer, witness measurement, sign measurement books on behalf of Company.
7. To compromise, settle, relinquish any claim(s) preferred by the firm, sign no claim certificate and refer all or any disputes to arbitration.

We have read the content of this Special Power of Attorney & accept the same and we hereby agree to ratify & confirm & do hereby ratify & confirm all acts, deeds & things lawfully done or caused to be done by our said Attorney.

(Signature of Shri.....)
Dated.....
Place

Authorized signatory of the firm

Seal of Firm

Note: The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall be duly registered with registrar or notarized.

Signature of Tenderer/s Dated: -----

Annexure – T17

SPECIAL POWER OF ATTORNEY
(For LLP Firm incorporated under LLP Act)

KNOW ALL MEN BY THESE PRESENTS: WHEREAS M/S
..... (Name of LLP & LLPIN number) is a LLP Firm registered under the LLP Act, 2008 and having its registered office at (herein after called the 'LLP').

AND WHEREAS by its resolution No..... passed in the meeting held on..... of the Partners of the LLP (LLP name) have decided to participate in the Tender No._invited by North Central Railway for the work namely "_____".

I.....(name and designation) the authorized representative of M/s (name of LLP) duly authorized in this behalf by aforesaid resolution do hereby irrevocably constitute, nominate, appoint and authorize Mr. / Ms. _____(designation)_____(address)____ & Mr./ Ms./ Mrs._____(designation) (address)

_____who is/are presently holding the above mentioned position in the LLP as our true and lawful attorney (hereinafter referred to as "Attorney") of the LLP to jointly or severally exercise all or any of the following powers for and on behalf of M/s (Name of LLP & LLPIN number) in respect of the aforesaid tender invited by the North Central Railway:

1. To appear before office of North Central Railway related to the process of tendering for the above said tender.
2. To download the tender documents for the above said tender.
3. To digitally sign the above said tender document and for uploading the offer on www.ireps.gov.in for the said Tender.
4. To attend meetings and submit clarifications including negotiations, if any, called by North Central Railway.
5. To sign the agreement and other relevant documents & receive payment on behalf of firm.
6. To co-ordinate measurement through contractor authorized engineer, witness measurement, sign measurement books on behalf of firm.
7. To compromise, settle, relinquish any claim(s) preferred by the firm, sign no claim certificate and refer all or any disputes to arbitration.

The LLP agrees and undertakes that in the event of any change in the constitution of the LLP, the rights and obligations of the LLP shall continue to be in full force without any effect thereof.

The LLP undertakes that it shall not cancel or amend this power of Attorney without obtaining previous written consent of Northern Central Railway.

AND the LLP hereby agrees that all acts, deeds or things lawfully done by the said Attorneys or either of them under the authority of this power shall be construed as acts, deeds and things done by the LLP and the LLP hereby undertakes to confirm and ratify all and whatsoever the said Attorneys or either of them shall lawfully do or cause to be done by virtue of the powers hereby given.

IN WITNESS WHEREOF this deed has been signed and sealed by Shri (name and designation), on this..... day of..... 20....

CONTRACTOR

DY. CHIEF ELECTRICAL ENGINEER(CON)

In presence of: WITNESSES:

1. Signature

Name:

Address:

Signatures of authorized representative & Seal of LLP

Name of authorized representative (Executants):

Designation:

2. Signature

Name:

Address:

Specimen Signatures of Attorney Holder(s) in token of acceptance:

(1) Name Signature.....

(2) Name Signature.....

Executed and Signed before me on this.....day ofat (place).

(Seal and signature of Notary Public)

Note: *The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall be duly registered with registrar or notarized.*

Annexure – T18

SPECIAL POWER OF ATTORNEY
(For Registered Society & Registered Trust)

KNOW ALL MEN BY THESE PRESENTS: WHEREAS M/s
..... (Name of Registered Society / Registered Trust) is a
Registered Society / Registered Trust registered under theAct (Name of the
Act vide which registered), and having its registered office at
(hereinafter called the 'Registered Society / Registered Trust').

AND WHEREAS by its resolution No..... passed in the meeting held
on..... of the Executive Member of the Registered Society/ Registered Trust the
Registered Society/ Registered Trust (Registered Society/ Registered
Trust name) have decided to participate in the Tender No.invited
by North Central Railway for the work namely "

" I.....(name and designation) the authorized
representative of M/s(name of Registered Society/
Registered Trust) duly authorized in this behalf by aforesaid resolution do hereby
irrevocably constitute, nominate, appoint and authorize Mr./Ms.(designation)
.....(address) & Mr./ Ms.(designation) (address) who is/ are presently
holding the above mentioned position in the Registered Society / Registered Trust as
our true and lawful attorney (hereinafter referred to as "Attorney") of the Registered
Society / Registered Trust to jointly or severally exercise all or any of the following
powers for and on behalf of M/s
(name of Registered Society/ Registered Trust) in respect of the aforesaid tender
Invited by the North Central Railway:

1. To appear before office of North Central Railway related to the process of tendering for the above said tender.
2. To download the tender documents for the above said tender.
3. To digitally sign the above said tender document and for uploading the offer on www.ireps.gov.in for the said Tender.
4. To attend meetings and submit clarifications including negotiations, if any, called by North Central Railway.
5. To sign the agreement and all other required documents & receive payment.
6. To co-ordinate measurement through contractor authorized engineer, witness measurement, sign measurement books on behalf of Registered Trust/Society.
7. To compromise, settle, relinquish any claim(s) preferred by the firm, sign no claim certificate and refer all or any disputes to arbitration.

The Registered Society/ Registered Trust agrees and undertakes that in the event of any change in the constitution of the Registered Society/ Registered Trust, the rights and obligations of the Registered Society/ Registered Trust shall continue to be in full force without any effect thereof.

The Registered Society/ Registered Trust undertake that it shall not cancel or amend this power of Attorney without obtaining previous written consent of North Central Railway.

AND the Registered Society/ Registered Trust hereby agrees that all acts, deeds or things lawfully done by the said Attorneys or either of them under the authority of this power shall be construed as acts, deeds and things done by the Registered Society/ Registered Trust and the Registered Society/ Registered Trust hereby undertakes to confirm and ratify all and whatsoever the said Attorneys or either of them shall lawfully do or cause to be done by virtue of the powers hereby given.

CONTRACTOR

DY. CHIEF ELECTRICAL ENGINEER(CON)

IN WITNESS WHEREOF this deed has been signed and sealed by Shri
 (name and designation), on this day
 of..... 20....

In presence of:

WITNESSES:

1. Signature Name:
 Address:

Signatures of authorized representative & Seal of
 Registered Society/ Registered Trust

Name of authorized representative (Executants):
 Designation:

2. Signature Name:
 Address:

Specimen Signatures of Attorney Holder(s) in token of acceptance:

(1) Name Signature.....

(2) Name Signature.....

Executed and signed before me on this.....day of at..... (place).

(Seal and signature of Notary Public)

Note: The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall be duly registered with registrar or notarized.

Annexure - T19

MEMORANDUM of UNDERSTANDING (MOU)

NON-JUDICIAL STAMP

Rs 500/-

ENTERED INTO AT..... (place) THIS DAY OF (month) 2022
Between

- 1.** (name of firm) having its registered office at.....full address) (therein after referred to as (say X, short form of firm) acting as the Lead Partner of the first part. And
- 2.** (name of firm) having its registered office at.....(full address) (hereinafter referred to as(say Y, short form of firm) in the capacity of first Joint Partner of the other part. And
- 3.** (name of firm) having its registered office at (full address) (hereinafter referred to as(say Z, short form of firm) in the capacity of 2nd Joint Partner of the other part.

The expressions of X, Y & Z shall wherever the context admits, mean and include their Respective legal representatives, successors-in-interest and assigns and shall collectively be referred to as the parties and individually as "the Party".

WHEREAS the parties here to have agreed to enter into a Joint Venture for the purpose of participation in tender in respect of the project work of ("complete name of work to furnish..... hereinafter to as the Work") mentioned in tender Notice No. and Tender No. Invited by Dy. Chief Electrical Engineer/ Construction/AGC or Chief Electrical Engineer (Con.), North Central Railway, Prayagraj (thereinafter referred to as "Employer").

Whereas in the event the Joint Venture being successful in its bid, the parties have agreed to perform the contract in accordance with the agreed terms & conditions and thereof and in the spirit of mutual co-operation to achieve the objective of this Joint Venture, to the full satisfaction of the Employer.

Now, therefore, for and in considerations and covenants hereinafter set forth, the parties hereby agree as follows:

- 1.** The following documents shall be deemed to form and be read and construed as an integral part of this Joint Venture:

- i)** Tender Notice and
- ii)** Tender Document
- iii)** Any Amendment/ Corrigendum issued "the Employer"
- iv)** The tender submitted on our behalf Jointly by the JV

- 2.** The "parties" have studied the documents and have agreed to participate in submitting a tender jointly under the name " X-Y-Z (JV)" (Name of JV).

CONTRACTOR

DY. CHIEF ELECTRICAL ENGINEER(CON)

3. X..... (Name of the lead partner) shall be the lead member of the JV for all intents and purpose and shall represent the Joint Venture in its dealing with the Employer. For this purpose of submission of bid proposals, the parties agree to nominate Shri (name with designation) of..... (name of the parties to which he belongs) as the leader duly authorized to sign and submit all documents and subsequent clarifications, if any, to the Employer. However, Shri (name with designation) shall not submit any such proposals, clarifications or commitments before securing the written clearance of the other partners, which shall be expeditiously given by X,Y,Z to X (to be decided internally by the JV members).

4. The parties have resolved that the share of interest/participation, in the said Joint Venture/Consortium shall be as under:

- | | | |
|-----------|--------------------------|---------------------|
| a. | Lead Partner | : at least 51% |
| b. | Joint Venture Prtner-1 | : Not less than 20% |
| c. | Joint Venture Partner-II | : Not less than 20% |

5. JOINT AND SEVERAL RESPONSIBILITY: The parties undertake that they shall be jointly and severally legally liable to the Employer in the discharge of all the obligations and liabilities as per the contract with the Employer/ Railways and for execution of project in accordance with General and Special Condition of the Contract if work is awarded to their JV. The parties shall be jointly and severally liable & responsible for fulfilling the obligations of the tender /tender document.

The parties shall also be liable jointly and severally for the loss, damages caused to the Railways during the course of execution of the contract or due to non-execution of the contract of part thereof.

6. ASSIGNMENT AND THIRD PARTIES: The parties shall Co-operate throughout the entire period of this JV on the basis of exclusivity and neither of the parties shall make arrangements or enter to agreement either directly or indirectly with any other party or group of parties on matters relating for the present "work".

7. EXECUTIVE AUTHORITY: The said Joint Venture through its authorized representative shall receive instructions, payment from the Employer. The management structure for the project shall be prepared by mutual consultation to enable completion of project to quality requirements within the permitted cost & time.

8. GUARANTEE AND BONDS: The Bank Guarantee, Bid Security deposit etc. and other Bond shall be furnished jointly by all the parties in the name of joint venture and that shall be legally binding on all the partners of the Joint Venture.

9. BID SUBMISSION: Each party shall bear its own cost and expenditure for participation and submission of the bid and all cost until conclusion of a contract with the Employer for the project Common expenditure shall be shared by all the parties of JV ratio of their actual participation.

CONTRACTOR

DY. CHIEF ELECTRICAL ENGINEER(CON)

10. INDEMINITY: Each party hereto agree to indemnify the other party against its respective parts in case of breach/default of respective party of the contract works of any liabilities sustained by the Joint Venture.

11. For the execution of respective portion of works, the parties shall make their own arrangements as per mutual agreement /understanding between them from time to time to bring the required finance, plants and equipment, materials, manpower and other resources.

12. Validity: This MOU shall remain in force till occurrence of the earliest to occur of the following, unless by mutual consent, the parties agree in writing to extend the validity for a further period.

- a.** The bid submitted by the Joint venture is declared unsuccessful, or
- b.** Cancellation /Shelving of the project by the Employer for any reasons prior to award of work.
- c.** Execution of detailed JV agreement by the parties, setting out detailed terms after award of work by the Employer.

13. The parties undertake not to make any modification/ alteration/ termination of the MOU of the Joint Venture during the validity of the tender.

14. The parties undertake not to make any changes in this Joint Venture or terminate this Joint venture, after submission of the tender bid except when modification becomes inevitable due to succession of law etc., without prior written consent of the employer. The parties further undertake that in any case Lead member shall continue to be the Lead member of the JV.

15. All members of JV certify that they have not been blacklisted or debarred by Railway or any other Ministry/Department of the Govt. of India/State Govt. from participation in tenders/contract in the past either in their individual capacity or the JV firm or partnership firm in which they were members/partners.

16. This JV shall be construed under the laws of India.

17. Credentials & Qualifying Criteria should be as under:

- a.** Technical eligibility criteria.
- b.** Financial eligibility criteria

Now the parties have joined hand to form the JV (MOU) on this.....day of (month) (year) with reference to and in confirmation of their discussions and understanding brought on record on (day)..... (month) (year).

Lead Member
(X)

Member –I
(Y)

Member –II
(Z)

(Name of the signatory with designation and name of firm should be furnished).

In witness whereof the parties have executed this JV the day, month and year first before written.

Witness:

- 1.
- 2.
- 3.

CONTRACTOR

DY. CHIEF ELECTRICAL ENGINEER(CON)

Annexure – T20**CERTIFICATE**

(For sole proprietorship firm)

I..... (Indicate Name of Sole prop) S/o..... (Full address of Sole Prop.) Proprietor of M/s..... (Indicate Name of Proprietary firm) situated at (Full address of Sole prop firm) do hereby solemnly affirm & declare as under:

1. That I am the "**Sole Proprietor**" of the firm working in the name & style of M/s..... (Indicate Name – Proprietary firm) at

Deponent

Signature and Seal

VERIFICATION:

I, the above-named deponent do hereby solemnly affirm & verify that the contents of my above affidavit are true & correct. Nothing has been concealed and no part of it is false.

Deponent

Signature and Seal

Place:

Date:

Note: *The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such AFFIDAVIT is being executed. Affidavit shall be affirmed before the Notary Public.*

CONTRACTOR

DY. CHIEF ELECTRICAL ENGINEER(CON)

Annexure – T21**LETTER OF CONSENT**

(To be submitted by Partnership Firm participating as member of JV)

We the following partners of M/s..... (Indicate name of firm) 1

..... 2.....

3..... 4.....

5..... 6.....having its office at

..... hereby give our consent on behalf of M/s (Indicate name of firm) in favor of Mr..... (Indicate name of Partner), whose specimen signature

are appended below, for entering..... into Joint Venture Agreement

with M/s (Indicate name of other firm's) having office at

in connection with Tender NoName..... of work

to sign & execute the MOU, JV agreement and all other required documents pertaining to above said tender on behalf of firm.

We have read the contents of this letter of consent & accept the same and we hereby agree to and ratify all acts, deeds & things of them or any documents executed by the said partner in the scope of this letter of consent on behalf of firm.

This letter of consent is made at on

Name & Signature of Partner/s

(Signature of Sh.....)

DATE.....

1.

2.

3.

Place.....

4.

5.

Seal of the Firm

Note: The stamp duty of Rs. 500/- or shall be governed by the provision of the Law relating to stamp in force in that State at the time.

Annexure – T22**SPECIAL POWER OF ATTORNEY**

(For Partnership Firms participating as a member of JV only)

We the following partners of M/s..... (Indicate name of firm)

(1)2.....

3.....4.....

5.....6..... having its office at

..... hereby give our consent on behalf of M/s (Indicate

name of firm) in favor of Mr. (Indicate name of Partner), whose specimen signature is appended below, for entering into Joint Venture

Agreement with M/s (Indicate name of other firm's) having office at in connection with T. No

.....Name of work to

sign & execute the MOU, JV agreement and all other required documents pertaining to above said tender.

We have read the content of this Special Power of Attorney & accept the same and we hereby agree to ratify & confirm & do hereby ratify & confirm all acts, deeds & things lawfully done or caused to be done by our said Attorney.

Executants Partner

(Signature of Sri)

(Name & signature)

DATE 1.....

2.....

Place 3.....

4.....

Seal of Firm

Seal of Firm

Note: The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall duly register with registrar or notarized.

Annexure – T23**Specimen Board's Resolution of a Private/Limited Company for
Entering into JV with other Entities**

Extract from the minutes of meeting of Board of Directors of the company held on (Date) at the office of the company situated at (Address of the company).

RESOLVED THAT (Name of the company) have decided to participate for the said tender for the work of (Name of the work) in joint venture with M/s..... (Name of the other Firm/ Firms or company/ companies with addresses) in name and style of the JV firm (Name of the Joint Venture firm).

FURTHER RESOLVED THAT Shri..... (Name and designation of authorized person of the company) is hereby authorized to execute & sign all necessary documents for submission of tender documents, JV Agreement and any documents in connection with present tender on behalf of company etc. For the above-mentioned work on behalf of the company.

Signed by Managing Director/ Director/ Company Secretary of the Company

Notes:

1 Stipulations in the above specimen Board's Resolution are for guidance only. Companies can incorporate other stipulation/ stipulations relevant with the tender and formation of JV, if required.

2 The above Annexure should be executed on the Letter Head of the company.

Annexure – T24**SPECIAL POWER OF ATTORNEY**

(To be submitted by Private/ Limited Companies participating as member of JV)

BE IT KNOWN to all that I (Indicate name of Director/ Sole Prop.) at the Company/ Proprietary firm (Indicate Name of Company/ Sole Proprietary firm) having its office at do hereby for and on behalf of the said Company/ Proprietary firm appoint Sh..... s/o Shriage.... (Indicate Name of Nominee with full address) of the Company/ Prop. Firm as our Attorney, whose specimen signature are appended below to execute the MOU/ JV Agreement & all other required documents with M/s (Indicate Name of other Co./ Prop. firm) situated at..... in connection with the following tender invited by North Central Railway:

"T. No. Name of work

..... "

We/ I have read the content of this Special Power of Attorney & accept the same, and we/ I hereby agree to ratify & confirm & do hereby ratify & confirm all acts, deeds & things lawfully done or caused to be done by our said Attorney.

In witness where of I..... (Indicate name of Director/ Sole Prop.) of M/s.(Indicate name of Co. / Prop. Firm) the above-named Director/

Proprietor has executed this Power of Attorney.

For M/s.....

(Sign. of Shri.....)

(Sign & Seal)

Place:

Date:

Note: The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall duly register with registrar or notarized.

Annexure – T25

**Partner's Resolution of LLP Firm incorporated under LLP Act for
Submitting Tender by LLP firm**
(To be printed on Firm's letter head)

EXTRACT OF THE RESOLUTION PASSED AT THE MEETING OF THE PARTNERS OF
(LLP Name) having LLPIN_____of 20..... (Hereinafter referred to as LLP)
HELD ON (Date)_at (Address).....

Whereas the Board has been described about NIT No. _____ issued by
North Central Railway for the work namely "-----", Partners
discussed the matter and after discussion following resolution was passed:
RESOLVED THAT the LLP (LLP name) shall participate in the above tender.

Resolved further that the LLP/Partners authorize(s), Mr./ Ms. _____ & Mr./
Ms. _____ (name and designation) of the LLP, to jointly or severally sign and submit all
the necessary papers, letters, forms, quotes, bids etc., negotiate, discuss, agree to
make any amendments, alterations or modifications thereto and to make
representations, submit papers, affidavits and to do any other act and complete
requisite formalities on behalf of the LLP in connection with completion of aforesaid
tender work and to enter into liability against the LLP.

Resolved further that LLP/ Partners authorize (s) Mr./ Ms. _____ (Name and
Designation) of the LLP to execute Power of Attorney in terms of this resolution in favor
of Mr./ Ms. _____ & Mr./ Ms. _____ the
person(s) above named.

The acts done and documents executed by such above named authorized person(s)
shall be binding on the LLP.

For the Organization,
(Seal of LLP & Signature of authorized person)

Name of authorized person: _____

Designation: _____

Place:

Dated:

Executed and Signed before me on this day of at (place).

(Seal and signature of Notary Public)

Notes:

1. *Stipulations in the above specimen Resolution are for guidance only. LLP firm can incorporate other stipulation/ stipulations relevant with the tender and formation of JV, if required.*

2. *The above Annexure should be executed on the Letter Head of LLP firm.*

Annexure – T26**JOINT VENTURE/CONSORTIUM AGREEMENT, IF APPLICABLE IN THE
TENDER****NONJUDICIAL STAMP****Rs 500/-**

This Joint Venture/Consortium Agreement executed at (Name of place) on this day of(month & year) between M/s X.....(Name of firm) M/s Y.....(Name of firm) M/s Z(Name of firm) wherein Registered office of Ist, 2nd and third party is at respectively

represented through their constituted attorney.....for the 2nd party.....and for the third party..... (The expression and words of the first 2nd & 3rd party shall mean and include their heirs, successors, assigns, nominees' execution, administrators and legal representative respectively).

WHEREAS the parties herein above mentioned are desirous of entering into a Joint Venture/Consortium for submitting bid document and if contract awarded, carrying on Engineering and or contract works, in connection with "Tender for.....(name of work with tender No./Tender Notice No.) as mutually decided between the parties of this of the Joint Venture/Consortium.

NOW THIS AGREEMENT WITNESSES AS UNDER:

1. That in and under this Joint Venture/Consortium Agreement the work will be done jointly in the name and style of M/s (Joint Venture/ Consortium of M/s X, Y, Z with address).

2. That all the parties shall be jointly and severally legally liable to the Employer in the discharge of all the obligations and liabilities as per the Contract with the Employer and severally and jointly responsible for the satisfactory/ successful execution/ completion of the work in all respects and in accordance with terms & specified in JV agreement. All the parties shall be jointly and severally liable and responsible for fulfilling the obligations of the tender/ bid document.

All the parties shall also be liable jointly and severally for the loss, damage caused to the Railway during the course of execution of the contract or due to non-execution of the contract or part thereof.

3. That the role and responsibility of each constituent of the said Joint Venture/ Consortium in detail, covering all aspects of the planning and Successful completion of the work shall be as under:

The First party shall be responsible for (Details may be furnished)

The Second party shall be responsible for..... (Details may be furnished)

The third party shall be responsible for (Details may be furnished).

4. The share of interest/participation, profit & loss of each constituent of the
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said Joint Venture/Consortium shall be as under:

- a. Lead Partner : at least 51%
- b. Joint Venture Partner-1 : Not less than 20%
- c. Joint Venture Partner-2 : Not less than 20%

5. That the parties of this Joint Venture/Consortium shall depute sufficient no. of experienced staff as committed to commensurate with their role and responsibilities and as required for the successful completion of the works in close consultation with each other.

6. That the financial investment and other resources required for the successful execution/completion of work under this Joint Venture/Consortium shall be brought in by the parties as per mutual agreement/ understanding between them from time to time.

7. That all the Bank Guarantees like performance Guarantee Bank Guarantee for Mobilization advance, machinery advance etc. shall be furnished jointly by all the parties in the name of Joint Venture / Consortium only.

8. That all the parties nominate and authorize Shri.....(Name of representative) of(Name of firm) as the representative of the JV and to sign the tender, , contract Agreement in respect of the said tender, to receive payment, to witness joint measurement of work done, to sign measurement books and all letter correspondence related to the mentioned work on behalf of the Joint Venture.

9. That all the above noted parties i.e. M/s X,Y,Z undertake not to make any changes in this Joint Venture/Consortium agreement during the currency of contract except when modification becomes inevitable due to successive laws etc. without prior consent of the Employer. The parties further undertake that in any case lead Member shall continue to be the Lead member of the JV.

10. That all the parties undertake that no member of the Joint Venture firm shall have the right to assign or transfer the interest right or liability in the contract without the written consent of the other members and that of the employer (Railways) in respect of the said tender/contract.

11. That all members of JV certify that they have not been black listed or debarred by or any other Ministry/Department of the Govt. of India/State Govt. from participation in tenders/contract in the past either in their individual capacity or the JV firm or partnership firm in which they were members/partners.

12. The Joint Venture agreement shall be valid during the entire currency of the contract including the period of extension if any and the maintenance period after the work is completed.

13. The Joint Venture agreement shall in all respect be governed by and interpreted in accordance with Indian Laws.

That this Joint Venture Agreement is pursuant the MOU entered in to at(place) this (day) (month) (Year) between above noted parties.

14. That the Credentials & Qualifying Criteria should be asunder.

- a) Technical eligibility criteria.
- b) Financial eligibility criteria

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NOW THE PARTIES HAVE JOINED HAND TO FORM THE JOINT VENTURE /CONSORTIUM ON THIS.....DAY OF WITH REFERENCE TO AND IN CONFIRMATION OF THEIR DISCUSSIONS AND UNDERSTANDING BROUGHT ON RECORD ON..... (date)

IN WITNESS THEREOF THE ABOVE-NAMED PARTIES HAVE SET THEIR RESPECTIVE HANDS ON THIS JOINT VENTURE/ CONSORTIUM AGREEMENT ON THE DAY, MONTH AND YEAR FIRST ABOVE MENTIONED IN THE PRESENCE OF THE FOLLOWING WITNESS.

WITNESS: First Party

Second Party

PART - I

CHAPTER – III

PRICES AND PAYMENT

1.3.1 **SCOPE**

This chapter deals with prices to be paid for supply and/or erection of various items of work or for supplies, and other amounts payable in accordance with accepted schedules of prices and rates and terms and conditions of payment mentioned herein. The total prices for the completed items of work are the actual prices payable to the Contractor as per the terms and conditions of the Contract.

1.3.2.0 **UNIT PRICES**

The unit rates given against various items of work in tender papers are the schedule of rates. The tenderers are required to quote uniform percentage below / at par / above against the schedule of rates while quoting the summary of prices. The actual payment to be made against any item of the schedule shall be derived after loading the schedule prices with the tenderer's quoted percentage. The prices so obtained shall be the unit prices for the various items of work given in Schedule of rates.

1.3.2.1 **UNIT PRICES FOR MATERIAL & ERECTION**

The unit prices indicated in tender Schedule are inclusive of all the prices of materials including all incidental charges for transport, loading/unloading and handling of materials, all insurance premia, etc. The unit price shall also include the cost of erection, testing & commissioning

The price shall include all taxes, duties and levies including GST as per extant rules on works contract applicable on this works contract. Therefore, they should quote their prices taking into account the rate of taxes as livable in the event of sale through works contract to the Central Government organization in that State.

No Sales Tax concessional Form A, C, & D will be issued by Railways. The Octroi exemption certificate will be issued by Railways on written request of the contractor. No reimbursement on account of octroi duty will be entertained by the purchaser.

The price shall also include provision for losses and wastages in transit and erection.

1.3.2.2 **UNIT PRICES FOR ERECTION OF RAILWAY'S SUPPLY MATERIALS**

The unit prices for erection indicated in tender Schedule are inclusive of cost of erection testing & commissioning to the extent indicated in the explanatory notes given in the tender papers. This also cover cost of transportation of materials from Railway's designated store/ section to the work site.

NOTE:

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Works contract tax: - As per latest rule of GST.

1.3.2.3 OTHER PRICE ADJUSTMENTS

No adjustment on account of variation in insurance and freight charges (road or rail) will be permitted.

1.3.2.4 QUANTITIES:-

The approximate estimated quantities of various items of work are included in Tender Schedule.

1.3.2.5 NON-SCHEDULE ITEMS

If during the execution of the work the contractor is called upon to carry out any new item of work not included in Schedules, the contractor shall execute such works at such price as may be mutually agreed with the Purchaser before commencement after obtaining the competent authority's approval and sanction.

1.3.3.0 PAYMENTS AND RECOVERIES:-

No advance payment shall be made to the contractor. The payment terms shall be governed as under. However on account payment will be made against the receipt of material at Contractor's depot / purchaser's depot and also progressive payment will be made for each item of the work during the erection stage. The payment terms shall be governed as under: -

Subject to any deductions or recoveries which the purchaser be entitled to make under the Contract, the contractor shall unless otherwise agreed to be entitled to get the following payments subject to conditions stipulated in subsequent paragraphs.

- i) Payments for design & drawings.
- ii) Payments for supply of materials.
- iii) Progress payments for supply and erection
- iv) Payment for spare items.
- v) Final settlement.

1.3.4.0 Deleted

1.3.5.0 PAYMENT FOR DESIGN & DRAWINGS.

Payments for designs shall be made on the basis of prices included in item 1, Schedule- 1, Section-1.

The amount payable shall be based on assessed quantities against items 1(a) and 1(b) of Schedule 1, Section-1 (Assessment 1) (See para 2.5.9) and payments shall be made in 10 installments.

The amount payable as the first installment shall be 1/10th of the estimated total payments due against item 1(a) and 1(b) of Schedule 1, Section-1 (Assessment 1). The first installment is payable soon after Schedule-1, Section-1, (Assessment 1) is approved and subsequent 8 installments shall be paid thereafter based on progress made as indicated below :-

Payment of five installments due against item 1(a) will be related to the approval of layout plans, wiring diagram, sectioning diagram and cross section drawings, including foundation layout and cross section drawings for L.T Supply Transformer Stations. Each of these installments will, however, be paid after every 20% of the aforesaid drawings for the entire section have been approved and distribution copies issued.

Payment for three installments due against item 1(a) will be related to the approval of structure erection drawings along with the profiles and the general arrangements drawings, including balance drawings for L.T. Supply Transformer stations. Each of these installments will be paid after every 33-1/3% of the aforesaid drawings for the entire section have been approved and distribution copies issued.

Eight installments against item 1(b) will be paid depending upon the progress of Switching Station designs and drawings as mutually agreed. However, the installments shall start with submission of power supply diagram for the section under consideration.

The 10th and the last installment shall be the balance amount payable to the Contractor against the actual total payment due against item 1(a) and 1(b) based on the final quantities for the completed work. The amount is payable only after design work is completed and completion drawings referred Para 2.5.11 are submitted.

1.3.6.0 PAYMENT FOR SUPPLY AND ERECTION

- (a) Payments will be made for supply of materials as specified below:
- (b) Payment will be made for supply of equipments, components, fittings, and materials required for the erection of the work in schedule as described below. No payment shall be made on supply of concreting materials. Payments made for supply will be subsequently be adjusted against the progress payments (Both supply and erection) and against payments on provisional acceptance.
- (c) Payment for spare items as per approved quantity at the rate of 80% of the schedule rate.
- (d) Payment for NS items as per schedule will be made at the rate of 70% of the schedule rate.
- (e) Payments for equipments, components, fittings, and materials required for the execution of the work will be made up to **80% of the material** value of the item included in tender schedule subject to complying the following: -
 - (i) Supplier's Challan and manufacturer's challan for the items.
 - (ii) Inspection certificate granted by the purchaser's representative/ (RITES etc).
 - (iii) Certificate of receipt of materials in good condition at contractor's/purchaser's Depot duly verified by the Purchaser's Engineers.
 - (iv) B.G. for an amount equivalent to total amount claimed against supply of material if the material is kept at contractor's depot. It is also to be brought in notice of the tenderers that there is limited storage capacity with purchaser, hence, prior approval of supply of material at the purchaser's depot will be

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required from Dy. CEE/C/AGC and no BG will be required for supply of materials at purchaser's depot.

- (v) Submission of insurance policy for material for which the payment is claimed.
- (vi) Quality Assurance Documents.
- (vii) Submission of Indemnity bonds for Cost of the materials required for erection.

Issue of materials to the contractor's for erection.

The contractor's supply items will be re-issued to the contractor at purchaser's depot for erection purpose on Submission of Indemnity bonds for amount equivalent to cost of material required for erection.

Bank Guarantee as described below:-

The "Bank Guarantee" shall be in the prescribed form issued by any State Bank of India or from any Scheduled Bank/Nationalised Bank duly conforming to the requirements and valid up to the successful erection. B.G. will be returned if no material is outstanding with the contractor after successful erection.

BG will have to be furnished by the contractor at least 15 days in advance.

1.3.7.0 ON ACCOUNT PAYMENTS

(a) **General:** - On account payment will be made for equipments, components, fittings, and materials as per SOR. On account Payments made will be subsequently be adjusted against the progress payments of the schedule items.

(b) On account not more than 5 times will be made against this work. Any on account bill beyond this limit will be at sole discretion of Dy CEE/Const/Agra Cantt.

Equipments, components, fittings, On account payment for supply of equipments, components, fittings and materials required for the execution of the work shall not exceed **80%** of the value of the materials required to complete the work of such equipments, components, fittings and materials as per schedule on handing over of the materials to the supplier's/purchaser's depot.

All on account payment will be made subject to compliance of following:

- a) Supplier's Challan and manufacturer's challan for the items.
- b) Inspection certificate granted by the purchaser's representative/ (RITES etc).
- c) Certificate of receipt of materials in good condition at supplier's/purchaser's depot duly verified by the Purchaser's Engineers.
- d) B.G. for an amount equivalent to total amount claimed against supply of material if the material is kept at supplier's depot. It is also to be brought in notice of the tenderers that there is limited storage capacity with purchaser, hence, prior approval of supply of material at the purchaser's depot will be required from Dy CEE/C/AGC and no BG will be required for supply of materials at purchaser's depot.
- e) Submission of insurance policy for material for which the payment is claimed.
- f) Quality Assurance Documents.
- g) Indemnity bonds for issuing of the materials for erection purpose.

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1.3.7.1 PROGRESS PAYMENT:**Progress payment for supply & erection.**

- (i) 80% for supply on receipt of SOR materials and 70% of NS items.
- (ii) 10% of Cost of materials on successful erection of various schedule items and 20% for NS items.
- (iii) Balance 10% payment shall be released on issue of completion certificate by the Purchasers Engineer.

1.3.7.2 Progress payment for erection only. (for Rly's Supply Items)

- (i) 90% of erection charges on successful erection of various schedule items
- (ii) Balance 10% payment shall be released on issue of completion certificate by the Purchasers Engineer.

1.3.7.3 PAYMENT SPARE & FOR ADDITIONAL SUPPLIES ITEMS

The Existing/This is a works contract. To meet day to day urgent maintenance requirement of spare, the contractor shall supply spare items as per the requirement given by the Railways. The payment of such spare/additional items will be made at the rate of 80% of schedule rate (where rate are combined).

1.3.7.4 Deleted

1.3.7.5 Deleted

1.3.7.6 FINAL SETTLEMENT

On Successful completion of guarantee period and issue of certificate of final acceptance of entire installations, the security deposit will be refunded / or Bank guarantee will be returned to the contractor after adjustment of any dues payable by the contractor to the purchaser.

1.3.7.7 DESIGN AND DRAWINGS

The contractor shall ensure that all designs and as erected drawings are submitted to the purchaser as mentioned in the tender schedule before claiming final bill.

1.3.8.0 RECOVERIES FROM THE CONTRACTOR

All the recoveries for materials supplied and services rendered by the Purchaser to the Contractor and other refunds due from the contractor shall unless otherwise specified, ordinarily be made by deductions from payments due to the Contractor from the bill.

1.3.9.0 RECONCILIATION OF MATERIALS SUPPLIED BY THE CONTRACTOR

The quantity of materials indicated in Schedule are approximate. All the materials supplied / erected by the contractor shall be correctly accounted for quantities and reconciled on completion of the work by the Contractor. On

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completion of work all surplus/excess materials supplied by the contractor shall be taken over back by the contractor and payment shall be made /adjusted finally only for erected materials. Hence contractor/s are advised to supply the materials as per approved drawings/ designs only after through study of site conditions.

1.3.10 PRICE VARIATION CLAUSE (PVC): As per GCC April-2022.

1.3.10.1 Price Variation During Extended Period of Contract: As per GCC April-2022.

1.3.11 Maintenance of Works: The Contractor shall at all times during the progress and continuance of the works and also for the period of maintenance specified in the Tender Form after the date of issue of the certificate of completion by the Engineer or any other earlier date subsequent to the completion of the works that may be fixed by the Engineer, be responsible for and effectively maintain and uphold in good substantial, sound and perfect condition all and every part of the works and shall make good from time to time and at all times as often as the Engineer shall require, any damage or defect that may during the above period arise in or be discovered or be in any way connected with the works, provided that such damage or defect is not directly caused by errors in the contract documents, act of providence or insurrection or civil riot, and the Contractor shall be liable for and shall pay and make good to the Railway or other persons legally entitled thereto whenever required by the Engineer so to do, all losses, damages, costs and expenses they or any of them may incur or be put or be liable to by reasons or in consequence of the operations of the Contractor or of his failure in any respect.

13.11.1 Certificate of Completion of Works: As per GCC April-2022.

13.11.2 Contractor not Absolved by Completion Certificate: As per GCC April-2022

13.11.3 Final Supplementary Agreement: As per GCC April-2022.

1.3.12 Approval only by Maintenance Certificate: As per GCC April-2022.

1.3.13.1 Maintenance Certificate: As per GCC April-2022.

1.3.13.2 Cessation of Railway's Liability: As per GCC April-2022.

1.3.13.3 Unfulfilled Obligations: As per GCC April-2022.

13.14.1 Final Payment: As per GCC April-2022.

13.14.2 Post Payment Audit: As per GCC April-2022.

1.3.15 Production of Vouchers etc by the Contractor: As per GCC April-2022.

1.3.16 LABOUR:

13.16.1 Wages to Labour: as per GCC April-2022.

13.16.2 Apprentices Act: as per GCC April-2022.

13.16.3 Provisions of Payments of Wages Act: as per GCC April-2022.

13.16.4 Provisions of Contract Labour (Regulation and Abolition) Act, 1970: as per GCC April-2022.

13.16.5 Provisions of Employees Provident Fund and Miscellaneous

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- Provisions Act, 1952:** as per GCC April-2022.
- 13.16.6 Provisions of "The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996" and "The Building and Other Construction Workers' Welfare Cess Act, 1996":** as per GCC April-2022.
- 13.16.7 Reporting of Accidents:** as per GCC April-2022.
- 13.16.8 Provision of Workmen's Compensation Act:** as per GCC April-2022.
- 13.16.9 Provision of Mines Act:** as per GCC April-2022.
- 1.3.17 DETERMINATION OF CONTRACT:**
- 13.17.1 Right of Railway to Determine the Contract:** as per GCC April-2022.
- 13.17.2 Payment on Determination of Contract:** as per GCC April-2022.
- 13.17.3 Determination of Contract owing to Default of Contractor:** as per GCC April-2022.
- 13.17.4 Right of Railway after Rescission of Contract owing to Default of Contractor:** as per GCC April-2022.
- 1.3.18 SETTLEMENT OF DISPUTES – INDIAN RAILWAY ARBITRATION AND CONCILIATION RULES:** as per GCC April-2022.

PART - I CHAPTER – IV

EXPLANATORY NOTES OF SCHEDULE OF RATES - SCHEDULE OF PRICES

SECTION 1– GENERAL:

1.4.1 Explanatory Notes for Various Items of Work in Sub – Section -1, 2, 3, 4 and 5 of SOQR and Sub - Section 6 of Non schedule items are given below:

1.4.2 The basic quantities of components and materials required to make up a unit of work for selected items are indicated for guidance only. There may be minor variation to suit erection but no adjustment in prices shall be made on that account. In estimating the prices for various items of work provision for loss and wastage in transit and erection should be provided for over and above the basic quantities of components and materials required to make up a unit work, indicated herein, except where otherwise specified for materials supplied by the purchaser.

1.4.3 In the explanatory notes of this Chapter, the term 'Small Parts Steel work' is meant to cover fabricated steel work made from rolled steel sections, complete with bolts and nuts and washers where required for fastening the small parts steel work to any structural member. The term "attachment" wherever used is intended to cover castings, forging, machined or welded components or fittings, which are attached directly to a structural member, or mounted on small parts steel work and shall include bolts and nuts for fastening the attachment to the structural member or small parts steel work.

1.4.4 In the explanatory notes given in Section 1 & 2 of this Chapter, the term "bimetallic connection" is meant to cover any connection between a copper conductor and an aluminum conductor. The clamps used for such connections shall be made up of a suitable aluminum alloy or copper alloy and the copper/aluminum conductor shall be wrapped with a bimetallic (aluminum copper) strip to prevent direct contact between aluminum and copper.

1.4.5 Special notes for measurements are included in this chapter under various items, where necessary.

1.4.6 Reconciliation of Materials Supplied by the Purchaser:

(a) The following procedure shall be adopted for the final reconciliation of the various equipment, materials fittings and conductors supplied by the purchaser.

(b) All the materials supplied by the purchaser shall be correctly accounted for and quantities reconciled on completion of the work by the Contractor. On completion of work, all surplus materials supplied by the Purchaser together with the ones found defective or that have become defective or broken on account of defective materials and/or workmanship shall be returned to purchaser by the Contractor.

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(c) Steel: Cost of rolled steel masts, gantry masts, fabricated steel work damaged or not accounted for, will be recovered at rates specified in the note below.

(d) Wires and Conductors: Same as (c) above.

(e) Other Equipment, Fittings and Components: The purchaser will supply the requirement of the various other equipment's, components or fittings listed in Annexure. If there are any shortages during final reconciliation, their cost will be recovered by the purchaser from the contractor at the prices inclusive of all charges as specified in Note below.

Note:

(i) If there are any shortage during final reconciliation, their cost will be recovered by the purchaser from the contractor at the book rate or the last purchase rate or the prevailing market rate whichever is higher plus 5% on account of initial freight, 2% on account of incidental charges together with supervision charges @ 12.5% of the total cost inclusive of material freight and incidental charges. Freight between the purchaser's source of supply and the contractor's depot shall be on the Contractor's account.

(ii) No recovery/reconciliation shall, however, be made as per the preceding para if the items stated under clause 1.4.6 are made contractor supply by including the respective optional items in the contract.

(f) Surplus/ Excess Material: The quantity of materials indicated in Schedule is approximate. All the materials supplied/ erected by the contractor shall be correctly accounted for quantities and reconciled on completion of the work by the Contractor. On completion of work all surplus/ excess materials supplied by the contractor shall be taken over back by the contractor and payment shall be made/ adjusted finally only for erected materials. Hence contractor/s are advised to supply the materials as per approved drawings/ designs only after through study of site conditions.

1.4.7 Released Material: The contractor shall return to the purchaser all the released materials from the existing system at the first available opportunity but not later than a week at the purchaser's stores. If the contractor fails to return the released material in specified time, the cost of released material will be recovered from the progress bill before releasing any payment.

SECTION 2- EXPLANATORY NOTES:**PART-A****1.4.8 EXPLANATORY NOTES of Scheduled Items:****Item 1(a): Preparation of Designs and Drawing for Overhead Equipment and Verification of Purchaser's Pegging Plan:**

The price shall cover preparation of all drawings and designs required to be finalized by the Contractor. The Price shall include the following:

(i) Making and submission of overhead equipment layout plans, including stagger, location of cut in insulator etc with all adjacent existing lines. The work shall include provision of 25 KV feeder wire and buried earth conductor for 2 X 25 Kv.

(ii) Preparation of cross-section drawings and structure erection drawings for each structure location.

(iii) The price includes the cost of survey, verification and transferring of track center of the proposed line from ESP (to be provided by the purchaser) and all other incidental charges required for successful completion of design. The rate also includes the cost of Preparation of layout plan for existing electrified lines (copy of existing LOP shall be supplied by the purchaser).

(iv) Choice of type and size of foundations to suit soil and loading conditions except for the ones which are considered as "Works under other Agencies".

(v) Preparation of long section drawings of overhead equipments where such drawings are required including detailed study of over line structures such as foot over bridges, road over bridges etc for maintaining the specified height of contact wire and requisite clearances.

(vi) Preparation of other designs and drawings including drawings of small parts steel work (other than those for which RDSO standard drawings are available)

(vii) Supply of requisite number of copies of all drawings, including completion drawings to the Purchaser.

(viii) Supply of requisite number of copies of Bonding plan drawings.

(ix) Preparation of Sectioning diagram, SWR/TWR of each station including adjacent section, stations and supply of required numbers of drawings of the same. No extra payment will be made for the preparation of such sectioning diagram SWR/TWR. This also includes provision of TWR boards at the station and cabins of approved material.

(x) If required, the contractor shall prepare pegging plans for the section. No extra payment will be made for the preparation of such pegging plans.

Notes for Measurements: For the purpose of payment against this item, the length of track shall be measured as under:

(i) **General:** by the difference in the chain ages of the length under consideration, as incorporated in the layout plans.

(ii) **Turnouts:** the track taking off shall be deemed as starting from the CONTRACTOR

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toe of the switch of the turnout.

(iii) Crossover: the length of track shall be taken as the difference in the chain ages of the toes of switches of the turnouts constituting the cross over.

(iv) Diamond crossing with or without Slips: The two tracks crossing each other shall be measured independently as per note (i) above as though there were no crossing. No extra shall be provided for slip points.

(v) Dead ends and tops of loops- the lengths for payment under this item shall be up to the chain age of anchor mast of the terminating OHE.

(vi) Feeders and return feeders from grid sub-station to feeding/switching station: This item will also be applicable independently in case of feeders/return feeders/ conductors from grid substation to overhead equipment feeding/ switching stations or in a case of feeders/conductors running on independent structures (not supporting OHE) along or across tracks.

In such a case the length of line to be considered for purpose of item (a) shall be measured by the distance between the center of gantries of the grid sub- station and feeding/ switching stations in case of feeder/return feeders/conductors line from grid sub-station, or by the distance between the center line of the two structures to which the feeders/ return feeders/conductors are anchored in case of feeders running along the track if such feeder/return feeders/conductors are running completely on independent structures or by the distance between the center of the two structures supporting the OHE on either side of the first and last independent structure in case of feeders/return feeders/conductors running along the track supporting OHE.

Item 2: Concrete for Foundation & Plinth:

2(a) (i): In Hard Soil:

2(a) (ii): In Rocky Soil:

The price shall cover excavation, supply and handling of all materials and accessories, temporary arrangements for excavation in hard soil and concrete/masonry drains/walls requiring use of chisel and hammer 2 (a) (i), or requiring blasting 2 (a) (ii) Shoring where necessary, casting concrete including frame work where necessary, tamping of concrete, grouting of masts and finishing the top of concrete foundation or anchor blocks. The price also includes dismantling of all connected temporary arrangements, back filling with earth and compacting the same to the required height and width as per drawing to ensure safety of foundation, confining the exposed height of foundation block to within 10 cm., and removal of spoil.

The Purchaser's Engineer shall certify where use of chisel and hammer or blasting has been necessary. The contractor shall arrange for supply of explosives and all tools and plants for blasting operations at his own cost. If half or more of the depth or width of excavation is in hard soil/concrete/masonry drains/walls or in rock, the entire

foundations shall be paid for under item 2(a) (i) or 2 (a) (ii) as the case may be. If half of the depth or width of the excavation is in hard soil/concrete/masonry drains/walls and the other half is in rock, the entire foundation shall be paid under item 2 (a) (ii). The price shall include the cost of cement.

Notes for measurement for items 2(a) (i):

(i) The payable volume of the foundations under item 2(a) (i) and 2(a)(ii) shall be the designed one as shown in the drawings for which the hole has been blasted, irrespective of the actual configuration assumed by the latter due to the blasting.

(ii) The depth of the excavation shall be measured from the formation level to the maximum excavated point.

Item 2(b): Concrete for Foundation & Plinth in other than Hard Soil and Rock:

The price shall cover excavation, supply and handling of all material and accessories, temporary arrangements for excavation in other than hard soil and concrete/masonry drains/walls requiring use of chisel and hammer or requiring blasting. Shoring where necessary, casting concrete including framework where necessary, tamping of concrete, grouting of masts and finishing the top of concrete foundation or anchor blocks. The price also includes dismantling of all concerted temporary arrangements, back filling with earth and compacting the same to the required height and width as per drawing to ensure safety of foundation, confining the exposed height of foundation block to within 10 cm and removal of excavated soil etc. from site to beyond the toe of formation or to a dumping place as agreeable to purchaser. The price shall include the cost of cement. The curing of casted foundations and other activities shall be carried out in accordance with relevant IS standards. The price shall also include the cost of repairing of platform/ platform shelter in case the platform/ platform surface is dismantled/removed/damaged during the course of foundation of mast/TTC/Portals at Platforms in it's original condition.

The price shall be inclusive of cleaning the foundation, white washing the exposed portion of foundation and coloring of muffs as decided by Railways. The price shall also include the backfilling of soil over the exposed portion of foundation, if any, as per Rlys. Standard.

NOTE for Item 2(b):

(i) The prices under Item 2(b) shall be same for any shape or size of concrete blocks. 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.

(ii) The prices under Item 2(b) shall apply for concreting of all foundations for mast, gantries portals and anchor blocks for guy rods and fencing uprights.

(iii) For the purposes of computation of volume of concrete under Item 2(b), the volume of steel work embedded in the foundation block and muff if any shall be ignored.

- (iv) Cost of all concrete will be paid for only under item 2(b).
- (v) For the purposes of computation of volume of concrete, under item 2(b), the volume of concrete shall include the volume of sand and bitumen in sand cored foundation. However, for the purpose of computation, of quantity of cement utilized in sand core foundations, the volume of the sand and bitumen used in core hole should be deducted from the total volume of the foundation.
- (vi) For purposes of computation 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 each column of portal, each head span mast, 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.
- (vii) The prices under item 2(b) shall also include the cost of concrete cable trenches and trench covers at the switching stations as well as embodiment of drainpipes, where required.
- (viii) The prices under item 2(b) shall also cover the cost of diversion of masonry/earth drain wherever necessary for casting of foundations.

NOTE: Nominal reinforcement will be necessary in black cotton soil foundations. Such nominally reinforced foundations in black cotton soil will be payable under Item 2(b) and not under Item 2(c). The steel for nominal reinforcement will be arranged by the Contractor and the concrete mixture, in such a case shall be as for normal foundations 1:2:4.

ITEM No. 2 (c) Reinforced concrete for foundation and plinth in other than hard soil and rock.:- The price shall cover excavation and all reinforced concrete work for foundations including supply of steel for reinforcement and other materials including bending, binding, laying of the reinforcement, shoring where necessary, casting concrete including frame work where necessary, grouting and finishing the tops of foundation blocks. The price shall also include dismantling of all connected temporary arrangements, back filling as required and removal of spoil. The price shall also cover all concrete work for foundation or anchor blocks on bridge piers, irrespective of whether they are actually reinforced or not, and counter weight foundations. Rails and fasteners required for counter weight foundations shall be supplied by the Purchaser free at the Contractor's depot or work spot according to convenience of the Purchaser. Dowel bars as may be required for bond with bridge structures shall be supplied and erected free of cost by the Purchaser. Dowel bars will not be considered as reinforcement for the purpose of this item. The price shall, include the cost of cement.

The rate includes the cost of all ancillary items required e.g. provision of rubble soling, cutting, bending and binding of re-enforcement bars & shuttering etc. for carrying out the foundations as per the approved drawing. The rate also includes the cost of testing of soil and any other testing required to establish the integrity of concrete as per the specification/approved design or drawings.

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Item 2(j): Concrete for Cylindrical type side bearing foundations (M-15 and M-20) (SBC -11000 kgf/sqm):- Cylindrical type foundation for side bearing locations for 11000 kgf/sqm safe bearing capacity (SBC) as an alternative to Conventional Side Bearing type foundation as per RDSO's drawing No.TI/DRG/CIV/FND/RDSO/00002/17/0 Rev-0 (for Conventional OHE).

The price shall cover excavation of pits with the help of mechanized augur, supply and handling of all materials and accessories including re-enforcement steel (epoxy coated) conforming to IS: 432 Part -1. The price shall include cutting, bending and binding of re-enforcement bars. Price shall include shoring if required, concrete grouting of mast and finishing the top of foundation of mast. The price shall also include dismantling of all temporary arrangement and removal of spoil. The price also includes the cost of protection fencing wherever required during the execution of work.

Machinery/Plant and Augur required for digging of pit shall be arranged by contractor at their own cost.

Item 3(a)(ii): Supply and Erection of Traction masts fabricated from Rolled mild steel joist (RSJ) of size 203 mm x 152 mm x 52.0 Kg/m and galvanized in length 9.5 m long or 8.5 m long: The price shall cover the cost of supply of traction mast, main mast of switching stations and Booster transformer stations fabricated from Rolled mild steel joist (RSJ) 203mm x 152mm x 52.0Kg/m designation WB-200, table 2.2 of IS-808/1989 duly drilled as per RDSO's Drawings given below for various types of masts and galvanized as per specification No. ETI/OHE/13 (4/84) with A&C slip No. 1 to 3. The steel shall be conforming to IS-2062/1992 (or latest) Gr. 'A' SK Zinc conforming to IS-209/1992 (or latest).

Drg. No. (i) ETI/OHE/C/0000144 Mod-C	9.5 M long
(ii) ETI/C/0030 latest Mod	11.4 m (S1)
(iii) ETI/C/0031 latest Mod	11.4 m (S2)
(iv) ETI/C/0036 latest Mod	8.0 m (S4)
(v) ETI/C/0181 latest Mod	12.4 m (S6)
(vi) ETI/C/0184 latest Mod	9.4 m (S9)

The price shall also cover the cost of supply of any other structures fabricated out of RSJ beam.

The price shall cover cost of erection, alignment and setting before grouting of individual traction masts and main masts of switching and Booster Transformers stations including those for head spans. The price shall also include the cost of repairing of platform shelters in case the shelter is dismantled/removed/damaged during the course of erection of a mast at platforms.

Item 3(b)(i): Supply & Erection of Fabricated and Galvanized Structures like Portals (O, N & R type): The price shall cover cost of supply and erection, alignment and setting before grouting, wherever required of Portals (O, N & R type) as per approved designs and drawings.

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The prices shall also include supply and erection of galvanized bolts, nuts washer's etc wherever required, as per approved designs and drawings. The price shall also include the cost of repairing of platform shelter in case the shelter is dismantled/removed/damaged during the course of erection of Portals at Platforms. The price shall also include the cost of road crane of suitable capacity if Boom erection is feasible by road crane. If boom erection is not feasible by road crane, rail crane will be provided by Railways and crane driver will be arranged by the contractor. The price shall cover the cost of supply of O, N and R type portals with components as per RDSO's Drg. No:

ETI/C/0008 Sheet No.1 latest Mod for
'N' type ETI/C/0017 Sheet No.1 latest
Mod for 'O' type ETI/C/0011 Sheet No.1
latest Mod for 'R' type

The structures shall be fabricated from steel conforming to IS:2062/2006, Gr. E-250 (Fe 410 W), Quality-A, IS-808/1989 and galvanized as per RDSO's specification No. ETI/OHE/13 (4/84) with A&C slip Nos 1 to 3, with latest spec.

Item 3(b)(ii): Supply & manual Erection of steel structure (traction masts) fabricated and galvanized type: B-series mast:-

The price shall cover the cost of supply of B-Series traction mast 9.5 m and/or 11.4 m long, i.e., B-Series Mast fabricated and galvanized as per RDSO Drg No. ETI/C/0071 (Mod-E), TI/DRG/CIV/B-Mast/00001/ 13/0 with latest mod and specification No. ETI/OHE/13 (4/84), with latest spec. Steel shall be conforming to IS-2062/2011 Gr. A and Zinc conforming to IS- 209 latest.

The price shall also cover the supply of all size of B-Series mast required which has not been mentioned.

The price shall cover cost of erection, alignment and setting before grouting of individual traction masts and main masts of Switching and Booster Transformers stations including those for head spans. The price shall also include the cost of repairing of platform shelters in case the shelter is dismantled/removed/damaged during the course of erection of a mast at platforms.

Note: 11.4 m long masts shall have provision for erection of Brackets (Cantilevers) for conventional as well as for High Rise OHE.

Item 3(b)(iii): Supply and manual erection of special fabricated and galvanized steel structures other than portal & traction masts not covered under items 3(b)(i) & 3(b)(ii). Bridge Mast & special type mast:-

The price shall cover the cost of supply and erection of special fabricated & galvanized steel structures (other than BFB/RSJ/B-Series masts and portals) for conventional and High Rise OHE. The structure to be supplied under this item shall be TTC, G-type, BFB type portals, Bridge masts, emergency masts and double/fabricated "S" series masts such as S3, S5, S7, S8, S-100, S-101, T-150, Dwarf Masts etc. Any other similar structure required during the execution of work shall also be supplied under this item.

The price shall include the cost of steel, fabrication, galvanization, and supply at site for erection. Steel shall be conforming to IS-2062 Gr. 'A', SK 2011 (latest), Zinc conforming to IS- 209/1997 (latest) and galvanization to RDSO's specification No. ETI/OHE/13(4/84) with A&C slip No. 1 to 3, with latest spec. The various structures covered under this item are:

SN	Description	Drg No.	Mod
1	TTC with 5.5/8.0m boom	ETI/C/0009 sheet 1	Latest
2	G-type portal upright & end pieces	ETI/C/0056	Latest
3	BFB portal	ETI/C/0026 Sh.1	Latest
4	S-7, 12.4m	ETI/C/0182	Latest
5	S-8, 12.4m	ETI/C/0183	Latest
6	S-100, for LT, transformer at SWS	ETI/C/0043	Latest
7	S-101, for Isolators inside SWS	ETI/C/0044	Latest
8	S-3, 11.4m	ETI/C/0180	Latest
9	S-5, 11.4m	ETI/C/0042	Latest
10	T-150, for LT supply transformer	ETI/PSI/037	Latest
11	Dwarf Mast	ETI/OHE/G/1402	Latest
12	Special BFB Portal for 5 tracks (General Arrangement for High Rise OHE)	TI/DRG/CIV/BFB-POTAL/00001/13/0 Sh. No. 1	Latest
13	G-Type Portal Special Upright and End Piece for High Rise OHE	TI/DRG/CIV/G-PORTAL/00001/13/0	Latest
14	Two Track Cantilever Structure (TTC) (General Arrangement for High Rise OHE)	TI/DRG/CIV/TTC/00001/13/0 Sh.-1	Latest

The price shall cover, cost of erection, alignment and setting before grouting , wherever required, gantries, including tower/ steel tower/steel work for feeders for traction sub-station, drop arms, standard super masts and suspension brackets for feeders and return conductors, dwarf masts or stub masts for anchoring, complete with anchor plates drilled and welded in position, multiple cantilever cross arm, chairs, adopters for bracket assemblies and all other small part steel works, the erection of which is carried out by the Contractor irrespective of whether they are supplied by the Purchaser or the Contractor. The prices shall also include supply and erection of galvanised bolts, nuts washers etc. wherever required as per approved designs and drawings. The prices shall also include the cost of repairing of platform shelters in case the shelter is dismantled/ removed/damaged during the course of erection of a mast/portal at platforms.

The price shall also include the cost of road crane of suitable capacity if Boom erection is feasible by road crane. If boom erection is not feasible by road crane, rail crane will be provided by Railways and crane driver will be arranged by the contractor.

Note for Item 3(a)(i), 3(a)(ii), 3(b)(i), 3(b)(ii) & 3(b)(iii): The price for the items 3(a)(i), 3(a)(ii) and 3(b)(i), 3(b)(ii), 3(b)(iii) shall also include the cost of stenciling of location number on masts/portal uprights in the manner as directed by the Purchaser. The price shall also include straightening of masts/portals uprights wherever approved by the

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purchaser and cutting of mast/portals/upright to suit the site condition.

For the purpose of payment for supply and/or erection, the black weights as per respective RDSO drawing for individual traction masts (RSJ, BFB & B series, S-1, S4, S-6 & S-9), head span, Portal structures (O, N & R type), special steel structures (TTC, BFB, G & P type portal, Dwarf masts, S3, S5, S8, S100, S101, T-150 etc) shall be payable to the contractor. The payable unit weight for standard masts is given above.

For the purpose of payment for supply and/or erection, of bridge mast or any other structures which are not covered in RDSO's drawings, if any, the black weights of such structures including all components as shown in respective approved drawing, shall be payable to the contractor by purchaser.

No payment is permissible for increased weight of any structure or their components on account of galvanization.

The payment shall be made on the basis of the final lengths/weight of the structures, in case the same are cut or modified as indicated above before erection.

In case of any dispute in unit weights mentioned in drawings, the matter will be decided by the CEE/C/NCR and decision taken in the matter will be final and binding on to the contractor.

Item 3(c): Supply only of Fabricated & galvanized Steel work other than Mast (SPS):

The price shall cover the cost of supply only of all fabricated steel work excluding fasteners which are required to be supplied by the Contractor. The cost of erection for such steel work, if carried out by the contractor shall be paid for under Item 3(b)(iii).

For standard fabricated steel work for which RDSO's approved drawing are available, the weight of steel work as specified in RDSO's drawing shall be considered for payment. 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 non-standard 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.

The price shall include the cost of supply of bracket top and bottom mast fittings suitable for PSC masts.

Notes for Items 3(a)(i), 3(a)(ii), 3(b)(i), 3(b)(ii), 3(b)(iii) & 3(c):

(i) For the purpose of payment against item 3(a)(i), 3(a)(ii), 3(b)(i), 3(b)(ii), 3(b)(iii) & 3(c), weight of structures of fabricated steel work will be calculated according to the weight of black steel given in section books for the length of various members shown in the approved drawings. There will be no addition for increased weight due to galvanizing or painting or weld material or reduction for holes or skew cuts.

(ii) The rates against item 3(b)(iii) shall be applicable to the erection of small parts steel work, which are not covered under the various other Items of work. Unless specifically indicated none of the other items of work shall include the cost of supply and/or erection of small parts steel work which will invariably be paid for under item 3(b) or 3(c) as applicable.

Item 3(e)(i): Supply and Erection of Guy Rod Assembly: The price shall cover supply and erection of guy rod assembly of various lengths for traction masts, feeder line towers or supports complete with mast guy rod fittings, guy rod with adjustments and part/s be grouted in the anchor block. The price shall not include the cost of supply and erection of a dwarf or stub mast with anchor plates drilled and welded in position, where required, for anchorage, and small parts steel work complete with bolts and nuts etc, if any, for attaching the mast guy rod fittings to the mast/structure which shall be paid for separately under the relevant items. Prices indicated against all other items should be exclusive of the price of supply and erection of guy rod, if any which will be paid for under this item.

Components Requirement:

Rly ID No.	Description of components	Quantity per Unit
3232	Mast guy rod fitting (welded) complete with 4 short bolts, nuts, lock nuts and washers for attachment to mast/S.P.S. including appropriate fittings.	1 off
5001-1/ 5001-3/ 5001	Anchor bolts (complete with nuts locknuts and split pins).	1 set
5002	Guy rod stirrup	1 Off
5004/5005/5005-2/1/2/9070 /9071	Guy rod with nut, lock nut, washer and split pin	1 Off
5007-1	Anchor 'V' Bolt	2 Off
5008	Anchor loop	2 Off
5220	Guy rod double strap assembly	1 Off or 2 Off (as Required)

NOTE:

(i) In case the contractor desires to adopt a different design for guy rod assembly, the same shall be indicated by him in the tender and the components required should be clearly listed under this item as deviation.

(ii) Supply and erection of guy rod assembly at anti creep & portals will also be paid for this item.

Item 3(i): Supply and Erection of 25 kV Caution Board/Plates: The price shall cover price of material including caution boards, SPS items, nuts, bolts etc as required. Erection charges of caution boards shall be of two types.

(i) General caution Notice at entrance to Railway station (Hindi & English) No. ETI/OHE/G/7551 Mod-C or Latest.

(ii) Caution Plates 25000 V No. ETI/OHE/G/7531 Mod-C or Latest.

(iii) Engine Stop boards.

Price shall be inclusive of sales tax, excise duty, freight etc. Boards shall require to be installed on a steel structure/ Rail post/ wall of a building therefore mode of erection shall be as per requirement of the site.

Item 3 (j): Supply and Erection of Protective Screens on ROB/FOB: The price shall cover on per Track basis on both sides of ROB/FOB, the cost of all material required for fabrication of protective screen including Angle, TEE, Expanded metal (Jali), GI sheet, Paints etc. The price shall also include the cost for fabrication, erection and painting at various locations. The fabrication and erection work shall be done as per RDSO Drawing No. ETI/C/0068 Mod- G or latest.

Item 3 (K): Supply and erection of Danger Plate on a Height Gauge: - The price shall cover supply of Danger Board (as per RDSO drawing No. ETI/C/0069 Rev-C) including necessary Bolts, Nuts, Washers etc and erection thereof on the boom of each Height Gauge.

Item 4(a)(i): Supply without Insulator and Erection of Single Bracket Assembly for Conventional type OHE: The price shall cover on a flat rate basis any bracket assembly on a traction mast or support or drop arm and shall include those on high/low level platform, in the vicinity of turnouts, over- bridges or overlaps and at a location with reduced encumbrance or terminating wires. The price shall include the cost of supply of all components including galvanized steel tube, but excluding solid core insulators (ID No 6000, 6030,6000-2 & 6030-4 or latest), dropper wires and small parts steel work complete with bolts and nuts etc, if any. The price shall cover erection of all components including dropper wires and solid core insulators & nut bolts etc. However, this does not include the anti-creep arrangement at masts/structures.

Components Requirement:

Rly. Id No.	Description of components	Qty. per unit
3020-1	Mast fitting for hook insulator (Forged)with 2 off bolts, nuts, lock nuts and washers of 16 dia.	1 set
2400	Tubular stay arm assembly (including galvanized steel tube)	1 set
2110/ 2130/ 2380	Catenary suspension bracket assembly or hook bracket	1 off
1160	Suspension clamp with packing Saddle (as per core drawing No. RE/33/P/1174(Mod B)	1 off
2120, 2140, 2040, 2080	Bracket tube assembly complete with tube cap and sleeve where required (including galvanised steel tube).	1 set
3070-1/2	Mast bracket fitting assembly including 2 off bolts, nuts, lock nuts and washers of 16 m for attachment to structure or to small part steel work.	1 set

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2151-2, 2152-2, 2161-2, 2162-2	Register arm hook Top & Bottom complete (Forged) with bolts, nuts and lock nuts.	1 off
2420, 2430, 2270-4 or 5	Register arm assembly or raised register arm assembly (including galvanised steel tube) (with modified RRA Clamp as per RDSO Drg. No. ETI/OHE/P/1370-1 Rev.'J' (RI no. 1371-1) and Double contact Wire as per RDSO SMI No. TI/MKI/0058 or latest) (including galvanised steel tube)	1 set
2460 Style 02 or 2470-Style 02	Register arm dropper assembly including dropper wire complete with bolts, nuts etc.	1 set
2391-1, 2540/2520	Steady arm hook (BFB) (Forged) or bent steady arm (where required)	As required
2361-1, 2491-2, 2492-2	25 mm drop bracket (Forged) with bolts & locknuts. 25 mm Steady arm clamp (Forged) with bolts & locknuts.	-do-
1220/1370/-1	Contact wire swivel clip or raised register arm clamp	1 off
2550-1/2	Anti-wind clamp	As required

Item 4(ax): Supply of Insulators for items 4(a)(i) & 4(a)(iii): The price shall cover only supply of the following Insulators mentioned against each item required for execution of work covered under items 4(a)(i) & 4(a)(iii). Erection cost of insulators are inclusive in items 4(a)(i) & 4(a)(iii) respectively.

Item No.	Insulator
4(ax)(i)	Stay Arm Porcelain (CD-1050 mm)
4(ax)(iv)	Bracket Porcelain (CD-1050 mm)
4(ax)(ii)	Stay Arm Composite (CD-1050 mm)
4(ax)(v)	Bracket Composite (CD-1050 mm)
4(ax)(iii)	Stay Arm Composite (CD-1600 mm)
4(ax)(vi)	Bracket Composite (CD-1600 mm)

Item 4(b)(i): Supply without insulator and erection of pull-off arrangement for one OHE: The price shall cover supply of all components required for a pull-off arrangement to pull one equipment only including supply of copper conductors, small jumper(50) wire, head-span mast fittings complete with M.S. angle, equalising plate assembly, steady-arm, catenary dropper clip, contact wire swivel clip and fittings excluding solid core insulators (Cost of insulator will be paid in Schedule-1, Section-5). The price shall cover erection of all components including solid core insulators, small jumper wire and conductors.

Note:- (i) For composite OHE' a catenary dropper clip with necessary bimetallic strip/ washer to be used in place of catenary dropper clip (Id. No.1192).

- (ii) 5 mm diameter Hard drawn Copper wire shall be used for Register Arm Dropper for all locations except for those on long Girder Bridges, where wear rate is high for which 7 mm diameter Hard drawn Copper wire shall be used for Register Arm Dropper.

ITEM No.4 (bx): Supply of Insulators for item Nos. 4 (b)(i) & 4 (b)(iii): The price shall cover only supply of following Insulators mentioned against each item required for execution of work covered under items 4(b)(i) & 4(b)(iii). Erection cost of insulators are inclusive in items 4 (b)(i) & 4 (b)(iii) respectively.

Item No. Insulator	4(bx)(i) Porcelain 9 Tonne (CD-1050 mm)
4(bx)(ii) Composite 9 Tonne (CD-1050 mm)	4(bx)(iii) Composite 9 Tonne (CD-1600 mm)
Item No. Insulator	4(bx)(i) Porcelain 9 Tonne (CD-1050 mm)
4(bx)(ii) Composite 9 Tonne (CD-1050 mm)	4(bx)(iii) Composite 9 Tonne (CD-1600 mm)

Item 5(az)(ii): Supply and Erection of Span Wire: The price shall cover supply and erection of span wire per meter. The payable length shall be the horizontal distance between the inner faces of all traction masts/structure on which the mast attachments are mounted. No extra shall be provided for sag. The price is applicable for all types of span wires including Head Span Wires. Erections of a meter beyond the first decimal shall be rounded off to the nearest first decimal.

Item 6(az): Manual Erection of Overhead Equipment only: The price shall cover for manual erection of all components including dropper clips, parallel clamps for jumpering splices, (where their use is approved), including contact wire, catenary wire, dropper wire, jumper wire and terminating wire and small parts steel work complete with bolts and nuts etc, if any. The price shall cover manual erection of all components and wires and conductors including contact wire, catenary wire, droppers, terminating wires, if any, but excluding small parts steel work, if any. The price shall be excluding the cost of erection of large span wire, which will be paid under item 5(a)(ii).

The price shall include provision of Retro reflective number plates on traction masts or structures. The prices shall exclude supply of small parts steel work for fixing of retro reflective number plate (like as Clamps & plates) will be paid under item no. 3(c). The price shall include bolts and nuts for attachment of Retro reflective number plates to masts/structures. The price shall also include the cost of painting the setting distance and rail level on masts/structures, stenciling of symbol for direction of emergency telephone socket. The price shall not include termination of conductors which will be paid for under item 8.

Rly. Ident No.	Description of components	Qty. for unit
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1040-2 or SK-534/1 & SK- 575/2 or SK- 576/1 & SK-535/2 or 1041-3	Contact wire parallel clamp small	As required
1180/SK-572/1 &SK- 572/2	Contact wire dropper clip (107)	-do-
1192	Catenary dropper clip complete with bolts, nuts etc	-do-
7501/7503	Enameled/Retroreflective number plates complete with 2 Galv. MS bolts m 10x35/30, nuts and lead washer for m10 bolts but excluding SPS for attachment of number plate to mast/ structures	-do-
1110-2	Contact wire ending clamp	-do-
1120	Catenary ending clamp	-do-
1140	Large span wire clamp (130)	-do-
5020-1/5020-2	9-T, Adjuster (Forged)	-do-
5030	Anchor double strap assembly	-do-
5191/5192	Compensating plate/equalizing plate	-do-

Note for Measurement:

(i) For the purpose of payment against item no. 6, the length of overhead equipment, which shall include terminating wires, shall be measured from the center lines of the traction masts/ structures at which the two ends of each tension length of overhead equipment are anchored.

(ii) The length shall be the difference between the actual chain ages of the two traction masts/structures at which the ends of each tension length are anchored or by the sum of the actual spans between the same two points whichever is higher as included in the "as erected" layout plans. For purpose of progress payment reference to layout plans as approved shall be made. The price under item 6 does not cover the cost of supply and erection of cut-in insulators, the supply and erection of which shall be paid for under item 11.

(iii) Contact wire of 107 mm² wire and catenary wire 65 mm² under item no 6(a) will be supplied by the Railways at designated store and further loading unloading & transportation up to the site will be done by the contractor for which payment will be made under Item NS-1.

ITEM No. 7(a): 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 and of size 19/3.99mm (240 Sq.mm) feeder/return conductor (along or Description Qty. for unit Supplied by Contact wire (107 Sq mm) As required Contractor Retro-reflective and Enameled number plates As required Contractor 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

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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.

ITEM No. 7(c) : 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 item 11 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:

1. The prices under items 7(a) and (b) 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.
2. For the purpose of payment against item 7 (a) and (b) 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.
3. 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

Item 7(d): Supply & Manual Erection of all Aluminum 25 kV Feeder/ Return Conductor (Single SPIDER): The price shall cover supply & manual erection of a 25 kV feeder/ return conductor (along or across track) made of a single all aluminum bare, hard drawn conductor conforming to IS:398 (Pt. I) with amendment-1 and of size 19/3.99 mm (240 Sq mm) (SPIDER). 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. Work is to be executed manually instead of with wiring train.

Note for Measurement:

1. The prices shall not include:

- (i) Termination which will be paid for under item 8.

(ii) 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. &

(iii) Cut-in-insulators and suspension insulators which shall be paid for under item 11.

2. For the purpose of payment, 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. For purpose of progress reference to "as approved drawings" shall be made.

Item 7(e): Supply & Manual Erection of Copper Cross Feeder Wires (37/2.25 mm HDBC) across the track at SP/SSP/FP/BT locations: The price shall cover the cost of supply & manual erection of 25 kV feeder wire across/ along the track at the location of SP/ SSP/ Gantries stations. Feeder wire shall be made of hard drawn bare copper conductor of size 37/2.25 mm. The price shall be inclusive of cost of feeder wire but exclusive of termination (which will be paid under item 8(b)(ix) and small parts steel work complete with bolts, nuts etc, if any.

Item 8(a)(v): Supply and Erection of Regulating Equipment (3-pulley type) with Counter Weight Assembly for Conventional OHE: The price shall cover supply and erection of counter weight assembly including 9-tone adjuster with double strap assembly and normal/ anti-theft guide tube assembly, the supply of regulating equipment and stainless steel wire rope (of various length as required) required for the regulating equipment and small parts steel works, if any. The price shall also cover adjustment of the entire regulating equipment. the price shall not include supply and erection of termination which will be paid for under item 8(b).

Item 8(b)(i): Supply without Insulator and Erection of Materials for Termination of Single Conductor of Overhead Equipment or Terminating Wire: The price shall cover supply of all material necessary for the termination of single conductor of overhead equipment or terminating wire on a traction mast or structure, including appropriate mast anchor fittings, clevis assembly, adjuster, anchor double straps, ending clamp for the catenary or contact wire or terminating wire and fittings but excluding 9-ton insulator assembly and terminating wire, if any. The price shall cover erection of all materials including the 9-ton insulator assembly and terminating wire, if any.

NOTE: In case of "V" type anchorage is adopted for terminating a single conductor, such an arrangement would be counted as two off under item 8(b)(i), for the purpose of payment.

Item 8(b)(ii): Supply without Insulators and Erection of Materials for Termination of Double OHE's Conductors: The price shall cover

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supply of all materials necessary for the yoked termination of two overhead equipment conductors on a traction mast or structure, including appropriate mast anchor fitting, clevis assembly two adjusters ending clamps for catenary and contact wires, anchor double strap assembly, equalizing/ compensating plate and fittings but excluding 9-ton insulators assembly and terminating wire, if any.

The price shall cover erection of all material including the 9-ton insulator assembly & terminating wire, if any.

Item 8(b)(iii): 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 Aluminum 25 kV feeder/return conductor (SPIDER), including appropriate mast anchor fittings adjuster, strain clamp end fitting including 25 kV cut-in- insulator and 9-ton insulator assembly. The price shall cover erection of all materials including the 9-ton insulator assembly and cut-in-insulators.

Item 8(b)(v): 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.

Item 8(b)(ix): Supply without Insulators and Erection of Materials for Termination of Copper Cross Feeder with Gentries:

The price shall cover the supply of all materials required for termination of copper cross feeder wire (37/2.25 mm HDBC) including appropriate mast anchor fitting (3231), 18 mm Single clevis (5040), 9-Ton adjuster (5020-2), Feeder ending clamp (1130), double clevis (3010) and other components as necessary excluding 9-Ton insulator assembly. The price shall also cover the erection of all materials including 9-Ton insulator assembly and termination of cross feeder at either ends.

Note: Fittings/Components Required for Termination of one Cross Feeder at both ends constitute one set.

Item 8(bx): Supply of Insulators for Item 8(b)(i), 8(b)(ii), 8(b)(iii), 8(b)(vi), 8(b)(vii), 8(b)(viii) & 8(b)(ix):

The price shall cover only supply of following 9-ton insulator assembly required for termination of OHE covered under item 8(b)(i), 8(b)(ii), 8(b)(iii), 8(b)(vi), 8(b)(vii), 8(b)(viii) & 8(b)(ix). Erection cost of insulators are inclusive in items 8(b)(i), 8(b)(ii), 8(b)(iii), 8(b)(vi), 8(b)(vii), 8(b)(viii) & 8(b)(ix) respectively.

Item No.	Insulator
8(bx)(i)	Porcelain 9-Ton (CD-1050 mm)
8(bx)(ii)	Composite 9 Ton (CD-1050 mm)
8(bx)(iii)	Composite 9 Ton (CD-1600 mm)

Note for Item 8:

(1) Small parts steel work complete with bolts and nuts wherever required, will be paid under item 3(a) or 3(b) and 3(c) as applicable and shall not be including in this item.

(2) The prices under item 8(b)(iii) shall not include the cost of jumper connection: (i) between feeders or return conductors and (ii) For feeders or return conductors to a bus bar, overhead equipment or isolator switch which will be paid for under item 15.

(3) The prices under items 8(b)(i) to 8(b)(ix) shall also include the cost of double eye distance rod (Indent no.5183), if provided for any type of terminations.

(4) Supply and erection of materials for termination of catenary wire on either side of the portals at anti creep locations, will also be paid for under this item.

Item 9(a): Supply without Insulator and Erection of anti-creep with Galvanized Steel Wire Suitable for Conventional type OHE:

The price shall cover supply of all materials for anti-creep including adjusters, galvanized steel wire, mast anchor fittings at its terminations on either side on structures, ending clamps and fittings but excluding 9-ton insulator assembly and small parts steel work, if any. Cost of SPS will be paid under item 3(c). The price shall cover erection of all materials including 9-ton insulator assembly but excluding small parts steel work, if any.

RLY. IDENT No.	DESCRIPTION OF COMPONENTS	QTY. Per UNIT
-	Galvanized steel wire (19/2.50 mm)	As required
6020	9-ton insulator assembly.	As required
1360	Steel wire ending clamp	2 off
5020-1/5020-2	9-ton adjuster (Forged)	2 off
5030	Anchor double strap assembly	As required
3010/5040	Clevis assembly	2 off
3231	Mast anchor fitting with bolts, nuts etc.	2 sets.
1170	Double suspension clamp	1 off
Less 1160	Suspension clamp	(-)1 off
5183	Double eye distance rod	As required.

Item 9(ax): Supply of 9-T Insulators for Items 9(a), 9(b), 9(c), 9(d) and 9(e): The price shall cover only supply of any of the following 9-tonne insulator assembly to be supplied at site for execution of work under items 9(a), 9(b), 9(c), 9(d) and 9(e). Erection cost of insulators are inclusive in items 9(a), 9(b), 9(c), 9(d) and 9(e) respectively.

Item No.	Insulator
9(ax)(i)	Porcelain 9-Tonne (CD-1050 mm)
9(ax)(ii)	Composite 9-Tonne (CD-1050 mm)
9(ax)(iii)	Composite 9-Tonne (CD-1600 mm)

Item 10(a): Extra on Item 6(a) for Supply and Erection of Additional Fittings required at Turnout, Diamond Crossing or

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Overlap: The price shall cover on flat rate basis supply of additional components & fittings required at turnout, crossing or over-laps (insulated or un-insulated) including overlaps, knuckle or crossing equipment at a turnout or a diamond crossing and parallel clamps/bimetallic parallel clamp for jumper connections between two sets of overhead equipment conductor at a turnout, diamond crossings, overlaps or neutral section. The price shall cover supply of required copper conductors & jumper wires and erection of all materials including jumper wire, and all adjustments required at turnouts, diamond crossings, overlaps and neutral sections.

The price shall also cover erection of potential equalizer jumpers at insulated overlaps and neutral sections.

The price shall not include extra bracket assemblies, overhead equipment, termination of overhead equipment and cut-in-insulator in the case of insulated overlaps and neutral section.

Item 10(c): Extra on Item 6(c) & (d) for Supply and Erection of Additional Fitting at a Turn-out, Diamond Crossing or Overlap: The price shall cover extra on item 6(c) & (d) for supply and erection of additional fitting at a turn-out diamond crossing or overlap.

Item No.11.(a) (i):-Supply & erection of solid core-cut-in insulator.

The price is applicable to the provision of an additional 9 tonne cut-in-insulator on a flat rate basis such as in a head span, cross span or in span wire or an overhead equipment conductor at an insulated overlap, not provided for in other items. The price shall cover supply of all components required for the cut-in-insulators assembly, including 9 tonne cut in insulator with appropriate terminal fittings for the conductor. This price shall cover erection of all components, including the 9-tonne insulator.

ITEM No. 11(a) (ii): Supply & erection of a solid core suspension insulator.

The price is applicable to the provision of a 9 ton suspension insulator assembly for suspension of an all aluminium 25 KV feeder (single or double SPIDER), 130 sq.mm or 65 sq.mm overhead equipment conductor or 19/2.79 mm all aluminium catenary or any other similar type of suspension. The price shall cover supply of all components, required for the suspension assembly including solid core suspension insulator with appropriate suspension clamp with bolts nuts etc., if any. The price shall cover erection of all components, including the 9 ton insulator assembly but excluding small parts steel work, the price shall include the cost of provision of a flat armour tape only to be used in connection with suspension of 'SPIDER' conductor.

Item 11(ax)(i) : Supply of 9-Tonne Insulators for Item 11(a)(i) & 11(a)(ii): The price shall cover only supply of any of the following 9 tonne insulator assembly to be supplied at site for execution of work under items 11(a)(i) & 11(a)(ii) respectively. Erection cost of insulators

are inclusive in items 11(a)(i) & 11(a)(ii) respectively.

Item No.	Insulator
11(ax)(i)	Porcelain 9 Tonne (CD-1050 mm)
11(ax)(ii)	Composite 9 Tonne (CD-1050 mm)
11(ax) (iii)	Composite 9 Tonne (CD-1600 mm)

Item 11 (b): Supply & Erection of 25 kV Post Insulator: The price is applicable to the provision of a 25 kV post insulator to support copper or aluminum jumper/bus bars. The price shall cover supply of all components and fittings/angle iron (outrigger) to support the jumpers including post insulator. The price shall cover erection of all components required for the assembly, including post insulator, small parts steel work with bolts and nuts etc, if any.

Item 11(bx): Supply of a 25 kV Post Insulator for Item 11(b): The price shall cover only supply of 25 kV Post insulator to be supplied at site for execution of work under items 11(b). Erection cost of insulators is inclusive in items 11(b).

Item 12(az): Supply Without Insulator and Erection of 25 kV Section Insulator Assembly: The price shall cover supply of all components required for a standard section insulator assembly (serving both the overhead equipment conductors) including special droppers for supporting the equipment and all terminal fittings for conductors and the section insulator assembly but excluding 9-ton Insulator (RI No.6020) and Sectioning insulator (RI No.6110) on the catenary and dropper wires as required. The price shall cover erection and adjustment of all components including section insulator assembly, 9- ton insulator on the catenary, sectioning insulator and droppers.

Rly. No.	Ident.	Description of components	Qty. per Unit
1120/or SK/ or 1122 & 1123		Catenary ending clamp	2 off
1192/ETI/OHE/S K/333.		Catenary dropper clip assembly	as required
6170		Parallel clamps for double contact wire	12 off
6180		Section insulator dropper assembly	3 sets
6100		Section insulator assembly	To be supplied by the contractor.
6020		9 ton insulator assembly	To be supplied by the contractor.

Item 12 (ax): Supply of 9-Ton and Sectioning Insulators for Item 12(a) & 12(az): The price shall cover only supply of Sectioning Insulator with any of the following 9 Tonne Insulator for execution of

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work under item 12(a). Erection cost of insulators is inclusive in items 12(a).

Item No.	Insulator
12(ax)(i)	Porcelain 9 Tonne (CD-1050 mm) & Sectioning Insulator
12(ax)(ii)	Composite 9 Tonne (CD-1050 mm) & Sectioning Insulator
12(ax)(iii)	Composite 9 Tonne (CD-1600 mm) & Sectioning Insulator

Item 12(d): Erection of Ceramic Beaded Glass Fiber-type Short Neutral Section Assembly (PTFE): The price shall cover erection and adjustment of Ceramic beaded glass fiber type short neutral section assembly (PTFE type short neutral section assembly), which would be supplied by the Purchaser.

The price would cover fittings for contact and catenary wire as necessary including supply of required dropper wire.

Item 13(a): Supply Without Insulator and Erection of 25 kV S.P. Isolators Without Earth Contact Assembly: The prices under this item shall cover supply of isolator switches of approved make, complete with arcing horns, operating rods, operating rods guides mounting base integral locks, as required but excluding solid core post insulator, operating rod insulator. The price shall cover erection of all components including solid core post insulator, & operating rod insulator.

The price shall also cover supply and erection of number plate of approved design for each isolator. The price shall not include supply and erection of small parts steel work complete with bolts and nuts etc for support of isolators and for support of operating rods on gantries/masts and insulator to support jumper and jumper connectors.

Item 13(ax): Supply of Post and Operating rod Insulators for Item 13(a): The price shall cover only supply of 25 kV solid core post and operating rod insulators for execution of work covered under item 13(a).

ITEM No. 13(c): Supply without Insulator and erection of 25 KV Double Pole Isolator.

The price shall cover supply and erection of a Double Pole Isolator complete with mounting base, operating rod and operating rod guides including the cost of Operating Rod Insulator and 25KV Solid Core Post Insulator required for the operation of the isolator (Cost of insulator will be paid in Schedule-1, Section-5). The price shall also cover supply and erection of Al-Cu strips, a padlock and a number plate of approved design for each isolator. The price shall not include supply and erection of small parts steel work for support of isolators and for support of operating rods on gantries masts.

Item 13(cx): Supply of Post and Operating rod Insulators for Item 13(c): The price shall cover only supply of 25 kV solid core post and operating rod insulators for execution of work covered under item 13(c).

ITEM No. 13(d): Extra for supply and erection of an earth contact assembly in an isolator. The price shall be payable as extra for erection of an earth contact assembly in any isolator The price shall cover the cost of supply and erection of 3x25 mm copper connections between the earth contact assembly and the structures.

ITEM No. 14: Supply and erection of connection between return conductor and the rail.

The price shall cover fabrication and erection of connections between all aluminium return conductor to cross rail/impedance bond (both of which as required will be supplied by the Purchaser free of cost at the Contractor's Depot) excluding the aluminium jumper connections from the return conductor to the steel flat which will be paid for under item 15(b) and any 11 KV post insulator for supporting the jumper which will be paid under item 11(d).

The price shall include the cost of necessary supports on the traction structure, terminal connections and covering the mild steel flats with two coats of red oxide zinc chromate primer to IS:2074, CNSL based and finished with 2 coats of Bitumen 85/25 blown grade.

Item 15(a)(i): Supply and Erection of Large Copper Jumper: The prices shall cover the supply of large jumper wire size 105 sq.mm (19/7/1.02 mm), made of annealed stranded 100% pure copper conductor as per RDSO specification no. ETI/OHE/2(2/94) with A& C slip no. 1 (or latest specification) and size of 160 sq.mm (19/7/1.25mm) for continuity jumper at isolators on a flat rate basis, the supply of all components and fittings required for providing a flexible copper large jumper connection, including supply of parallel clamps, bi-metallic and Aluminum-Copper Al-Cu strips, wherever required and bolted type terminal connectors wherever required.

The price shall also cover the erection of the complete jumper assembly including jumper wire. The price shall not, however, be applicable for jumper connections already including under item 6(a) and 10, but shall be applicable for any jumper of 105 Sq.mm (19/7/1.02mm) connections in any combination between two OHE, feeders, lightening arrestors, isolators and booster stations or Continuity jumper at Boom anchor anti-creep will be payable under this item.

Item 15(a)(ii): Supply and Erection of Small Copper Jumper: The prices shall cover the supply of small jumper wire size 50 sq. mm (19/ 1.8 mm), made of annealed stranded 100% pure copper conductor, and on a flat rate basis, the supply of all components and fittings required for providing a flexible small copper jumper connection, including supply of parallel clamps, bi metallic and aluminum-copper strips, wherever required and bolted type terminal connector wherever required.

The price shall also cover the erection of the complete jumper assembly including jumper wire. The price shall not, however, be applicable for jumper connections already including under item 6(a) and 10, but shall be applicable for any small jumper connection in any combination required for lightening arresters and isolators etc. Anti-theft jumper as per drawing No. ETI/OHE/G/ 05107, with latest mod. for connecting out-of-run OHE with the in-running OHE at insulated/un-insulated overlap locations and also anti-creep locations at polluted zone wherever considered necessary will be payable under this item.

ITEM No. 15(a)(iv) : Supply and erection of copper jumpers (5 mm dia dropper wire). The price shall cover supply of conductors/ jumper wires, and on a flat rate basis, the supply of all components and fittings required for providing a single strand / flexible copper jumper connections not included under items 6(a), 10, 15(a)(i), 15(a)(ii) & 15(a)(iii), including supply of parallel clamps, bi-metallic and Aluminium Copper Al-Cu strips, wherever required, including supply of bolted type terminal connector where ever required.

The price shall also cover the erection of the complete jumper assembly including jumper wire, to be provided between the Over head equipment and L.T. Transformers, drop out switch.

NOTE for items 15(a)(i), 15(a)(ii) & 15(iii): Please see the note under item 15(e).

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ITEM 15 (b): Supply and erection of an aluminium jumper: The price shall cover on a flat rate basis the supply and erection of an aluminium jumper complete with all components and fittings required for providing jumper connection, including parallel clamps, bimetallic ALCU strips wherever required, and terminal or tee clamps at either end. The price shall be applicable for any aluminium jumper/connections in any combination between feeders, return conductors, overhead equipment, isolators and out going busbars or switching stations and booster stations. Jumper connections for 25 KV feeders at angle tower traction sub-station or at feeding stations will also be paid under this item.

Item 15(d): Supply of Materials and Erection of a Large Copper Jumper 160 Sq. mm between Aluminium Bus and Cross Feeder: This jumper shall be provided between 36 mm Aluminium bus and the copper cross feeder at SP/SSP/FP/BT locations. The price shall cover the supply of 160sqmm flexible copper jumper wire, made of annealed stranded 100% pure copper conductor as per RDSO's specification ETI/OHE/3(2/94) with A&C Slip No 1 (latest spec.), all components and fittings required for providing a flexible copper jumper (160 Sq. mm) and connection between 36 mm Aluminium bus and cross feeder including Terminal connector 19mm multiple hole bolted type (1009), parallel clamps (1050-3), Al-Cu bimetallic strips, fasteners. The price shall also cover the erection of the complete jumper assembly including jumper wire.

Item 15(e): Supply of Materials and Erection of Large Copper Jumper 160 Sq. mm between Cross Feeder and OHE: This jumper shall be provided between copper cross feeders and OHE. The price shall cover supply of 160 sq mm flexible copper jumper wire, made of annealed standard 100% pure copper conductor as per RDSO's specification ETI/OHE/3(2/94) with A&C Slip No 1 (latest spec.), and all components and fittings required for providing a flexible copper jumper (160 Sq. mm) between copper cross feeder and existing OHE, including Parallel clamps (1030-3 & 1050-3) complete with fasteners etc as required. The price shall also cover the erection of the complete jumper assembly including jumper wire.

Item 16(a): Supply and Erection of Structure Bond: The price shall cover supply of all materials including **mild steel flat** required to provide a structure bond connecting a traction mast or structures to the nearest non-track circuited rail, or earth electrode, including all fasteners at both ends. The price shall include shaping and drilling of the bond and erection of all materials including the bond. The price shall also include provision of heat shrinkable PVC tube for structure bond under track circuited rail. This would also cover connection or earthing terminals of equipment like L.T. Transformers with structure and then to rails as per relevant drawings.

The price shall cover provision of buried rail to running rail as per RDSO drawing No. ETI/OHE/G/05306, with latest mod and shall include supply, fabrication and erection of all connections (including drilling at both ends) and refilling of buried rail pit. The digging up of 1 m deep pit for the purpose of buried rail shall be done by the Railways.

Item 16(a)(ii): Supply and erection of a Galvanised steel stranded Wire structure bond: The price shall cover supply of all materials including Galvanised steel stranded wire required to provide a structure bond connecting a traction mast or structures to the nearest non-track circuited rail including all fasteners at both ends as per RDSO's drawing No. TI/DRG/OHE/GTBLUG/RDSO/0001/04/0. The price shall include fixing of lugs and drilling of the rails and erection of all materials including the bond.

The price shall also include provision of heat shrinkable PVC tube for structure

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bond under track circuited rail. This would also cover connection or earthing terminals of equipments like L.T. Transformers with structure and then to rails as per relevant drawings with all accessories.

Note:- The cost of survey, verification and transferring of track center of the proposed line from ESP (to be provided by the purchaser) and all other incidental charges required for successful completion of OHE design

Item 16(b): Supply and Erection of Longitudinal Bond: The price shall cover the supply of all materials including mild steel flats, fasteners etc. required to provide longitudinal bond connecting two rails at the rail joint at the locations to be specified by the purchaser. The price shall include shaping and drilling of the bond and erection of all materials including the bonds.

Item 16(c): Supply and Erection of Transverse and Special Bond: The price shall cover supply of all materials including mild steel flats, fasteners etc. required to provide transverse bonds connecting rails of the same/adjacent tracks at the locations to be specified by the Purchaser. The price shall also cover the supply of all materials including mild steel flat to provide special bonds at a level-crossings, foot over/road over bridge/protective screen etc., for which the location will be specified by the purchaser. The price shall also include provision of heat shrinkable PVC tube for transverse and special bonds under track circuited rail. The price shall include shaping and drilling of the bond and erection of all materials including the bond. The price shall cover provision of special type of bond as SMI-TI/IN/0042(12/2008) Rev "0" and para 1.3 Earthing and Bonding. The cross bonding of the UP BEC-UP Mast/Portal-UP traction rail-DN traction rail-DN Mast/Portal-DN BEC should be done by 50X6 mm MS/GS flat at every 450 Mtr. The details of the AEC/BEC and cross bonding scheme are given in Drg. No. TI/DRG/OHE/EARTHING/RDSO/00001/20/0 (annexure 44).

Item 17(a): Supply and Erection of Single Earth Electrode: The price shall cover supply and erection of an earthing station with a single pipe embedded into the ground by driving or otherwise complete with protective concrete box and lugs suitable for directly connecting two mild steel flats of minimum size 50 mm x 6 mm.

Item 17(b): Extra for Special Embedment of Earth Electrode: The price shall be payable as extra on item 17(a) where an earth electrode is embedded by driving or otherwise in an earth pit filled with charcoal and salt. The price shall cover supply and erection of all additional materials required for embedding the earth pipe.

Item 17(c): Supply and Erection of MS Earth Bus: The price shall cover the supply of all materials including 50 mm x 6 mm mild steel flats for providing earth bus. The price shall also cover erection of earth bus either buried at a depth of 300 mm below ground level painted with 2 coats of red oxide zinc chromate primer and 2 finishing coats of bitumen as per the particulars specified or fixed on wooden gutties on walls. It shall include connecting the earth bus to earth electrodes and to various floor-or-wall- mounted equipment or structures to be earthed and also connections to non- track-circuited rails, wherever required it shall also cover the cost of making recesses in concrete foundation blocks or floor or cubicles and covering them up. The connection of earth strips to each other shall be made either by riveting or by welding. The connection of earth strips to various equipment, structures or fencing post shall be made with G.I. bolts and nuts and spring washer/ lock-nuts.

Item 17(d): Supply and Erection of Copper Strip for Equipments' Earthing: The price shall cover supply and erection of 25mm x 3 mm copper strip to connect the earth terminals of equipment like potential transformers, lightening arrestors, L.T. supply transformers and booster transformer to the main masts of the gantries on which they are mounted. The price shall cover all fastenings required for fixing the copper strips along any structure member of the gantry.

Item 17(e): Supply and erection of 8 SWG G.I WIRE for earthing: The price shall cover supply and erection of 8 SWG G.I wire per Meter, used for earthing at remote control cubicles and fencing panels.

ITEM No. 18(b) : Supply and Erection of 25 kV, vacuum type Interrupters: The price shall cover supply of 25 kV, AC, 50 Hz, Single Pole, outdoor type, vacuum Interrupters complete with all accessories and components as per RDSO's specification No.ETI/PSI/167(09/97), with latest spec. at site and erection of the same complete with supporting frame work and terminal connectors. The price for erection shall include alignment and grouting of the Interrupter on its foundation block and mounting of accessories, if any, in their respective positions. The price shall also cover supply and erection of enameled number plates. All necessary tools, equipments, instruments including power supply required for carrying out necessary checks, tests and commissioning shall be arranged by the contractor.

ITEM No. 19 : Supply and erection of 25 KV Potential Transformers (Type-I): The price shall cover supply and erection of a 25 kV potential transformer type-I complete with all fittings and accessories as per relevant specifications, including terminal connectors and fixing bolts. The price for supply and erection shall include proper alignment of the transformer in position. The price shall also cover the supply and erection of an enameled number plate and fixing bolts. The price shall not include the cost of any small parts steel work.

ITEM No. 20(a) : Supply and erection of 42 kV lightening arrestors: The price shall cover supply and erection of 42 kV lightening arrestors complete with all fittings and accessories as per relevant specifications including terminal connectors. The cost of supply and erection shall include proper alignment of the lightening arrestor in position. The price shall not cover supply and erection of cadmium copper jumper (65) which will be paid under ITEM No 15. The price shall not include the cost of any small parts steel work.

ITEM No. 21 : Supply and erection of terminal boards in control cubicles: The price shall cover supply and erection of a wall mounted terminal board with six numbers of two way terminal blocks for connecting the cables from the outdoor equipment of a switching station as per Railway Drawing given.

ITEM No. 22(a) : Supply and erection of an iron clad 110 V D.C. fuse box: The price shall cover supply and erection of a 15A, 110V iron clad two way fuse box on the wall inside the remote control cubicles. The fuse box shall be complete with two fuse carriers and bases.

Item 22(b): Supply and Erection of Iron Clad 250 V, AC Fuse- box: The price shall cover supply and erection of a 15A, 250 V, AC, Iron clad 4-way fuse box on the wall inside the remote-control cubicle, for heater supply of interrupters. The fuse box shall contain four fuse carriers and bases.

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ITEM No. 23 : Supply and erection of lead acid batteries: The price shall cover supply and erection of 110V, 40AH lead acid battery complete with stand, accessories and a tool board. The price for erection shall include installation and connecting up of the battery, but exclude the cost of connecting cables (cable will be supplied by the purchaser), erection of which will be paid for under item 23 of section 9. Price shall include supply of 110V, 40AH lead acid battery complete with accessories and connectors as per relevant RDSO's specification given in Annexure-1. Price shall also cover supply of Mild Steel stand, electrolyte and Tool Board with thermometer, hydrometer & wrench.

ITEM No. 24 : Supply and erection of battery chargers: The price shall cover supply and erection of battery charger for a 110 V, 40 AH lead acid battery complete with connecting lead and plug for connection to 230 V A.C. supply. The price for erection shall include mounting of the charger in position and connecting it up to the 230 V A.C. distribution boards, which will be provided by the Purchaser in the control cubicles.

ITEM No. 25: Supply and Installation of Cables for:-

ITEM No. 25 (a) Control and Indication.

The price shall cover supply, installation and connecting up of cables for control and indication from the interrupter to the terminal board. The price shall include supply and erection of terminal connectors at both ends, if required the conduits may be provided where it is necessary.

ITEM No. 25 (b) Heater Supply.

The price shall cover supply, installation and connecting up of heater supply cable from interrupter to interrupter or from the interrupter to the 230V A.C. fuse box mounted on wall inside the control cubicle and from this fuse box to L.T. distribution board inside the control cubicle. The price shall include cost of supply and erection of terminal connectors at each end, if any required, and conduit, if any at the interrupter end.

ITEM No. 25 (c) Catenary Indication

The price shall include supply, installation and connecting up of cable for catenary indication, between potential transformer Type-I and the terminal board inside the control cubicle. The price shall include supply and erection of terminal connectors at both the ends if required and conduit to be embedded between the steel work based and the cable trench and shall include all fastenings on masts and structural members to support them.

ITEM No. 25 (d) L. T. Power Supply

The price shall cover supply, installation in trenches and connecting up of L.T. Power supply cable between the L.T. supply transformer at switching station and L.T. distribution board, inside the control cubicle. The price shall cover supply and erection of suitable cable boxes, if required, and connectors at both ends.

ITEM No. 25 (e) 110 V D. C. Supply

The price shall cover supply, installation and connection up of cable between 110V battery charger and battery, between battery and the D.C. fuse box and between the D.C. fuse box and terminal board. The price shall include terminal connectors, wherever required.

NOTE : 1. The length of cables shall be the actual distance measured along the lengths of the cable between the starting and terminating points of each cables.

2. for purposes of payment fraction of a metre in the total length of cable of

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each type used at a switching station shall be rounded off to the next higher metre.

3. Price under item 25 do not include cost of concrete cable trenches which will be paid for under item 2(c).

Item 26(a)(ii): Supply & Erection of Bus-Bars:

(i) Aluminum Bus-Bar 36 mm x 28 mm: The Price shall cover Supply & erection of Aluminum Bus-Bar 36 mm x 28 mm including Bending, shaping & clamping on to Insulators, Connectors or Equipment terminals.

(ii) Solid Copper Bus-Bar 18 mm: The Price shall cover Supply & erection of Solid Copper Bus-Bar 18 mm including Bending & shaping.

NOTE: The price under item 26(a)(i), (a)(ii) does not cover the cost of terminal connectors which will be paid for under items 26(b) or (c) as applicable.

Item 26(b)(i) to (vii): Supply & Erection of Aluminium Bus-Bar Connectors: The Price shall cover Supply & erection of Bus-Bar Junctions and connectors of various types specified including Bolts, Nuts etc required at Junctions or Terminations of Bus-Bar.

Item 26(c)(i) to (iv): Supply & Erection of Solid Copper Bus-Bar Connectors: The Price shall cover Supply & erection of Solid Copper Bus-Bar Junctions and connectors of various types specified including Bolts, Nuts etc. required at Junctions or Terminations of Solid Copper Bus-Bars.

ITEM No. 27(a): Supply, Erection, oil filtration, testing and commissioning of 25 kV/240 V 10 kVA L.T. supply transformers: The price shall cover Supply of 25 kV/240V 10 kVA LT supply transformers, at site, as per the RDSO's specification indicated in Annexure-1 of Part-IV of this tender paper, and erection of the same complete with terminal connectors on a mast or gantry. The price shall be applicable for transformers mounted on steel pedestals at switching CONTRACTOR DY. CHIEF ELECTRICAL ENGINEER(CON) Page 92 of 194 stations also. The price shall also cover supply and erection of an enameled number plate of approved design. The price shall also cover oil filtration and pre- commissioning tests as approved by the railways. The contractor shall make his own arrangement for oil filtration equipments, as well as power supply required for the same. All necessary tools, equipments, instruments required for carrying out oil filtration/ checks/tests and commissioning shall be arranged by the contractor.

ITEM No. 27(b): Supply, Erection, oil filtration, testing and commissioning of 25 kV/240 V, 5 kVA L.T. supply transformers: The price shall cover supply of 25 kV/240 V, 5 kVA LT supply transformers, at site, as per the RDSO's specification indicated in Annexure-1 of Part-IV of this tender paper, and erection of the same complete with terminal connectors on a mast or gantry. The price shall be applicable for transformers mounted on steel pedestals at switching stations also. The price shall also cover supply and erection of an enamelled number plate of approved design. The price shall also cover oil filtration and pre- commissioning tests as approved by the railways. The contractor shall make his own arrangement for oil filtration equipments, as well as power supply required for the same. All necessary tools, equipments, instruments required for carrying out oil filtration/ checks/tests and commissioning shall be arranged by the contractor.

Item 27(c): Supply, Erection, Oil Filtration, Testing and Commissioning of 25 kV/240 V, 25 kVA LT Supply Transformers: The price shall cover supply of 25kV/240V, 25 kVA LT supply transformers, at site, as per the RDSO's specification and erection of the same complete with terminal connectors on a CONTRACTOR

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mast or gantry. The price shall be applicable for transformers mounted on steel pedestals at switching stations also. The price shall also cover supply and erection of an enameled number plate of approved design. The price shall also cover oil filtration and pre-commissioning tests as approved by the railways. The contractor shall make his own arrangement for oil filtration equipment, as well as power supply required for the same. All necessary tools, equipment, instruments required for carrying out oil filtration/ checks/ tests and commissioning shall be arranged by the contractor.

ITEM No. 27(d): Supply, Erection, oil filtration, testing and commissioning of 25 kV/240 V, 50 kVA L.T. supply transformers: The price shall cover supply of 25kV/240V, 50 kVA LT supply transformers, at site, as per the RDSO's specification indicated in Annexure-1 of Part-IV of this tender paper, and erection of the same complete with terminal connectors on a mast or gantry. The price shall be applicable for transformers mounted on steel pedestals at switching stations also. The price shall also cover supply and erection of an enamelled number plate of approved design. The price shall also cover oil filtration and pre-commissioning tests as approved by the railways. The contractor shall make his own arrangement for oil filtration equipments, as well as power supply required for the same. All necessary tools, equipments, instruments required for carrying out oil filtration/checks/tests and commissioning shall be arranged by the contractor.

NOTE for item 27(a), 27(b), 27(c) & 27(d): The replenishment of the transformer oil on account of testing and leakages during the warranty period shall be done by the Contractor at his own cost.

Item 28: Supply without Insulator and Erection of 25 kV D.O. Fuse Switch: The price shall cover supply and erection of 25 kV drop out fuse switch complete with all mounting accessories and terminal connectors as required but without the cost of the supply of 25 kV solid core insulator. The price shall not include erection of small parts steel work.

ITEM No.28(x) : Supply of Post Insulators for Item 28: The price shall cover only supply of 25 kV Solid Core Insulators (Post Insulators) for execution of work covered under item 28. Erection cost of insulators are inclusive in item 28.

ITEM No. 30(a)(i) : Supply and erection of fencing panels at Switching Stations: The price shall include supply and erection of fencing panels painted with two coats of red oxide zinc chromate primer to IS:2074:1979 and finished with two coats of aluminium paint. The prices shall not include supply and erection of fencing up-rights, anti-climbing devices but shall include the cost of fasteners and the price shall be for a metre length of the panels, 2.4 meter height measured in the plan view of the appropriate approved drawings.

(ii) Supply and erection of fencing uprights: The price shall cover supply and erection of fencing uprights panels painted with two coats of red oxide zinc chromate primer to IS:2074:1992 and finished with two coats of aluminium paint. The price shall be on the basis of black weight of the steel with no deduction for holes or skew cut or no increase for weld materials. The cost of foundation of uprights will be paid under item-2.

ITEM No. 30(b) :**(i) Supply and erection of anti-climbing device at Switching Stations:**

The price shall cover supply and erection of an anti-climbing device consisting of galvanised steel fixtures mounted on the fencing panels as per approved design. The price shall be per metre length of the panel.

(ii) Supply and erection of anti-climbing device for B.T. Stations: The price shall cover on a lump sum basis the supply and erection of anti-climbing device consisting of galvanised steel fixtures mounted on the masts, of the gantry below the transformer. The price shall be for each B.T. Station provided with the device.

(iii) Supply and erection of anti-climbing devices for L.T. Supply Transformer Stations: The price shall cover on a lump sum basis the supply and erection of anti-climbing device consisting of galvanised steel fixtures mounted on the masts below the transformer. The price shall be for each mast provided with the devices.

(iv) Supply and erection of Anti Monkey Menace: The price shall cover supply and erection of anti monkey menace consisting of Hot dip galvanized fixtures (MS angle 60mm x 60mm x 8mm) including all bolts, nuts, MS Flat and barbed wire as per requirement, mounted on masts as RDSO's drawing Nos. TI/SK/OHE/ANTIMON/RDSO/00001/08/0 & TI/SK/OHE/ANTIMON/RDSO/00001/09/0. The location for provision of "Anti Monkey Menace" if any shall be advised by the concerned project after award of the contract. All components shall be hot dip galvanized after fabrication and take approval from the project with the type of mast also.

Item 31: Modification to already Erected Equipment: The price under this item shall cover various modifications required to be carried out, in a section of completely erected overhead equipment energised or fit to be energised, certified as such by the Purchaser's Engineer provided such modifications are not on account of non-compliance of specifications, approved drawings and instructions given by the Purchaser for the execution of the work from time to time, during the progress of the work. All the prices are on a flat basis and cover only the important and most frequent type of modifications required to compensate the contractor for additional work involved. No payments shall be admissible for other minor modifications which may be necessary in the course of work. All work originally done shall be paid for at normal rates as applicable. Dismantling of foundations and masts/structures shall be done by the Purchaser at his own cost.

In all the following cases, the dismantled equipment shall be handed over by the contractor to the Purchaser's Engineer at the spot of dismantlement or at the contractor's Depot, as required by Purchaser's Engineer.

Item 31(a): Transfer of Equipment from One Mast or Support to Another:

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 of support and consequent adjustment to overhead equipment required such as re- spacing of droppers, leveling etc. The foundations and steel work and bracket assembly for the new mast or structure will be paid under appropriate items.

ITEM No. 31(b): Provision of an additional bracket assembly/assemblies on mast or support:

The price shall cover dismantling of an existing bracket assembly/assemblies and provision of a multiple cantilever cross arm wherever required, supplied free of cost by the Purchaser

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and erection of bracket assemblies on the multiple cantilever cross arm. The price shall include any consequential adjustment to traction overhead equipment such as re-spacing of droppers, leveling, etc. This prices shall not include the price for supply and erection of any additional bracket assemblies, which will be paid under appropriate item.

Item 31(d): Dismantling of Overhead Equipment: The price shall cover cost of dismantling of equipment including Terminations, tensioning devices, guy rod assemblies, bracket assemblies, ACA and associated small parts steel work (excluding components embedded in concrete).

Item No. 31(e): Dismantling of feeder/return conductor: The price shall cover dismantling of feeder, or return conductor including guy rods, terminations, suspension assemblies, super masts and associated small parts steel work.

Item 31(f): Splicing and Extension of Anchored Overhead Equipment: The price shall cover splicing of terminated overhead equipment for extension and consequent adjustment of the affected equipment. The dismantled equipment (excluding portions embedded in concrete) shall be returned to the Purchaser's Engineer. The cost of dismantling of overhead equipment would be paid for under item 31(d) for the whole length of the anchoring span irrespective of the physical position of the splices. The extended overhead equipment shall be deemed as starting from the center line of the structure preceding the old terminating structure and the extended overhead equipment shall be paid for under item 6(a) or 6(b) or 6(c) as applicable.

Item 31(gz): Dismantling of Section Insulator: The price shall cover cost of dismantling of section insulator, splicing of catenary and contact wires and the necessary adjustments to droppers. The dismantled equipment shall be handed over to the Purchaser's Engineer at the spot of dismantling or at the contactor's Depot/s.

Item 31(h): Slewing of Overhead Equipment: The price shall cover for temporary slewing or lowering of erected OHE adjusted and /or unadjusted to ground for special works, at the request of the Purchaser and restoration and re-adjustment of the equipment after completion of special works. The price shall be per span or part thereof, including anchoring spans.

Item 31(i): Dismantling of Isolator with Connectors: The price shall cover cost of dismantling of an isolator, single or gang-operated, including dismantling of connections to the overhead equipment and associated accessories & small parts steel work.

Notes for Item 31: All claims under this item have to be supported by the following certificate to be furnished by the contractor on the connected bills:

- i)** The modifications are not on account of non- compliance of specifications approved and instructions given by the Railways for execution of works.
- ii)** The quantities of work involved for modification have been finalized jointly with the Railway's Engineers before taking the work in hand.
- iii)** Dismantled materials have been handed over to the Purchaser's representative.

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Extra on Erection for Work under Power Block (Only 100% Extra): The price under this item shall cover extra charges over and above erection rates of various items (specified in the tender schedule) in the vicinity of energized overhead equipment, feeders or erection of equipment which joints equipment already energized or on energized equipment which calls for a power block (Shut off traction power). The price payable under this item 100% extra over the erection rates of the items referred to above provided such work is not called for on account of non-compliance with specification, approved drawings and instructions given by the purchaser from time to time.

Contractor shall provide sufficient trained staff for discharging and earthing of relevant section as directed by purchaser during power block (Discharge rod shall be arranged by contractor).

Where the price under this item is applicable, the contractor shall finalize the quantities of various items of work to be done under a power block jointly with the purchaser's engineer prior to taking the work in hand.

Note: The extra erection rate under this item will not be payable if power block is given for a total duration of 4 hrs. or more in a day.

1.4.9 : EXPLANATORY NOTES OF NON-SCHEDULE ITEMS:

Schedule:-6

N.S. Item 1:- Handling /leading loading unloading &Transportation of Rlys. supply / released materials .

The price shall cover the cost of handling/leading loading , unloading and transportation of Rly's supply and Rly's released OHE/PSI /GPS work materials such as masts, busbar, bracket, fittings, poles /LT cables, wires etc from SSE/C/ store /JHS (or as decided by the Railway) to work site and vice versa.

N.S. Item 2:- Supply and erection of retro reflective number plate: The price shall cover Supply, erection and fixing of retro reflective structure number plate including cost of nut, bolt & washer as per latest RDSO specification.

N.S. Item 3:- Supply of 5 MM / 7 MM Solid Round Copper Dropper Wire as per Dropper Schedule: The price shall cover supply and manufacturing of 5mm/7 mm dia copper dropper wire conf. To IS 282/1982 (latest) using fabricators own copper wire bars conf. To IS-191 (Part V)/1980 latest with oxygen contents not more than 450 PPM.

N.S. Item 4 :- Supply and Erection of 160 sq.mm copper jumpers for isolator: The Price Shall Cover Supply and Erection of 160 sq.mm copper jumpers for isolators as per site requirement and as per instruction of site in-charge.

N.S. Item 5 :- The Price shall cover Provision of hiring of Non AC multi Utility 4 Wheeler vehicle Scorpio, Tavera, Innova, Tata safari or equivalent in good working condition not older than three years with registration including Driver, Fuel, maintenance and Toll & Parking etc. for supervision/ Management of Electrical works of Agra construction unit of N. C. Railway for running of 3000 Kms. per Month (nature of work 12 Hrs per day without any rest/Holiday).

N.S. Item 6 :- The price shall cover Supply & Erection of Automatic Change Over Switch [CLS Panel] 150 As per Latest RDSO Specification.

Schedule:-7

N.S. Item 1 :- Cutting and removal of old foundation of masts and portals:- The price shall cover cutting and dismantling of old foundations of masts/portals upto a depth of approx 20 Cm. below ground level as directed by the site incharge and filling up of earth upto the ground level

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N.S. Item 2:- Dismantling of released cantilever:- The price shall cover dismantling of released cantilever with insulator and top & bottom attachment from mast or support and proper stacking at suitable location/ store as per direction of site engineer.

N.S. Item 3:- Dismantling of ACA /FTA/ATD:- The price shall cover dismantling of released ACA/ATD/FTA and proper stacking at suitable location/ store as per direction of site engineer.

N.S. Item 4:- Dismantling of Small Part Steel:- The price shall cover dismantling of released SPS from mast or supports and proper stacking at suitable location/ store as per direction of site engineer.

N.S. Item 5:- Cutting and removal of OHE masts and portals:- The price shall cover cutting and removal of old/released OHE masts, fabricated structures and uprights of portals and putting away from the track as per the direction of site engineer.

N.S. Item 6:- Dismantling of dropper wire on existing OHE Spans:- The price shall cover dismantling of dropper from the existing OHE and handed over to the depot/ site incharge.

N.S. Item 7:- Dismantling of Guy rod:- The price shall cover dismantling of released of Guy Rod etc from mast or supports and proper stacking at suitable location/ store as per direction of site engineer.

N.S. Item 8:- Dismantling, Shifting and erection of existing 25KV/230 Volt, 10/25/50 KVA AT and 25KV D.O. fuse from old location to new location , testing and commissioning etc:- The price shall cover Dismantling, Shifting and erection of existing 25KV/230 Volt, 10/25/50 KVA AT and 25KV D.O. fuse from old location to new location, testing and commissioning etc.

Note:- 1. All items needs to be taken as per latest guidelines/specification of RDSO. IF RDSO specification does not exist then it should be pre-approved by Engineer.

2. Ordering of the material need to put after proper assessment of site to minimize the unused material throughout the project.

PART –II CHAPTER – I (For OHE)
SECTION-1: GENERAL SPECIFICATION

2.1.1 INTRODUCTION:

This part deals with general information and criteria for the work: - Design, Supply, Erection, Testing and Commissioning of OHE Electrification Bateshwar (BASR) station in connection with conversion of 'D' class station into 'B' Station in Agra Division of N.C. Railway

DEFINITION:

The following definitions shall apply for the purpose of this specification, in addition to definitions applicable to standard equipment.

- a) "Grid Sub-station" means the sub-station of a power supply authority which is connected to the grid network in the area and from which 132 kV power is supplied to the Railway for electric traction.
- b) "Interrupter" means a single pole single phase non- automatic circuit breaker capable of interrupting normal full load current.
- c) "Return Feeder" means the conductor of the feeder line from a traction sub- station to the corresponding feeding station which is connected to the earth terminal of the 132/ 25 kV traction transformer secondary winding.
- d) "Traction overhead equipment" means the overhead conductors and other associated equipment and structures erected over the track to supply power to the electric locomotives.
- e) "Traction sub-station" means a 132/ 25 kV sub-station for supply of power to traction overhead equipment (installed by the Purchaser), in accordance with this specification.
- f) "25 kV Feeder" means the conductor or feeder line from the traction sub-station to the corresponding Switching station and which is connected to the unearthed terminal of the 132/ 2x25 kV traction transformer secondary winding.
- g) "Feeding station" means the 25 kV interrupters and other associated equipment as also structures erected near the track, within or outside the sub- station boundary, for feeding different sections of the traction overhead equipment.
- h) "Shunt Capacitor Bank" means shunt capacitor equipment, along with control gear, protective relays, series reactor and accessories erected on 25 kV side of a traction sub-station for the purpose of improvement of power factor and reduction of maximum demand.

2.1.2 FUNCTIONS: Not applicable.

2.1.3 LOCATION: The location of the "Design, Supply, Erection, Testing and Commissioning of OHE Electrification Bateshwar (BASR) station in connection with conversion of 'D' class station into 'B' Station in Agra

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Division of N.C. Railway.

2.1.4 CLIMATIC DATA: The climatic data pertaining to the area in which these block sections will be located are given in part-III.

2.1.5 WIND PRESSURE: Structures and foundations for the OHE shall be designed for a wind pressure of 155 Kgf/meter² or as per latest data.

2.1.7 System Particulars. - The nominal voltage of the equipment will be overhead 25KV AC, 50 Hz single phase. The supply voltage may, however, rise upto 27.5KV and one terminal of the 25 KV system will be solidly earthed at the traction sub-station and also connected to the running rails. The other terminal will be connected to the overhead equipment through switchgear provided at the traction sub-station and at the feeding station.

2.1.8 Rolling Stock.

(a) **Locomotives.** - The Electrical Locomotives will generally be equipped with DC motors fed through rectifiers installed on the Locomotives.

(b) **Over size consignments** - The specifications requirements in regard to movement of steam locomotives and oversize consignments for each section are indicated in Part-III.

2.1.9. Power Supply: -

(a) Electric power will be supplied at 25 KV AC 50 Hz. single phases from traction sub-stations.

(b) Switching stations: - There are three types of switching station.

1. Feeding stations.
2. Sectioning stations
3. Sub-sectioning stations.

(c) **Feeding Station: -**

Supply will be affected to the overhead equipment through switchgear installed at feeding station. All feeding stations will be located normally near the track.

(d) **Sectioning Stations: -**

The substation cannot as a rule be paralleled and consequently a neutral section of OHE with insulated overlaps on other side will be provided approximately mid-way between two consecutive feeding stations. N/S may also be provided at feeding station. Facilities to bridge the neutral section between feeding station will be provided at sectioning stations.

(e) **Sub Sectioning Stations:--**

In order to facilitate maintenance of OHE and to permit isolation of faulty sections and expeditious restoration of power supply in healthy sections, sub sectioning stations with insulated overlaps will be provided between the feeding stations and the sectioning stations.

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PART-II CHAPTER-I (For OHE)

SECTION-2: OVERHEAD EQUIPMENT

2.1.6 Track Gauge & Track Centers:

(a) The track gauge is 1676 mm in multiple track Zones. The normal distance between track centers shall be generally more than 4270 mm.

(b) Speed: The overhead equipment which shall be of the simple polygonal type and pre-sag should be designed for a maximum speed of 160 Km/h if regulated and for a maximum speed of 80 Km/h if un-regulated, unless otherwise specified in Part- III for any particular section.

(c) Curves: The maximum radius permissible is 175 m (573 ft.), i.e., 10° curve. Inside station limits, the curvature at 1 in 8 1/2 turnout is 8°, i.e., radius 218 m (716 ft).

(d) Super Elevation: The maximum super elevation is 165 mm (6.5") On curves, the minimum setting of structures shall be decided on the basis of maximum super elevation. For purposes of design and erection of overhead equipment, the actual super elevation as existing or as indicated to the Contractor shall be adopted.

(e) Low Joints: For low of loosely packed rail joints a difference of 25mm (1") in the level of opposite rails may be taken as the basis for estimating the displacement of the pantograph with respect to its normal position.

(f) Formation: Generally, sections with more than one track have common formation. In certain lengths, however, the formation for different track may be separate.

(g) Displacement: The general design of overhead equipment shall permit a displacement of ± 100 mm of tracks without difficulty and any adjustment of the overhead equipment on this account shall be of such a nature as could be done conveniently without changing any component of the overhead equipment.

2.1.7 Sectioning Insulated overlaps: -

(a) Insulated overlaps are provided for facility of isolator. Some of the overlaps may be provided with manually operated isolator switches.

(b) Yard Supply: The sectioning diagram/s also indicate the tracks in station yard and siding whose equipment is electrically independent from those of other tracks.

The overhead equipment in yards and sidings may be fed through isolator switch or interrupter in accordance with arrangement indicated in the sectioning diagram/s.

(c) Section Insulators: Section insulators shall be provided as indicated in the sectioning diagrams, or crossover between main tracks and to isolated sections of overhead equipment in yards and sidings. Section insulators may also be used to form neutral sections at special locations as indicated in approved drawings.

(d) Feeders & Return feeders -

Where a traction substation is located away from the track to be electrified, 25kv feeders and return feeders will be run from the traction sub-station to the feeding station. Two hard drawn bare all aluminum conductors 19/3.99mm (classification spider) shall make up such feeders and return feeders. These should be kept together by use of parallel clamps spaced every 10mtr.

(e) 25kv along track feeders: -

25kv along track may connect sectioning of overhead equipment or connect the overhead equipment to a switching station or in Isolator switch or gantry. Such feeders will be run usually on traction structures and sometimes on independent masts. A single 'SPIDER' conductor shall be used for such feeders.

(f) Return Conductor: Return conductor may be run on traction structures or masts. A single 'SPIDER' conductor shall be used for such return conductors.

(g) Sectioning Diagram: The provisional sectioning diagram/s of the sections to be electrified will be given to the successful tenderer.

2.1.8

(a) Pantographs: The outline of the pantograph, its dimensions and its current collecting area are shown in a drawing listed in Annexure.

(b) Number and pressure: Each locomotive will be equipped with two pantographs, but only one pantograph, generally the trailing one, will be in the use at a time. The working pressure of the pantograph on the contact wire may vary between 5 and 15 Kg.

(c) Spacing in Multiple Headed Trains: The distance between adjacent running pantographs in the case of multiple heading would normally be 20 m. This distance may however be reduced to 7.9 m between two pantographs in very exceptional cases.

(d) Insulation Clearance: The electrical clearance for the pantograph on tangent tracks and on curves for design and erection of overhead equipment shall be based on the schedule of dimensions 1676 mm Gauge (2004 revised), issued by the Ministry of Railway (Railway Board), Government of India and other orders that may be issued by the Railway Board from time to time.

2.1.9 Overhead Equipment:

(a) Brief Description: Essentially the traction overhead equipment shall consist of a standard catenary wire from which a grooved contact wire is suitably suspended by means of droppers. In order to cater for a speed of 160 Kmph the contact wire is given a pre-sag of about 100 mm for 72 m span and reduced suitably for other spans or as per latest guideline.

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(b) Catenary: The catenary wire shall be either of cadmium copper 19/2.10mm, 65mm² or of Aluminum Alloy of 115 mm² nominal section, 19/2.79 mm in size.

(c) Contact wire: The contact wire shall be grooved and made of hard drawn copper having 107 sq. mm cross section.

(d) Droppers: Droppers shall be made of hard drawn round copper wire, approximately 5 mm dia. Dropper shall be spaced not more than 9 m apart.

(e) Encumbrance: As a general rule, the nominal "encumbrance", i.e., the center distance between the catenary and contact wire at the support shall be 1.40 m. Deviation from this figure will be permitted in special cases (e.g. spans near over bridges, structures with more than one cantilever etc.)

(f) Jumper: All jumpers connected to OHE conductors shall be of copper only. The in-span jumpers, potential equalizer jumpers at insulated overlaps and neutral section, shall be of 50 mm² nominal, 19/1.8mm size Flexible jumpers of nominal section 105 mm², 19/7/1.06 mm size shall be used at overlaps, turnouts crossings etc.

(g) Bridle Wire: Wire for supporting contact wire for regulated tramway equipment shall be of Cadmium copper 7/2.10mm in size.

(h) Anti-theft jumper: Anti-theft jumper of 50 mm sq nominal, 19/1.8 mm in size shall be used in out of run wire of conventional OHE and copper cadmium anti creep wire as an anti-theft measures.

The jumper connecting the aluminum conductors to any other conductor's terminal or clamp shall be made with the aid of suitable bi-metallic clamps. All aluminum jumpers of size 19/7/1.4 mm bore 3/4 hard shall be used to connect other aluminum conductors such as return conductors. The tail ends of feeder wires from the strain clamps at the termination of a feeder, return feeder of return conductor to be connected directly to a terminal or clamp where possible to avoid the use of a separate jumper wire.

2.1.10 Type of equipment: The overhead equipment used shall normally be either of the regulated or unregulated type. Unregulated tramway type equipment (Contact wire only) may be adopted where specially indicated by the Purchaser.

(a) REGULATED: In the regulated type of overhead equipment, the tension of both the catenary and the contact wires shall be maintained at a constant value at all temperature by means of automatic tensioning devices to take up the variation in the length of overhead equipment due to temperature variation.

An anti-creep shall be provided at a point approximately midway between two tensioning devices and not more than 750 meters from any one of them. The general arrangement of an anti-creep is shown in a drawing listed in Annexure. The arrangement shall generally consist of the galvanized steel wire anchored on the masts adjacent to the anti-creep central mast in accordance with the relevant drawing. Alternatively, the arrangement may consist of catenary on

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either side of the boom of a portal with the contact wire running through and providing a jumper connection as per general arrangement shown in typical drawing listed in Annexure.

(b) Unregulated: The unregulated type of OHE has no provision for automatic regulation of tension of either the catenary or the contact wire.

(c) Tramway Type (Regulated Contact Wire Only): In tramway type only a contact wire is provided without a continuous catenary wire or droppers. The tension in the contact wire is regulated. At support, bridle wire is used for supporting the contact wire.

2.1.11 Plane of Contact:

(a) Regulated: The regulated overhead equipment shall be so erected that the contact wire has the designed sag.

(b) Un-regulated: The contact wire shall have no sag at a temperature of 35° C.

(c) Tramway type: In tramway type equipment, the contact wire will have its own natural sag when erected.

(d) Dropper: Dropper charts to be used for standard span of regulated and unregulated OHE would be supplied by purchaser. Dropper for non-standard spans, spans with section insulators and special locations shall be calculated by the Contractor in accordance with the method indicated by the Purchaser and submitted to the Purchaser for approval.

2.1.12 Tensions:

(a) Regulated:

(i) In regulated equipment the tension in the catenary and in the contact wire shall be 1,000 Kgf in each conductor.

(ii) The regulated tension in the Aluminum alloy catenary shall be 1,000 kgf and 1,000 kgf in the copper Contact wire.

(b) Unregulated: At 35° C without wind 1000 kgf in each conductor.

(c) Tramway type: In regulated type tramway type, the tension shall be 1250 kgf.

2.1.13 Clearances:

(a) General: The distance between live parts and parts at earth potential (or part likely to be earthed) shall be as large as possible. In all cases the values given in Schedule of Dimensions, 1676mm Gauge (2004 revised or latest) shall be observed along with any other supplementary rules, that may be issued by the Railway Board and advised to the Contractor.

(b) Over-bridges and Tunnels: The clearances which are to be made available at over bridges, signal, gantries and other over line structures shall be based on the above rules.

(c) Platform Sheds and Other Structures: In the course of checking the overhead equipment pegging plans, the Contractor shall prepare a list of platform sheds and other structures in the vicinity of track to be wired. The clearances to these structures shall be in accordance with those shown in the relevant drawings listed in Annexure. If these clearances are not available, the Contractor shall advise the Purchaser in time to enable the latter to take up necessary modification.

2.1.14 Height of Contact Wire:

(a) Normally, the minimum height of contact wire above rail level shall be 5.50 m at mid span under the worst temperature condition. This height may be reduced under bridges and the in tunnels to the extent permitted by the Purchaser. The minimum height shall be 4.80 m. In electric locomotive sheds and over electric locomotive inspection pits, the minimum height shall be 5.80 m.

At level crossing the minimum height shall be 5.50 m. Any infringement restricting minimum height at level crossings will be removed by the Purchaser. These heights could be varied as per new guidelines/instructions.

(b) Gradient of Contact wire: Any change in the height of the contact wire shall be made gradually and the maximum slope shall not normally exceed 3 mm per meter on main line and 10 mm per meter on sidings. The end spans of any section with a gradient of contact wire shall have a slope not greater than half the main slope.

2.1.15 Stagger: To ensure uniform wear of contact strips of pantographs, the contact wire shall normally be staggered in a manner which will be indicated by the Purchaser.

2.1.16 Termination:

(a) General: Traction overhead lines shall be terminated using components specified. The termination may be carried forward by one or two spans if anchoring facilities so required.

(b) Terminating wires shall be electrically connected to the conductors with which they are likely to approach closely or come into contact under normal conditions.

(c) Supplementary insulation: If a terminating wire passes a live conductor to which it should not be connected, i.e., in a different elementary section, the portion of the terminating wire close to the live conductor shall be separated by means of insulators. The insulators shall be located in such a manner as to clear the swept zone of the pantograph under the worst conditions and as far away as is possible from live conductors.

2.1.17 Type of structures:

(a) Cantilever: The overhead equipment of main tracks in case of multiple track sections shall be electrically and mechanically independent of one another by provision of independent cantilever masts to the maximum extent possible (See Annexure for general arrangement drawing).

(b) Head spans: Head span construction may be adopted with unregulated overhead equipment. A single head span shall not normally cover more than six tracks (See Annexure for general arrangement drawing of head spans carrying complete overhead equipment).

(c) Portals: In case where the tracks in a multiple tracks section do not permit location of independent masts and where automatic tensioning of overhead equipment is required, rigid portals may be used. Also, in the vicinity of points and crossings, portals may be used, provided it is not possible to have prescribed setting with independent cantilever masts. These structures shall be equipped with standard bracket assemblies for supporting individual equipment of different tracks. The use of such structures is to be avoided as far as possible and for this purpose the Purchaser will arrange to slew the tracks, if practicable. A single portal shall normally not cover more than five tracks. Portal structures will also be employed at anti creep central locations and such portals will have necessary guy arrangement.

(d) Foundations: Foundations for all structures shall be designed in an economical manner by following the methods of design indicated by the Purchaser and observing the schedule furnished by him.

2.1.18 Cantilever assembly: The bracket assembly carrying overhead equipment shall be of the swiveling type. The assembly shall be such that the tubes adopted will permit easy adjustment of the whole equipment after erection to cater for displacement of the track during maintenance up to the extent of 100 mm on either side except as otherwise relaxed by the Purchaser. In special locations, pull off arrangements may be used with the approval of the Purchaser with the approval of the Purchaser (See Annexure for drawing of the bracket assembly and component).

2.1.19 Overlaps: Overlaps shall be provided at suitable intervals such that neither the tension length exceeds 1,500 m nor the fixed anchor to balance weight anchor exceeds 750 meters.

(a) General: The two contact wires at the overlapping zone shall be parallel to each other in a place parallel to the track and run separated from each other (See Annexure for general arrangement drawings).

(b) Insulated: In the case of insulated overlaps the separation between the two contact and the two catenary wires shall be 0.5m (See Annexure for general arrangement drawings).

2.1.20 Points and Crossings: Arrangements of overhead equipment of different type e.g. regulated, unregulated or tramway at points and crossings shall be in accordance with the standard drawings listed in Annexure.

2.1.21 Section Insulators:

(a) Brief description: The section insulators shall provide effective electrical isolation of two elementary electrical sections of overhead equipment and permit smooth passage of the pantograph in either direction at all speeds up to 70 Km/h. The outline of a section insulator is shown in a drawing listed in Annexure. The section insulators shall be of the single wire type.

(b) Size and weight: The section insulator assembly shall be such it should be possible to install the insulator in overhead equipment provided the axial distance between the catenary and the contact wire with section insulator in position is not less than 450 mm. The weight of the complete assembly shall not be more than 45 kg for single wire type excluding the weight of the catenary insulator and the catenary ending clamps.

2.1.22 Isolators: Manually operated isolator single or double pole type with or without earth contact assembly may be required to bridge certain section insulator or insulated overlap. In certain large Yards, isolators controlling different lines may be grouped together on a gantry (See Annexure).

2.1.23 Return Conductors: At all booster stations, the return conductor shall be provided with a cut-in- insulators. At point midway between two booster stations, the return conductor be connected to the rail through suitable terminal which will provide a means of isolation, when required. The drawings showing the general arrangement of connection to the return conductor are listed in Annexure. The connection from the isolating arrangement to the rail shall be by means of 2 MS flats, each of minimum size 50mm x 6mm and at feeding stations 4 MS flat each of minimum size 50mm x 6mm or latest RDSO Specifications. The flats shall be given to coats of red oxide zinc chromate's primer to IS:2074 or latest CNSL based and finished with two coats of Bitumen 85/25 blown grade. Return conductors may be taken underground in special locations such as under overline structure with the approval of the Purchaser. The return conductor shall also be connected with buried rail on either side the overlap before the feeding post and cut- in- insulator should be provided on the return conductor before the feeding post within the overlap limits and two independent rail connection links from the masts on either side on the cut- in- insulator. The same practice is to be adopted in all sub - sectioning posts and sectioning posts for the return conductor.

2.1.24 Bridges and tunnels over Bridges:

(a) Over Bridge: The complete overhead equipment (i.e., both the catenary and the contact wires) shall normally pass under overline structures. Additional intermediate suspension points shall be provided if necessary, to ensure the specified minimum height of contact wire being maintained. In general case the catenary may be anchored on either side of the over line structure and the contact wire carried underneath.

(b) Tunnels and Cuttings: The arrangements proposed for the equipment in tunnels and cuttings shall take into account the special features of each location and shall be in accordance with general design specified.

(c) Safety Screen: On over bridges metallic protective screens shall be provided in order to prevent and person from coming into contact with the live overhead equipment. Such screens shall be properly earthed.

(d) Height Gauge at Level Crossing:

Height gauge is to be provide at all level crossing in accordance with the general arrangement drawings listed in Annexure.

2.1.25 Bonding and Earthing:

(a) Bonding and earthing shall be done in accordance with the code for bonding and earthing.

(b) Longitudinal and Transverse Bonding: Longitudinal and transverse bonding of tracks, bonding of structures including traction structures to rails and associated earths shall be provided in accordance with the above code.

(c) Traction Structure Bonding: Every traction mast or structure shall be bonded to a non-track-circulated rail unless it is provided with a continuous earth wire or it is individually earthed by means of an earthing station. For general arrangement drawings, see Annexure.

(d) Double Rail Track Circuit: Where track circuits are provided on both rails, traction masts/structures shall not be bonded to rails but shall be provided with an earth wire made of steel reinforced aluminum conductor consisting of 6 strands of aluminum and one strand of steel each of 4.09mm dia. (RACOON) (Conforming to IS 398 Pt. II 1976 or latest). The earth wire shall be run on traction masts or structures. They shall be divided into different electrical sections not exceeding 1,000 m long. The earth wire in each such section shall be connected at two traction structures, situated at distance not exceeding 250m on either side of the midpoint of the Section to two 10 Ohm, earths which will be provided by the Contractor.

2.1.27 LT Supply transformer station

The low-tension supply required for S&T department will be obtained through LT supply transformer stations mounted on steel structures and connected to the 25kv OHE through drop out fuses switches .The LT side shall be connected to the switch fuse unit by means of 2core 70sqmm aluminum cable .The general arrangement drawing for LT supply transformer station for single, double, and multi track section is enclosed in Annexure -I.

PART - II CHAPTER - II (For OHE)

FOUNDATIONS

2.2.1 Scope: This chapter deals with the design of foundations and anchor blocks for traction structures carrying OHE (including those on bridges), Structures for Feeder wire, structures at switching and other concrete work. It also deals with specification for concrete.

2.2.2 Design of Foundations:

(a) Soil Pressure: For design of foundations of traction structures carrying overhead equipment or feeder, the Contractor shall determine the type and allowable bearing pressure of soil at suitable interval and adopt the type and size of the foundation suitable for the particular location with the help of the approved employment schedules. In cases of particularly weak soil, the bearing pressure may have to be determined for each location where so advised by Purchaser.

Soil bearing pressure, using SPT (Falling weight equipment) should be determined generally for 5 Km interval or less wherever change of soil is encountered. In general, IS/Code of Practices (IS :6403 or latest) shall be followed. In addition, at every 250 m and soil bearing pressure should be determined by Dial gauge type Penetro-meter. Dial gauge penetro-meter shall be made available by the Contractor for each foundation site so as to facilitate cross check at each individual location.

For design of foundation for masts and gantries at switching stations and booster stations, the Contractor shall determine the type and allowable bearing pressure of soil at the locations of such stations and shall prepare designs for the foundations suitable for each location to suit the bearing pressure of the soil in consultation with the Purchaser.

(b) Structures Carrying Overhead Equipment: Foundation for traction structures carrying overhead equipment, feeder wire shall be either of the side bearing side gravity or new pure gravity type according to the location, formation of the sub grade and bearing pressure of the soil. In new filled up soil or cinder foundation, pure gravity sand filled core foundations, foundation with cast in-situ reinforced concrete piles or cantilever type foundation with counter weights guyed foundations may be adopted.

(c) On Bridge Piers: complete design of foundations for traction structures or feeder wire on bridge to suit different locations and conditions will be furnished by the Contractor.

(d) Masts and Fabricated Structures at Switching Stations: Foundations for the masts of gantries at switching stations shall be of the pure gravity type, the base of which shall rest on consolidated soil.

(e) Fencing Posts: Foundations for fencing posts shall rest in consolidated soil if the depth of unconsolidated soil is less than 1.5 m below the datum level and shall be rectangular parallel piped in shape. If the depth of unconsolidated soil is more than 1.5 m, the foundation block shall rest on reinforced concrete

piles cast-in-situ or reinforced concrete foundation may be adopted as desired by the Purchaser.

(f) Typical Design: Typical designs and drawings of side bearing and pure gravity and side gravity type foundations were included in the drawings listed in Annexure.

Latest Employment schedule for standard foundations for traction structures for various locations and types are to be followed.

(g) Special Foundations: In the case of foundations at locations not covered by the employment schedules furnished by the Purchaser, the Contractor shall prepare special designs and furnish full design calculations justifying the choice of the type of foundations for such locations. In black cotton soil specially piles foundations of under reamed type as per RDSO's standard designs (Reference RDSO's drawing No. ETI/C/0062 Mod. 'A' or latest) or any other approved design may have to be cast at limited locations for trial purpose. The tenderer may furnish the technical details of alternative design, construction methods proposed to be adopted and their previous background/experience, if any. The decision of the Purchaser with regard to feasibility and suitability of adoption of the alternative design for each type of foundation will be final.

(h) Equipment Pedestals: Pedestals for interrupters and LT supply transformers where required, shall be of mass concrete with the base resting on consolidated soil.

(i) Cable Trenches: The cable trench shall rest on original ground if the depth of unconsolidated soil is less than 0.5 m. If the depth of the unconsolidated soil is more than 0.5 m the cable trench shall be made of reinforced cement concrete of approved design supported at suitable intervals on concrete pillars.

2.2.3 Bearing Pressure: The following allowable bearing pressure may generally be expected for various kinds of soil. The information is given for general guidance only.

(i) Average good soil in banks and cutting 11,000 kg per Sq. meter.

(ii) Morrum soil in cutting 22,000 kg per Sq. meter.

(iii) New banks & bad soils in bank & cuttings 5,500 kg per Sq. meter.

(iv) Black Cotton Soil: Pure gravity foundation shall normally be adopted. However, under reamed pile foundations may be adopted at the option of the Purchaser in limited locations for trial purpose. In the case of dry black cotton soil, the soil should be subjected to a bearing pressure as close as possible but not exceeding 16,500 kg/sq. meter the depth of the foundation block being not less than 2.8m. In the case of wet black cotton soil, the soil should be subjected to a bearing pressure as close as possible but not exceeding 8,000 kg/sq. meter.

In the case of hard rock, a hole should be blasted in the rock, or by means of any other drilling and pneumatic method and the mast sealed into it with concrete.

2.2.4 Concrete: Concrete for foundations shall be nominal mix of grade M-10 obtained by mixing cement, coarse aggregate, fine aggregate and water in accordance with proportions given vide Table 3 of IS:456, 1978. For grouting, mugging, embedding of structures in foundations and for cable trenches at switching stations, nominal mix concrete M-15 obtained by mixing materials in proportions (as indicated in Table - 3 of IS:456 - 1978 or latest) shall be used. Volume batching may be adopted vide clause 9.2.2 of IS:456 - 1978 or latest.

In judging the acceptability of the materials, quality of concrete and the method of work, the Purchaser will generally observe the provisions of the "Indian Standard Code of Practice for Plain and Reinforced Concrete, IS 456-1978 or latest. The crushing strength of concrete shall not be less than the limits given below:

Crushing Strength of 15 cm cubes by Works Test:

<u>Concrete</u>	<u>At 7 days age</u>	<u>At 28 days age</u>
(a) M-10	70 Kg cm ²	100 Kg/cm ²
(b) M-15	100 Kg cm ²	150 Kg/cm ²

Note:

(a) Test specimens of works tests shall be taken at the site of work for mixtures of concrete ready for pouring into the foundation hole. All tests shall be carried out in accordance with IS: 516-1959 or its latest version. The sample of concrete from which test specimens are made shall be representative of the entire batch. One Sample will be taken for each 50 cum or part thereof.

(b) Age is reckoned from the day of casting.

2.2.5 Size and Grading of Aggregates: The graded coarse aggregate 40 mm nominal size (table 2 of IS: 383-1970 or latest version) shall be used for foundation. A coarse aggregate for grouting muffs and embedding shall be 20 mm graded nominal size as per table 2 of IS: 383-1970 or latest version (Specification for coarse and fine aggregate from natural sources for concrete).

Fine aggregate shall be graded from 10mm downwards. The maximum size of aggregate for under reamed pile foundation shall be 20 mm graded nominal size.

2.2.6 Sand Cored Foundations: After erection of masts in sand cored foundations, the core hole of the foundation blocks shall be filled with dried sand and covered with a layer of bitumen of 80 mm thickness below 30 mm

from top level of the block. A hemispherical shaped muff shall be provided on such foundations in lieu of standard type.

2.2.7 Sinking of Concrete Shells: Where the water table is high, one or more sections of reinforced concrete shells may have to be sunk before casting concrete. The size of each shell shall be 1,200 mm outside dia x 50mm thick x 600 mm high reinforced with 6mm (1/4") dia rods spaced 150mm. Apart from both longitudinally and circumferentially, the concrete shall be of grade M-15.

2.2.8 Type of Foundation in Black Cotton Soil: The foundations in dry black cotton soil should be of type BC or NBC or any other type as approved by the Purchaser.

2.2.9 Cement: The cement to be used in the construction of PCC / RCC structures should be of Ordinary Portland Cement to IS:269 (or Latest version) or Portland Pozzolana cement (fly ash based) as per IS: 1489 Pt-I (or Latest version).

PART - II CHAPTER -III (For OHE)

STRUCTURES AND STEEL WORK

2.3.1 Scope: This chapter deals with the design of steel structures including gantry structures, supporting structures and small parts steel work including chairs, brackets and other fabricated for mounting various equipments, bus bars cables etc. steel work for over head equipment, switching stations and L.T. supply transformer station and the specification for steel masts.

GENERAL – The steel structures may be of riveted, bolted or welded construction as convenient for installation. The thickness of smallest steel section used shall not be less than 6 mm (or ¼"). Legs of gantry structures/portals and supporting steel work and uprights or bus bar supports shall generally be embedded in concrete foundation blocks and for equipment and in special cases secured by means of holding down bolts.

2.3.2 Types: Structures and gantries may consist of any or more of the following type:

- (i) Broad flange beams.
- (ii) Rolled steel joists (I Section).
- (iii) Fabricated steel structures (Welded/bolted).

Structure/uprights shall generally be embedded in concrete foundation blocks, in special cases structures may be secured by means of holding down bolts.

2.3.3 Design:

a) All the steel structures like gantries/portals, other supporting members, small part steel work etc., shall be galvanized after fabrication with a minimum value of average mass of zinc coating being not less than 610g/m², as per RDSO's specification no. ETI/OHE/13(4/84) with Amendment no. 1, 2 & 3.

b) All the steel structures and small parts steel for carrying overhead equipment are to be fully galvanized after drilling and fabrication as per specification ETI/OHE/13(4/84) and with A and C slip number 1 of 5/86, 2 of 4/90, 3 of 4/90, no painted structures are to be used.

c) **Steel structures** - Designs for steel structures shall, except where otherwise provided comply with the "Indian Standard Code Practice for use of Structural Steel in General Building Construction" IS 800 -1984. The thickness of smallest steel section used shall be 5mm for galvanized members.

All the steel structures and small parts steel for carrying overhead equipment are to be fully galvanized after drilling and fabrication as per specification ETI/OHE/13(4/84) and with A and C slip number 1 of 5/86, 2 of 4/90, 3 of 4/90 (or latest). No painted structures are to be used.

For calculation of wind load on structures, conductors and equipments, the basic wind pressure shall be taken as 112.5 Kg/sq.mtr.

Upright and fencing post:

Upright carrying equipment such as potential transformers, current transformer, lightening arrestor, bus bar, support insulators shall be made from standard metric steel sections viz. channels, angles or small joints, either single or fabricated.

The deflection at the top of the mast or structure shall be limited to one eightieth ($1/80^{\text{th}}$) of its height above foundation.

The torsional rotation of the mast due to permanent load shall not be exceed 0.1 radian.

STEEL:

Steel conforming to IS:2062-1992 shall be used for all fabricated steel work. Steel should be to designation ST 42-S.

2.3.4 Cantilever Mast:

(a) Load: For purposes of all designed and worst possible combination of all loads that may occur, shall be considered.

The load shall include the following (weights to be assumed for design of structures are shown against important items):

(i) Weight of overhead equipment (1.60 Kg/meter for each conventional and 1.32 Kg/meter for each composite OHE).

(ii) Weight of bracket supporting the overhead equipment (60 Kg/normal Bracket).

(iii) Weight of a man (60 kg).

(iv) Weight of an earth wire (0.32 Kg/meter).

(v) Weight of feeder, return conductor or other special equipment wherever they occur.

(vi) The effect of concentricity of vertical and horizontal loads on the bracket due to variation in temperature.

(vii) Wind loads perpendicular and paralleled to the track.

(viii) Radial forces on the mast, due to stagger, curvature, anchorage etc.

(ix) Weight of the mast itself.

(x) Any load or loads that may occur due to the special location of the structure.

(b) Deflection: Notwithstanding the provisions contained in IS:800-1984 (or latest) regarding permissible deflection, the following shall apply:

(i) The deflection at the top of the mast due to permanent loads shall not exceed 8 cm and the mast shall be so erected that it becomes reasonably vertical after application of permanent loads.

(i) The additional deflection under maximum wind pressure shall not be exceed 8 cm at the level of the contact wire.

(c) Torsion: The tensional rotation of the mast due to permanent loads shall not exceed 0.1 radian.

(d) Typical design: The typical design of traction mast is included in the set of standard drawings listed in Annexure. Employment schedules for standard masts for various locations and types are included in the standard drawings listed in Annexure to enable selection of suitable types for different location and local conditions.

2.3.5 Anchor Masts:

(a) Masts at which overhead equipment will be anchored shall also normally be of the same type as those in other locations. Anchor masts shall normally be provided with suitable guys but struts may be permitted in special cases.

(b) Dwarf Masts: At certain locations where due to local conditions it is not feasible to anchor the guy rod on a foundation block in the ground, a dwarf mast shall be used in accordance with approved designs.

2.3.6 Head spans:

(a) Load: The loads to be considered shall be as detailed in Para 2.3.4(a) as far as applicable and at their worst combination.

(b) Sag for Head-span Wire: The sag of the head span wire shall be approximately one - tenth (1/10) of the span.

(c) Minimum Tension in Cross-span and Steady-span Wire: For purpose of design, a minimum tension of 200 kg shall be ensured in the span wires for worst combination of temperature and wind load.

(d) Deflection of Mast: Deflection at the top of the mast or structure shall be limited to one eightieth (1/80th) of its height above foundation.

(e) Typical Design: Typical design for head span mast carrying overhead equipment of 4 tracks will be furnished to the Contractor.

2.3.7 Portal:

(a) General: Portals shall be of fabricated steel of standard types of purchaser's designs. The most important designs are covered by Drawing listed in Annexure.

(b) Load: The loads shall be as detailed in Para 2.3.4(a) applicable.

2.3.8 Structures on Bridges:

(a) The structures may be either cantilever masts or portals (Hinged or fixed at base) depending on the type and condition of bridge pier capping. As far as possible, cantilever masts grouted in foundation blocks on piers will be used. Where this is not possible cantilever masts with holding down bolts or suitable portals (hinged or fixed at the base) may be adopted.

(b) Designs of structures on bridges to suit different locations and local conditions will be furnished to the Contractor by the Purchaser.

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2.3.9 Special Structures: In the event of structures at locations not covered by the employment schedules furnished by the Purchaser, the Contractor shall furnish complete design calculations justifying the choice of the type of structures for such locations.

2.3.10 Setting of Structures:

(a) The setting is the distance from the central line of the track, on straight or curve to the face of the mast/structure of fitting located on the mast.

(b) On straight and outside of curve, the standard setting shall be as per the relevant drawing included in Annexure. Minimum setting of structures shall be 2.8 m plus curve allowance as required. Whenever this distance could not be provided, specific approval of Purchaser shall be obtained before erection. Setting of portal upright, overlap/ turn-out structures, anchoring structures and other masts carrying more than one OHE will be 3.0 m wherever possible.

(c) Extra clearance in curves: The minimum setting of structures on curves shall be determined by adding to the above minimum figures an extra clearance indicated in the table included in the set of standard drawings listed in Annexure.

(d) In case of structures carrying counter weight assemblies, the term setting shall refer to the minimum distance of the counter-weight from the track centre under the worst conditions of wind.

(e) Structure on Platforms: The setting of structures on platforms shall be not less than 4.75 m.

(f) Structures near Signals: In the vicinity of signals, structures shall be located in a manner which shall ensure good visibility. Where necessary, the setting shall be increased as per the relevant drawing included in Annexure.

(g) Setting of Structures: The value of setting of masts/structures shall be painted on each mast/structure. The figure shall be 25 mm in size in white on a red background. In addition, the track level shall also be marked on the mast/structure by a horizontal red painted stroke.

2.3.11 Number of Structures Carrying Overhead Equipment: All structures shall be numbered in accordance with the numbering given in the approved overhead equipment layout plans. Retro-reflective number plates shall be provided on each mast on structure as per approved design.

2.3.12 Steel Work For Switching Stations And Gantries:

(a) Horizontal Members Of Gantry.

Horizontal member of main as well as auxiliary gantry carrying isolator switches, insulators PT's etc. shall be made from steel sections. They shall preferably be attached to masts by means of clamps to avoid drilling of masts sections.

(b) For purpose of design, all possible loads which may occur in the worst combination shall be considered. The loads shall include the following: -

- i) Weight of insulators, instrument transformers, isolator switches, bus bars, and their accessories.
- ii) Loads caused by feeders, along and across tracks return feeders etc.
- iii) Loads caused by anchorage due to guying of anchored masts (where applicable).
- iv) Pull or push on the structure due to anchorage & radial tension (where applicable).
- v) Wind load on the different structure, conductors, and equipment. The wind pressure shall be taken as that indicated in Part-III.
- vi) Weight of man working on structure.
- vii) Weight of structure itself.
- viii) Erection loads.
- ix) Any other load or load which may occur due to special equipment wherever they occur.

(c) Tension Of Conductors.:-

For purpose of designs the maximum tension of different conductors without wind load shall normally be as under.:-

- i) Maximum tension in the cross feeders at switching stations under worst conditions.

- 1. For spans less than 18 m - 100 Kgf.
- 2. For spans more than 18 m - 200 Kgf.

- ii) Maximum tension in longitudinal feeders running parallel to the track at the switching stations under worst conditions 150 Kgf.
- iii) Tension in anchored OHE in case of Sectioning & paralleling stations 2000 Kgf.

(d) Deflection Of Gantry Masts.

Deflection under the permanent loads (at an average temp of 35 degree centigrade without wind) at the top of the fabricated structures of mast shall be limited to 1/80th of its height above foundation.

- (e) Mast of the gantry at which feeder or OHE will be anchored at the switching station shall; normally be provided with suitable guys, but struts shall not be permitted.

(f) Chairs And Brackets.

Chairs, brackets and supporting steel work carrying PT,s LA's insulators etc. shall be made of fabricated steel and be mounted on the main auxiliary gantry preferably by means of clamps to avoid drilling of mast sections.

(g) Uprights And Fencing.

Uprights carrying operating handles of isolator and fencing posts shall be made

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from steel section, viz. channels, angles or small joists, either single or fabricated.

2.3.12 Steel: Steel conforming to IS:2062 – 1992 (or latest version) shall be used for all fabricated steel work.

PART - II CHAPTER – IV (For OHE)

EQUIPMENT, COMPONENTS AND MATERIALS

2.4.1 General: This chapter deals with the details and specifications of the equipment, components and materials to be used for traction overhead equipment, Feeder Equipment, switching stations, booster transformer stations and LT supply transformer stations. This chapter does not cover structures and foundations, which are dealt in Part II, Chapter II and III. In general, based on the specifications issued by various bodies, such as Indian Standards Institution, British Standards Institution etc., specifications have been issued by the CORE.

2.4.2 Compliance with Standard Specification: In the technical specification of equipment, components and materials, references are made to the following standard specifications:

- (i) International Electro-technical commission (abbreviated as IEC) publications.
- (ii) British Standards (abbreviated as BS).
- (iii) Indian standards (abbreviated as IS or BIS).

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 clearly English rendering of the text and illustrations of the national standard specifications and explanatory notes on the specific deviation from IEC, British or Indian Standards in question, shall also be submitted. 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.

2.4.3 Quality Assurance: The provision of Part I for quality assurance will apply, including facilities to be provided by the manufacturer.

2.4.4 Proto-type Tests:

(a) Fittings, Components and Materials: All the fittings, components and materials to be supplied by the Contractor in terms of this contract, the requisite number or proto type of components shall be supplied free of cost to the Purchaser for tests and approved. The tests will be conducted in a laboratory selected by the purchaser.

(b) Equipment: This comprises inspection and tests conducted on the first equipment of a specified manufacturer, which the Purchaser considers sufficient to prove that the design is in conformity with the specification, at the manufacturer's Factory. The type tests shall be conducted on each equipment as indicated in the individual specification, in the presence of the Purchaser's representative. The Contractor shall arrange to get these tests conducted at his own costs.

(c) Responsibility: Any testing and approval by the Purchaser of prototype shall in no way absolve the contractor of his responsibility under the terms of the contract for the equipment supplied and erected.

(d) Exemption from Proto-type Test: If proto type sample of equipment, components or fittings of any manufacture have already been approved in connection with the electrification of other sections of Indian Railways on the 25 KV, 50 HZ single phased A.C system prototype samples of such equipment, components or fittings will be exempted from the tests. Supply of bulk quantities shall, however, be effected only after the Purchaser's prior approval is obtained in writing.

(e) The results of proto type tests will be communicated to the Contractor as expeditiously as possible. Any delay in this respect will be the ground for extension of time for completion of work.

2.4.5 Inspection and Test: These comprised inspection and tests conducted at the manufacturer's factory for ensuring quality of manufactured items as part of the Quality Assurance Program me.

2.4.6 Test Certificates: Three copies of the test certificates of successful prototype tests carried out at the manufacturer's Factory on all equipment shall be furnished to the Purchaser within a month after completion of the proto type test. Three copies of the routine test carried out of each equipment shall also be furnished, after the equipment is passed by the Purchaser's representative for inspection.

2.4.7 Bulk manufacture: Bulk manufacture may be undertaken only after specifications approved of the Purchaser or his representative has been obtained indicating that tests on the proto types are satisfactory. Where prototype has already been approved in connection with manufacturer may proceed after exemption from proto type tests is received from the purchaser in writing.

2.4.8 Interchangeability: All equipment, components and fittings shall be interchangeable and supplies shall be in accordance with the purchaser's design unless otherwise specifically approved by him. Components such as fuses, indication lamps etc should be replaceable with substitutes available indigenously as far as possible. Important components and fittings and their drawings have been listed in Schedule.

2.4.9 Technical specification: Following specifications (or latest version) will govern the supply and testing of important materials, components and equipment:

Structural steel	IS 2062-1992
	IS 800-1980
	IS 808-1989

Tensile testing	IS 1608 - 1972 for steel products etc. IS 1731 - 1971 IS 2004 - 1978
Welding	IS 816 - 1969
Disc Insulator	IS 731 - 1971 IS 3188 - 1980
All aluminum conductor	IS:398 (Pt.I)-1976
Material for aluminum	IS:5082 - 1981
Tubular bus bar.	
Dimensions for aluminum	IS:2673 - 1979
Tubular bus bar.	
Galvanized stay strand	IS: 2141 - 1979
PVC insulated cables	IS: 1554(Pt.I)1988
Tin bronze castings.	IS: 306 - 1983
Aluminum bronze castings.	IS : 3091 - 1965
Malleable iron castings.	IS: 2108 - 1977
Grey iron castings.	IS: 210 - 1978
Aluminum castings.	IS: 617 - 1975
Copper strip for formed	IS: 1897-1983 ETI/OHE/76(6/97) with
Fittings.	A & C slip No 1,3,4,5,6,7,8 & 9
Cadmium copper	ETI-OHE/50(6/97) with A&C slip No.1 of 6(97)
Contact wire	ETI/OHE/42(6/97)
Annealed stranded copper	ETI/OHE/3(2/94) with A&C slip No.1 of 4(95)
Conductor for jumper wire.	
Copper bus bar	RE/30/OHE/5(11/60)
Structural steel tubes.	ETI/OHE/11(5/89)
Hot dip galvanization of	ETI/OHE/13(4/84) with A&C slip No.1 of 5(86)
Steel masts (Rolled and	2&3 of 4(90)
Fabricated) tubes and	
Fittings used on 25 KV AC	
OHE.	
Stainless steel wire rope.	ETI/OHE/14(9/94) with A&C slip No.1 of 9(95) 2 of 2(97), 3 of 8(99), 4 of 12(99), 5 of 10(01). TI/SPC/OHE/WR/1060(06/06) with A&C slip of (5/07)
25 KV solid core insulator	ETI/OHE/15(9/91) with A&C slip No.1 of 5(99)
Including those for polluted	2 of 2(2000) and 3 of 2(2000)
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Zones.	TI/SPC/OHE/INS/0070(04/07) with A & C Slip No-01 & 02 (10/16)
Silicone Composite Insulators:	TI/SPC/OHE/INSCOM/1071, Rev-01 (12/16)
25 KV single and double pole Isolator.	ETI/OHE/16(1/94) with A & C for RE slip No. 2 (03/04)
Bolts, Nuts and Washers	ETI/OHE/18(4/84) with A&C slip No.1 of 11(84) 2 of 6(87) and 3 of 9(87). TI/SPC/OHE/FASTNERS/0120 with A&C slip No.5 of (03/13)
Aluminum Alloy section and tube. Slip No.1 of Nov., 84.	ETI/OHE/21(9/74)
Standard drawings and Traction Overhead equipment.	RE/OHE/25(3/66) ETI/OHE/53(6/88) with A&C slip No.5 of Overhead Equipment (11/06)
Section Insulator.	RE/OHE/27(8/84) with A&C slip No.1 of 10(92) TI/SPC/OHE/LWTSI/0060 (Rev. 1) with A & C Slip no.1
Double wire section insulator.	RE/OHE/28(3/72)
Retro Reflective type Number plate	ETI/OHE/33A(12/97)
Galvanized steel wire.	ETI/OHE/36(12/73) with A& C slip No.1 of 5(98)
Copper trolley contact wire for AC & DC electric traction.	ETI/OHE/42(6/97)
Fittings for 25 KV 50 HZ AC Traction equipment.	ETI/OHE/49(9/95) with A&C slip No.1 of 6(97) And 2 of 4(2000) ETI/SPC/OHE/FITTINGS/0130 with OHE A&C slip No.1 (10/13)
Cadmium copper conductor for OHE traction.	ETI/OHE/50(6/97) ETI/OHE/50(6/97) with A/C slip no-1 to 5 for OHE traction (09/16)
7.5 KV Lightning arrestor.	ETI/PSI/3(8/75) with A&C slip No.1 of 2(91)
25 KV Interrupter.	ETI/PSI/3(8/75) with A&C slip No.1 of 2(91)
25 KV Potential transformers. And Slip No.4 of 6/97)	ETI/PSI/8(10/79) with A&C slip No.1 of 7/82 Sip No.2 of 3/86
25 KV Booster transformers.	ETI/PSI/13 (3/85)
25 KV Drop out fuse switch.	ETI/PSI/14 (1/86)

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25 KV/240V, 10 KVA LT Trans.	ETI/PSI/15(10/73) With A&C slip No.1 of 7/76 & No.2 3/81
110 V lead Acid Battery.	ETI/PSI/21(6/81) with addendum and corrigendum slip 1 of 7/81
110 V Battery charger envelop type end fittings for alu. alloy stranded draft alu. Conductor.	ETI/PSI/11(6/81)
Alu.alloy stranded catenary wire. 19/2.79mm	ETI/AL/OHE/54(2/85)
Bimetallic (Al-Cu) strip	ETI/OHE/55(4/90)
Provisional specification for Retore reflective structure number plate.	ETI/OHE/33A(12/97)
Specification for hard drawn copper catenary.	ETI/OHE/37(12/73)
Winch type regulating equipment 25 KV AC Traction.	ETI/OHE/48(7/84).
Specification for 3 pulley type regulating equipment (3:1 ratio).	ETI/OHE/48A(9/85). TI/SPC/OHE/ATD/0060 Rev. 1 equipment (3:1 ratio) with A & C Slip No. 1 (09/16)
Technical specifications for fittings for 25 KV AC OHE.	ETI/OHE/49(9/95). ETI/SPC/OHE/FITTINGS/0130 (10/13) for 25 KV AC OHE
Specification for discharge/earthing pole assembly for 25 kV ac traction.	ETI/OHE/51(9/87).
Principles for OHE layout plans and sectioning diagrams for 25 kV ac traction.	ETI/OHE/53(6/88).
Technical specification for 4-wheeler overhead equipment inspection car 1676mm. Gauge.	ETI/OHE/58(12/93).
Specification for hand operated lifting and swiveling platform.	ETI/OHE/58(1/95).
Technical specification for 8-wheeler overhead equipment inspection car 1676mm. Gauge	ETI/OHE/59(7/93).
Specification for Hybrid insulators.	ETI/OHE/62(9/85).
Technical specification for short neutral CONTRACTOR	ETI/OHE/63(5/91). DY. CHIEF ELECTRICAL ENGINEER(CON)

section assembly (phase break).

Specification for solid core cylindrical	ETI/OHE/64(10/88).
Post insulators for systems with nominal Voltage of 220kV, 132kV, 110 kV & 66 kv. Specification for continuous cast copper wire rods.	ETI/OHE/65(8/87) with A & C wire rods Slip No. 1 to 4 (09/16).
Code of bonding and earthing for 25kv a.c. 50 Hz single phase traction system.	ETI/OHE/71(11/90) (03/93)
Specification for 4 axle car for winding and/or unwinding of contact wire and catenary wire.	ETI/OHE/72(11/91).
Prototype technical specification for wire ropes for use in auto-tensioning devices for 25 kV a.c. traction overhead equipment (Not for general use as validation is yet to be done).	TI/SPC/OHE/WR/0990.
Prototype technical specification for composite insulator for 25 kV a.c. 50 Hz single phase overhead traction lines (Not for general use as validation is yet to be done).	TI/SPC/OHE/INSCOM/0990.
Gearless hand operated pulling and lifting machines (TIRFOR).	TI/SPC/OHE/TOOLPL/0990. machines(TIRFOR) (11/99)
Ratchet lever Hoist (Pull-lifts).	TI/SPC/OHE/TOOLPL/1990 TI/SPC/OHE/TOOLPL/1990 (11/99)
Insulated Cadmium copper catenary 19/2.1mm. diameter for provision under overline structures in the 25 KV a.c. electric traction.	TI/SPC/OHE/INSCA/T/0000.
Technical specification for infrared imaging system for handheld application.	TI/SPC/OHE/TIPS/0010.
Specification for polymer insulators for 25 kv single phase 50 Hz overhead traction line.	ETI/OHE/68(11/87).

2.4.10 (a) Nomenclature and Marking: All components and fittings supplied by the contractors shall bear the respective identification number and a mark to identify the source of supply except in the case of galvanized tubes, bolts and nuts and/or any other fittings as may be agreed to by the purchaser.

(b) In case of insulators, galvanized steel tubes, stainless steel wire rope and conductors, name of manufacturer shall be specified in "As Erected" drawings for identification.

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2.4.11 Steel Work and Protection against Rust:

(a) Galvanizing: All ferrous materials and fittings shall be hot dip galvanized according to the Specification ETI/OHE/13(4/84) with A & C slip No.1 of 5/86), 2 & 3 of (4/90) (or latest version).

(b) Painting: Some components or parts may, with the approval of the purchaser, be protected only by paint and parts as protected shall be given two coats of composite Aluminum primer and two coats of aluminum paints. The second coat of aluminum paint shall be applied after erection.

(c) Rectification at Site: In case of modifications, which would damage the protective coat, repairs to such damage would be allowed only in exceptional circumstances. The part damaged shall be protected in accordance with the method indicated in specification ETI/OHE/13 (4/84) with A&C slip 1 of 5/86 (or Latest Version) or any other method approved by the Purchaser. The contractor shall, in all such cases obtain prior permission from the purchaser before carrying out repairs.

2.4.12 Bracket assembly components -

a. **Arrangements for normal OHE** - The arrangement of the different fittings and structural components of bracket assemblies are shown in drawings listed in Annexure 1, Part IV. The employment schedule of bracket will be furnished to the contractor.

b. **Bracket** - Bracket tubes shall be of seamless cold drawn or electric resistance weld steel complying with ETI OHE 11(5/89) with an insulator near the support. The length of about 200mm beyond the catenary suspension bracket to facilitate adjustment during track maintenance.

c. **Tubular stay arm** - Steel tubes with adjustable steel rods shall be used for tubular stay arm of all bracket assemblies.

d. **Register arm** - The register arm shall also be electrical resistance weld or cold drawn steel tube of proper dimensions duly formed. It shall be suspended by a dropper from the catenary suspension clamp/bracket tube. A hook and eye arrangement shall be used at the bracket end to permit free movement in every direction.

e. **Steady arm** - Steady arm shall normally be fitted in all assemblies for overhead equipment in running. The steady arm shall be of light alloy BFB section arranged to work always in tension in accordance with ETI.OHE/21 (9/74). Steady arm of Secondary tracks may be of solid galvanised steel rodding. The contact wire shall be fixed by a simple swivel clip without threaded parts. Steady arm shall normally be 1.0 m long, but for special locations such as turn outs, diamonds crossings etc. steady arms shall be longer as indicated in the relevant drawings listed in Annexure-I, Part IV. Bent steady arms of aluminum alloy tube conforming to Spec. ETI/OHE/21(9/74) shall be used for neutral section overlap and in the central mast of a 4-span insulated overlap.

f. **Bracket for Unregulated Tramway type Equipment:** Unregulated equipment shall normally span two tracks and the contact wire carried on V-Type clamps suspended from a span wire. The span wire shall be provided with a turn buckle at only one end.

2.4.13 Droppers:

(a) **General Designs:** The droppers shall generally be designed as shown in standard drawings and made of copper wire about 5mm dia meter conforming to IS:282 (or latest version) and shall be attached to the catenary wire by a copper dropper clip. The contact wire shall be held by a clip of aluminum bronze as shown in the standard drawings. The distribution of dropper shall be in accordance with standard design.

(b) **Loading:** The droppers shall be able to withstand a vertical load of 200 Kg. at the point of attachment to the contract wire and the clip shall not slide under horizontal load of 120 Kg.

(c) The permissible tolerance in the overall length of a dropper will be ± 5 mm.

2.4.14 (a) Insulators: All insulators except those on return conductor and earth wires shall be of the solid core type. Disc insulators shall be used on return conductors and earth wires or other locations as desired by the Purchaser. All solid core insulators shall conform to TI/SPC/OHE/INS/0070 (04/07) with A & C Slip no-01 & 02 (10/16) (or latest version) or TI/SPC/OHE/INSCOM/1071, Rev-01 (12/16) (or latest version) as the case may be.

(b) **Interchangeability:** For free inter changeability only the following types of insulators shall be used. While the shapes of the insulators may vary slightly from those shown in the drawings, the essential dimensions of the galvanized malleable cast iron caps as given in standard drawings shall be adopted.

(i) **Stay-arm Insulators:** These insulators will be used in conjunction with the tubular stay arm of all bracket assemblies.

(ii) **Bracket Insulators:** These will be used at the base of each bracket assembly in conjunction with bracket tubes.

(iii) **9-Ton Insulators:** These will be used at all places for cut in and terminal insulation including these in return conductors, feeder conductors but excluding those in earth wire.

(iv) **Sold Core Post Insulators:** These will be used at all places for supporting isolator mechanism, bus bars, jumpers etc of 25 kV.

(v) Disc insulators 255

Clevis type 255 mm dia insulators will be used for return conductor, suspension and for earth wire cut-in- insulator.

(v) 11 KV Post insulators -

These will be used at all places for supporting bus bars, jumpers etc., in conjunction with return conductor/return feeders.

(Note: - As per RDSO instructions issued under letter no TI/OHE/INS/99 dated 24.5.99, all 9-tonne insulators, stay arm insulators, and bracket insulators are required to be tested at load of specified value before installation. The arrangement of load testing arrangement is shown in drawing no ETI/OHE/SK/611/(in sheet 2)

2.4.15 Ending Fittings and Splices:

(a) General Designs: Terminating or ending fittings and splices on copper conductors shall be of the cone type clamping on both the inner and outer strands of conductors except for contact wire ending clamps which may be wedge type. The arrangements shall be easy to install and also be such as would apply the clamping pressure gradually without shock (See ETI/OHE/49(9/95) with A&C slip No.1 of 3(97) (or latest version).

For Aluminum Alloy/pure aluminum conductor, the Termination of Feeder shall be as per ETI/OHE/G/05/45-1 or latest.

(b) Loading: All the parts shall be capable of withstanding, without damage, a load greater than the ultimate strength of the wires to which they are fitted. In the case of threads, no damage shall occur when they are subjected to a load equal to two third of the ultimate strength of the wire.

(c) Restricted use of Splices: The use of splices shall generally be avoided and their use shall be restricted to the minimum necessary. Over main tracks, there shall be no splice in the contact wire on first erection. Elsewhere, not more than one splice be used in any tension length (i.e. anchor to anchor) for which prior approval shall be taken from the Purchaser. Additional splices may, however, be provided to enable retention of conductors which are found defective during and/or after erection. Splices may also be permitted for repair of damage due to theft or railway accidents.

(d) Strength of Assembled Fittings: The strength of fittings assembled with appropriate conductors or wires shall not be less than that of the conductors or wire itself.

(e) Additional Terminating Wires: Cadmium copper stranded wire of 65 sq. mm nominal section of 37/ 2.1mm (as used in head span construction) may be used as additional terminating wires for extending single and double conductors respectively, if termination at the nearest structure is not feasible.

2.4.16 Electrical Connections for OHE:

(a) General Designs: All electrical connections between conductors shall be made by parallel clamps. The general arrangements of connections are shown in the standard drawings, listed in Annexure.

(b) Jumper: Copper jumpers shall be of any of the following:

(i) Large Jumper of annealed copper in accordance with specification ETI/OHE/3 (2/94) A and C Slip No.1 of April-1995 (or latest version).

(ii) Small jumper of annealed copper in accordance with the specification IS 434 Pt-I (or latest version). Aluminum jumpers, wherever used, shall be of all aluminum stranded conductor 19/7/4 mm bare 3/4 H generally conforming to IS:8130:1984 (or latest version).

(c) Bus Bars: Bus bar or rigid jumpers in copper where used shall be of 18 mm dia of copper rod in accordance with RE/30/OHE/5(11/60) (or latest version). Aluminum bus bars wherever used shall be of 36/30.4mm or 36/28 mm tubing. Aluminum tubular bus bars shall be made of alloy to IS:5082-1981 (or latest version). The tolerance on diameter and thickness shall be as per class-I IS:2673-1979 (or latest version).

(d) Feeders: Feeders shall be of all aluminum conductors 19/3.99mm (Spider), 234 mm².

(e) Return Conductor: The return conductors shall be of all aluminum conductor 19/3.99mm (SPIDER) and is included in a drawing listed in Annexure.

(f) Earth wire shall be of steel reinforced aluminum conductor 7/4.09mm (Raccoon) conforming to IS 398 (Part II)/ 1976 (or latest version).

2.4.17 Regulating Equipment:

(a) A general arrangement is shown in the standard drawings listed in Annexure. The regulating equipment should have a minimum adjustment range of 950 mm. Stainless steel wire rope in accordance to TI/SPC/OHE/WR/1060 (06/06) with A & C slip no. 1 & 2 (05/07) (or latest version) shall be used in this equipment and these shall be sufficiently flexible for the purpose.

(b) Counter Weight: Counter weights and arrangements used shall be such that these could be accommodated within 330 mm (13 in) measured transverse to the track under the worst condition of wind. The vertical upward movement shall be listed with a fixed top.

(c) Reduction Ratio: Reduction ratio in the arrangement used shall be five for winch type and three in three pulley type.

2.4.18 Head-span Construction:

(a) Size and Factor of Safety: All span wires used in head span construction shall be stranded cadmium copper of 65 sq.mm or 130 sq.mm cross section. All the wires shall be designed with a factor of safety of not less than 4 under the most unfavorable conditions.

(b) Turn Buckles: Each span wire shall be equipped with a turn buckle at each end of the span.

(c) Additional Insulators: Additional insulators shall be provided as necessary in head span, cross span and steady span, wires to ensure electrical independence between the equipment in different elementary electrical sections.

2.4.19 Isolators: 25 kV Isolator switches shall comply with specification as indicated in Para 2.4.9.

2.4.20 Bus-Bars:

(a) No splicing will normally be allowed in the tubular bus-bars unless the length of the bus-bar exceeds 6 m.

(b) General: The bus-bar shall be clean, smooth, mechanically sound and free from surface and other defects. Provision shall be made where necessary to allow for expansion and contraction of bus-bars caused by temperature variation. The open ends of bus bars shall be covered by suitable tubes cap, wherever the tubular bus-bars are required to be bent, the radius of the bend shall be not less than 200 mm.

(c) Joint: The joints in bus-bars shall be mechanically technically and electrically sound so that the temperature rise under normal working conditions does not exceed 40⁰ C for an ambient temperature of 65⁰ C.

(d) All aluminum joints shall be thoroughly cleaned and smeared with suitable corrosion inhibiting joint compound before and after assembling the joint. Similar procedure shall be followed for connecting the equipment terminals to the aluminum bus bars with bimetallic connectors.

PART – II CHAPTER –V (For OHE)

DESIGNS & DRAWINGS

2.5.1 General:

(a) This chapter deals with the procedure for approval of designs and drawings.

(b) The type designs shall be as few as possible to cover the largest field of application consistent with economic consideration.

(c) In all drawings, as far as possible only such symbols as are in international use, shall be used.

2.5.2 Contractor's Drawings:

(a) The Contractor shall submit to the Purchaser for approval except where otherwise specified below, all detailed designs and drawings which are necessary to ensure correct supply of equipment, components and materials and to enable correct and complete erection of overhead equipment, switching stations, booster transformer stations and LT supply transformer stations in an expeditious and economic manner.

(b) Responsibility: It is to be clearly understood that all original designs and drawings shall be based on a thorough study. General designs and dimensions shall be such that the Contractor is satisfied about the suitability of the designs for the purpose. The Purchaser's approval will be based on these considerations and notwithstanding the Purchaser's acceptance, the ultimate responsibility for the correct design and execution of the work shall rest with the Contractor.

2.5.3 Standards for Drawings: All designs, legends note on drawings and schedules of materials shall be in English and shall be prepared in the metric system. All designs and drawings shall conform to specification RE/OHE/25(3/66) or latest version.

2.5.4 Basic Designs:

(a) Standard Designs: Where the Contractor adopt designs and drawing conforming to standard designs, drawings and specifications of the Research, Designs and Standards Organization, Manak Nagar, Lucknow (RDSO) for basic arrangements, equipments, components and fittings of traction overhead equipment, Feeder Wire equipment, switching stations booster transformer stations and LT supply transformer stations and adopts employment schedules furnished by the Purchaser, he shall verify such designs and drawings and employment schedules and satisfying himself that these are correct and the latest approved drawings, before use. Within two months of the issue of letter of Acceptance of Tender the Contractor shall indicate to the Purchaser, the list of standard basic arrangement, components and fittings, drawings and employment schedules, which he will adopt for the purpose of

the work. The procedure outlined in specification shall be followed for approval of basic designs.

(b) Deviations: Normally deviation from the standard drawings of the Purchaser will not be accepted. However, in exceptional cases where the Contractor desires to suggest improvements as a result of his experience or other developments, he shall justify his proposals with supporting explanatory note.

2.5.5 Special Designs:

(a) In cases where standard designs, drawings or employment schedules do not cover requirement of special location or site conditions, the Contractor shall submit his own designs or drawings along with supporting calculations and notes for scrutiny and approval of the Purchaser.

(b) Such special designs shall generally be in conformity with basic designs furnished by the Purchaser and in accordance with the specifications. If the Contractor wishes to adopt special designs which do not conform to the general basic designs of the Purchaser, he shall submit alternative designs and drawings justifying his proposal.

2.5.6 Particular Designs and Working Drawings for OHE:

(a) Contractor's Pegging Plans: The Contractor shall carry out survey and prepare overhead equipment pegging plans. He shall submit such plans for approval after checking their feasibility at site.

(b) Principles of Layout: The Contractor shall in all cases ensure that the final pegging plans are in conformity with the latest "Principles of preparation and checking of OHE layout plans and sectioning diagram" issued by RDSO.

(c) Provisional Layout Plans: The contractor shall prepare and submit overhead equipment layout plants incorporating the following information:

- (i) The run of wires in different thickness or color in special cases and termination.
- (ii) The run of wires for future wiring indicated to the contractor, in dotted lines.
- (iii) Exact position of all cut- in- insulators, including section insulators.
- (iv) Direction and value of stagger at each traction structure location.
- (v) Clearance of live conductors to structures in the vicinity including bridges, signals gantries etc.
- (vi) Layout of feeders.
- (vii) Jumper connections and connection to switches and switching stations.
- (viii) List of infringements.

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- (ix) Kilometer numbers and type of structures.
- (x) Location and number of switches.

(xi) Schematic sectioning diagram drawn to a convenient scale showing section insulator, number of switches, elementary sections and connections to the switches and switching stations.

(xii) Table giving reference of approved profile drawings, feeder layout plans and other relevant drawings.

(d) OHE Profile Drawings: After completion of the overhead equipment layout plans, the Contractor shall prepare an overhead equipment profile drawing showing the actual height of the contact wire under each over line structure, the gradient and height of the contact wire on either side of the structure and the encumbrances at structure until normal height of contact wire and encumbrances are restored.

(e) Cross Section Drawing: While the layout plans are being finalized, the Contractor shall submit for approval, insofar as yard between outermost points and crossing are concerned, cross section drawings for each structure showing guy rods, if any, indicating the cross section of the formation, height and nature of the bank, whether new or old, nature of soil, type of foundation block, structure proposed, reverse deflection of the structure and all necessary particulars for erection of the foundation and the structures. In the preparation of drawings, care shall be taken to show all obstructions such as Signal wires, points rod and their correct location in reference to track/tracks as well as underground obstructions like pipes, cables etc after collecting such information from the site.

In open line sections, cross-sections shall be submitted in the following Performa, separately for each Railway line. For special foundation drawings with all necessary details shall be submitted to the Purchaser. In case of side bearing foundation with extra depth, formation details at such location and necessary details of anchor foundation will be submitted.

Cross Section for the Open Route Section:

Km _____ to _____
S.No. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Location No. _____

Chainage _____

Setting Distance in 'm' _____

Step Distance in 'm' _____

B.M. Code _____

Soil Type & Pressure _____

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Foundation Type & Size

Mast Size & Length in 'm'

Mast Embedded Length in 'm'

Reverse Deflection Cm

Super Mast Length (m)

Cross Arm Length (m)

Any Obstruction

(f) Final Layout Plans: After all the cross- section drawings in a section covered by layout plan are finalized and foundations are casted, the Contractor shall revise the layout plans to take into account any modifications to the locations of structures during the process of casting of foundations.

(g) Structure Erection Drawings: The Contractor shall then submit structure erection drawings for each structure incorporating all the details included in the cross-section drawing for the structure and as erected at site and the details of the bracket assembly, mast extensions, isolator mounting frame and anchorage of overhead equipment, feeder return conductors proposed for each structure together with all particulars necessary for the correct erection of overhead equipment at the structure. For structures with isolators, the details of electrical connection shall also be incorporated. In open line sections the Contractor shall submit structure erection particular in the typical Performa as given below separately for each main line track in addition to particular details as indicated in the Performa for cross-section drawings. Modification to this Performa if found necessary will be finalized at the time of the structure erection drawings.

Sr. No. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Location No.

Chainage

- 1.** Encumbrance
- 2.** Contact wire height

- 3.** Stagger
 - i)** Catenary
 - ii)** Contact

- 4.** Stay arm
 - i)** (a) M

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ii) CODE

5. Bracket

i) (b) M

ii) CODE

6. REGISTER

i) C/D(m)

ii) CODE

7. STD/BENT Code

8. Identification Mark: Other Reference/Codes for Misc. items line steel work for stay/bracket attachment Misc. single/double catenary etc. will be indicated.

2.5.7 Particular designs and working drawings for SSP,

The location plan of will be furnished by the purchaser to the contractor. The contractor shall prepare and submit detailed drg indicate.

i) Position of incoming lines on the gantries (existing) inside the SSP.

ii) Location of switching station gantry showing where the 25 KV outgoing feeders are to be terminated.

iii) Schematic diagram of connections of Interrupters potential transformer

Lightning arrestor, DP isolators, & auxiliary transformer.

iv) Arrangement of cross feeders and longitudinal feeder anchored on the gantry (existing) if any including jumper connections to the overhead equipment

(v) Position of the room in SSP.

(vi) **Earthing lay out drawings**

Earthing layout drawing for each switching station indicating the layout of full earthing system in plan. The drawing shall show the location of earth electrodes and mark the runs of earthing strips and connections to each equipment, gantry mast, fencing post and fencing panel. All components shall be marked with their reference numbers. For further details of the run of conductors and connections, separate drawings which may be common to all switching stations be made and references to the drawings marked on the layout. A schedule of components shall be made out in the drawing giving drawing references of components.

(vii) Cable Run Layout.

Cable run layout of the SSP indicating inter-connection between various equipments, indoor and outdoor, along with schematic arrangements and physical disposition of equipments, colour coding or code number and the index scheme adopted for terminals. The drawings shall also indicate the cable size and grades of insulation. The quantity of various cables required shall be indicated on drawings

(viii) Fencing outline with gates.

2.5.8 Booster and LT supply transformer station drawing. (deleted)

2.5.9 Schedule of Quantities:

(a) Within a month of the issue of Letter of Acceptance of tender, the contractor shall assess the quantities of various items of work including various components and fittings as covered in Schedule 1, Section 2 and submit Schedule 1, Section-2 (Assess 1) along with the corresponding quantity of various fittings and components for approval of the Purchaser. Such an assessment shall be revised at suitable intervals after the first assessment is approved till the work is completed. Such reassessments denominated as Schedule 1, Section-2 (Assess.2) (Assess. 3) etc., shall also be submitted for approval of the Purchaser.

On receipt of approval of each & final layout plan from the purchaser, the following schedules of quantities relating to each layout plan shall be submitted within a fortnight.

(i) Schedules of number of masts, weight of different masts and total weight of masts.

(ii) Schedules of number of foundations, types volume of different foundations and total volume.

(iii) Schedule of quantities of various items of work other than masts and foundations under Schedule -I.

(iv) Schedule of net tension lengths of contact, cat nary and feeder wires and lengths required to be ordered.

(v) Schedule of length of other wires and conductors required to be ordered and

(vi) Schedules of small parts steel-work.

(b) Switching station

(iv) Schedule of number of foundations, types volume of different foundations and total volume.

(v) Schedule of number of masts, type, weight of different masts and total weight of each gantry.

- iii) Schedule of steel work type weight of each member and total weight.
- iv) Schedule of quantity of various items of works of schedule not included in Item (i) , (ii) and (iii) above

Note:- Payment for supply of materials will be made only after approval of OHE layout plan by the Railways as per clause 2.5.6 and approval of Assessment as per clause 2.5.9.

2.5.10 Submission of Drawing Schedules:

(a) The submission of designs and drawings for approval shall be done in the manner indicated below.

In case Contractor wish to deviate from standard drawings, he should submit to the Purchaser revised drawings with full details of deviation sought explaining the necessity of deviation, calculations and other supporting documents. The Purchaser, if satisfied about the necessity and adequacy of deviations, shall refer the matter to RDSO for necessary approval. In case of deviations on working drawings, decision shall be communicated by the Purchaser to the Contractor. The number of copies of drawings which shall be submitted are indicated in the following sub - pares. The Purchaser will return one copy of the drawing either with approval, subject to modification where necessary or with comments. The Purchaser shall endeavor to return this copy within a period of fifteen days from the date of receipt and shall normally return the copy within a month. Where drawings are returned with comments or approval subject to modifications, the Contractor shall submit to the Purchaser within fifteen days of receipt of such advice revised drawings for approval taking into account the comments or modifications. Also, the Contractor shall as far as possible avoid correspondence on such comment and shall endeavor to settle any difference of opinion on the comment by discussions with the Purchaser's Engineers. No drawings shall be resubmitted without incorporating the modifications required by the comments of the Purchaser, unless the Purchaser has agreed to the deletion of such comments.

(b) Deviation from Standard: In case of deviations from standard designs and drawings, copies of correspondence and drawings shall be sent in duplicate to the Dy. Chief Electrical Engineer/Const/North Central Railway, Agra or his successor/nominee. In the particular case of deviation in the design of fittings the drawings of deviation in the design of fittings the drawings submitted by the Contractor shall be actual manufacturing drawings complete with tolerances and full specifications of the materials used. In addition, four samples of the modified fittings shall also be submitted after the drawings are approved.

(c) Special Design: Special designs to meet the requirement of particular locations and local conditions shall be submitted in due time in duplicate for approval.

(d) Contractor's Pegging Plans: The contractor should survey and prepare pegging plans and submit three copies of such plans for

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approval.

(e) Cross-Section Drawings: Cross-section drawings shall be submitted for approval in two copies for a convenient section at a time separately for sections within station limits. Such drawings shall be submitted progressively and as far as possible without gap.

(f) OHE Layout Plans and Profile Drawings: Overhead equipment layout plan, provisional and final and profile drawings shall be submitted for approval in three copies.

(g) Structure Erection Drawings: Structure erection drawings shall be submitted for approval in two copies for a section at a time separately for section within station limits and sections outside station limits, progressively and without gaps.

(h) Schedule of Quantities: Schedules of quantities for each approved layout plan/switching station shall be submitted for approval in two copies.

(i) Distribution Copies: On receipt of Purchaser's qualified approval to the Contractor's drawings, Schedule of quantities, the Contractor, shall submit original tracings of those drawings and schedules for the signature of the Purchaser in token approval within seven days of the receipt of approval and the Purchaser shall as far as possible return the same to the contractor within 7 working days thereafter. On receipt of the tracing from the purchaser, the contractor shall submit copies for distributions to field officers and other department as indicated below within 7 days of receipt of approval tracings:

i.	Standard designs including fittings drawings:	8 copies.
ii.	Special designs:	8 copies.
iii.	Final pegging plans:	8 copies.
iv.	Structure cross- section drawings:	8 copies.
v.	OHE layout plans:	14 copies
vi.	OHE profile drawings:	10 copies
vii.	Structure erection drawings:	10 copies
viii	Modified Sectioning diagram -	10 Copies
ix.	SWR/TWR drawings -	10 copies
x.	Drawings for SSP -	10 copies
xi	LT. Supply transformer stations.	10 copies
xi)	Cable run lay out of the SSP	10 copies
xii)	Earthing layout of SSP	10 copies

In all the above cases the Contractor has the option to supply only six copies of the approved drawings provided one of them is a **transparent paper print of good quality.**

The contractor shall submit 2 soft copies of all AUTO CAD drawings contained in DWG format.

2.5.11 Completion Drawings and Schedule: After completion of work, all drawings and designs submitted by the Contractor and approved by
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the purchaser shall be made up to date incorporating actual supply and erection particulars including the name of make of insulators, galvanized steel tube, stainless steel wire rope etc. The mark of conductors shall be specified in the "As erected" OHE Layout plans, SED and other relevant drawings for identification. Such drawings and schedules shall then be verified and corrected, if necessary, by the Contractor jointly with the Purchaser's representatives. The verified and corrected drawings shall be supplied in four sets, one of which shall be transparencies of linen or film reproduction or any other durable material approved by the Purchaser. **The contractor shall submit 2 soft copies of all AUTO CAD drawings .**

PART - II CHAPTER – VI (For OHE)

ERECTION AND INSTALLATION OF EQUIPMENT

2.6.1 Scope: This chapter deals with the methods of erection and installation of traction equipment, including casting of foundations and erection of structures.

2.6.2 Methods of Erection: All work shall be done in accordance with methods of erection and installation of equipment approved by the purchaser. In the case of switching station, booster transformer stations, LT Supply transformer stations, standard methods adopted for erection and installation of electrical equipment shall be adopted.

2.6.3 Sectioning: The entire equipment shall be erected in accordance with the finally adopted sectioning diagram and in such a way so as to facilitate sectioning which may be required in future and which will be indicated by the purchaser.

2.6.4 Inspection: All erection and installation work shall be subject to inspection by the purchaser to ensure that the work is done in accordance with the specification, approved designs and drawings and is of the best quality suitable for the purpose.

2.6.5 Measurements: All measurements for location of structures and foundations shall be made with the aid of steel tapes. On curves, these measurements shall be taken on the outer rail of the middle track in the case of odd number of and on the inner Rail of the first outer tracks from the center of the formation in the case of an even number of tracks, structures on curves shall be located in the radial of set of the location as determined.

2.6.6 Bolts, Nuts etc: All bolts, nuts, locknuts, screws, locking plates and split cotter pins etc, shall be properly tightened and secured and the contractor shall carry out systematic inspection of this aspect of work after all adjustments to overhead equipment are completed and prior to offering completed section of equipments to the purchaser for inspection and testing.

2.6.7 Damage to Galvanizing Painting: In loading, transport and erection, all galvanized painted materials shall be handled with care to avoid damage to galvanizing/painting. If galvanizing/painting is damaged in spite of all care taken, the damaged parts of component shall be put up for inspection, to obtain permission from the purchaser to carry out repairs.

2.6.8 (a) Foundations: The contractor shall carry out soil pressure tests in accordance with methods approved by the purchaser to determine permissible bearing pressure of various representative types of soils in the presence of the purchaser's representative during the pegging out of site inspection. He shall adopt only those values as accepted by the purchaser for the design and foundations.

(b) Location: The location of each foundation or anchor block shall be set out correctly in accordance with approved structure cross-section drawings or foundations layout drawings, as the case may be, in the presence of the purchaser's representative.

(c) Method of Installation: The contractor shall adopt mechanized method (Concrete mixer) for installations of foundation in the station areas with five lines or more. The contractor may adopt either manual or mechanized method for installation of foundations in the other areas. He may erect traction mast or structures in the same operation as casting of foundations or erect them subsequently in cored holes left in foundation blocks and grout them separately. In any case, the method of casting of foundation blocks and erection of masts or structures shall be subject to the approval of the purchaser.

(d) Excavation: Normally, excavation of soil for foundations or anchor block along the tracks may be done up to length of 1 to 1.2 m and depth of 0.8 to 1 m without shoring, providing the excavated hole is concreted immediately and not left overnight. Shoring shall otherwise be done unless the hole is re-filled with soil and tamped. In case the length of excavation is 1 to 1.2 m and depth of excavation is 1 to 1.2 m and depth for foundations and anchor blocks alongside the tracks is more than 0.8 to 1 m, the excavation may be undertaken only after certification by the Purchaser's representative to be safe and concrete is cast on the same day. Shoring shall be done to the satisfaction of the purchaser's representative, if the excavated hole is left overnight. All water-logged locations will come under the purview of this Para. In poor soil or ash banks, no excavation shall be done without adequate shoring and piling. For large foundations and water-logged locations shoring shall be done in accordance with drawings submitted/shuttering of the pits should be provided effectively to the satisfaction of the purchaser. Core hole covers should be provided promptly on casting of foundation (within 48 hours) and their edges cemented to the foundation block. Prior to doing so, water should be filled in the core hole so as to assist in curing. The date of casting should be inscribed on the foundation block. In case of platform areas and level crossings, the core should be filled with sand before provision of core hole covers so as to prevent any injury to rail users even if the core hole cover gets damaged or is displaced. The track ballast should be restored to its original form promptly after casting of the foundation block. The exceed earth should be removed well clear of the area so as to avoid any mixing up with the track ballast or any obstruction to the track drains. In case of cuttings, the earth should be thrown well away from the shoulders so that there is no risk of its flowing back to the drain during the rains.

(e) Concreting: All concreting or grouting shall be done in accordance with Para 2.2.4 with ballast graded for the purpose specified in Para 2.2.5. The concrete shall be poured and tamped properly in accordance with the method approved by the purchaser. The contractor shall arrange to provide concrete testing samples for tests once every week or as and when required by the purchaser, to determine crushing strength after **7 days or 28 days** curing as required.

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(f) Muffs: All anchor blocks and foundations of structures carrying overhead equipment shall be provided with concrete muffs. The top of these muffs shall be above the level of ground of the track formation and of adequate height of not less than 15 cm to afford reasonable protection during rainy weather. Muffs may be installed at the same time the masts are grouted or after the mast/structure is loaded with equipment. The foundations of structures for switching stations need not, however, be provided with muffs. The top of such foundations shall be given a slope of 1 in 50 towards the edge to ensure that water does not collect at the base of the structure of the frame work of the equipment.

(g) Suitable grooves or niches shall be provided in the foundation blocks, wherever required, at the time of casting, to enable embedment of earth strips etc. to avoid the necessity of chipping off concrete.

(h) Conduits for cables should be embedded in the foundation blocks, wherever required, to avoid subsequent chipping off and breaking of the foundation blocks.

2.6.9 (a) Masts and Structure Erection: In case traction masts or structures are erected in cored foundations, till such time they are grouted, they shall be properly wedged to prevent them leaning towards the track and endanger safety of moving vehicles.

In case traction masts or structures are erected simultaneously with the casting of the foundations, the contractor shall provide suitable temporary supports approved by the purchaser. The masts shall be embedded in the foundation blocks for the correct length specified in approved drawings.

NOTE: (1) The Contractor shall arrange road crane of suitable capacity if Boom, Mast, Portal Upright, TTC erection is feasible by road crane. If, it is not feasible by road crane, rail crane will be provided by Railways and crane driver will be arranged by the contractor.

(2) Masts/uprights should be grouted on the same day they are dropped in the foundations.

(b) Reverse Deflection: All traction masts and structures shall be erected with the correct reverse deflection so that they become reasonably vertical after they are loaded. The method of erection of masts with the correct reverse deflection shall be submitted to the purchaser for approval.

(c) Infringement to Standard Dimensions: In erection, care shall be taken to ensure that no part of the traction mast, structure or any fitting located on such mast or structure infringe the Schedule of Dimensions 1676 mm gauge Revised, 2004 with latest ACS.

(d) Alignment of Masts at Gantries: The main masts of gantries shall be carefully aligned to enable easy and good assembly of fabricated steel work.

2.6.10 A. Equipment

The insulation of the equipment shall be carried out strictly in accordance with the instructions issued by the Manufacturer. The equipment shall be leveled carefully before being fixed finally in position. The bushings of insulators shall be protected adequately during erection of equipment to avoid chipping or damage to the porcelain.

The following methods shall be adopted for mounting the various equipments

Equipment	Method of mounting
i) Main Power transformer	On two 90 lb/yd. Flat/footed rails laid on concrete foundations with a spacing of 1676 mm between the inner face of the rails.
ii) 25 KV Circuit breaker	On steel supports mounted on concrete foundation with operating mechanism kiosk on concrete pedestal where necessary.
iii) 25 KV Circuit breakers and Interruptors.	On fabricated steel supports erected on concrete foundations.
iv) Isolator, potential Transformers, Current, Trans-Former L.T. Supply trans-Formers, 25 KV Fuse switches & Lightning arrestors.	on steel supports mounted on concrete foundation.

The Circuit breakers, interrupters and isolators shall be mounted in such a way that they can be manually operated conveniently by a person standing on a concrete pedestal of suitable height.

v) Shunt Capacitor bank & series reactor	On steel racks which in turn shall be mounted on a concrete plinth with suitable base frame.
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B.Overhead Equipment:

(a) A suggested method for erection of OHE which would ensure good speed and quality erection is included in section 2 of this chapter. The contractor may, however, follow other methods which they consider would speed up and ensure good quality work, subject to the approval of the purchaser. Any wiring method should take into consideration appreciable stretch of the catenary and contact wires in the initial days after they are strung and put

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under tension.

(b) Bracket Tubes: In the erection of bracket assemblies, it shall be ensured that the free length of the bracket tube beyond the catenary suspension bracket is at least 200 mm to facilitate adjustment during maintenance.

(c) Stay Arms: The choice of stay arms shall be such that their adjuster is capable of adjustments of minimum of 90 mm in either direction except as otherwise relaxed.

(d) Insulators: Before insulators are used in bracket assemblies or dispatched to work site for erection from the contractor's stores depot, they shall be tested as specified for routine mechanical test. No chipped or cracked insulators shall be installed. All insulators shall be cleaned before offering complete sections of equipment for inspection and testing.

(e) Stringing Catenary: Care shall be taken to avoid kinking or bride caging of the catenary wire in stringing and subsequent operations. While stringing, the wire shall be suspended from pulley blocks hung from the suspension clamp eye of bracket assemblies. The pulleys shall be fitted with ball bearing free movement in all directions to prevent damage to the strands of the wire. The design shall also be such that it will prevent slipping off of the wire. The design shall also be such that it will prevent slip of the wire during stringing operations. The designs of the pulley shall be submitted to the purchaser for approval. After initial stringing of the catenary, it shall be maintained of the 'No Load Tension' for a minimum duration of 48 hours before the pulley blocks are removed and the catenary is clamped to suspension clamps of bracket assemblies. Shorter periods may, however, be allowed by the purchaser.

(f) Stringing Contact Wire: Care shall be taken to avoid formation of kinks, twists and damage to contact wire in stringing and subsequent operations, while stringing the contact wire, it shall be suspended from pulleys hung from droppers fitted to the catenary in their final position. In curves, the contact wire shall be run in pulleys located at traction masts or supports, corresponding to the approximate final position of the wire.

(g) Location of Droppers: Droppers shall be correctly positioned in each span to ensure correct level of contact wire as per dropper chart applicable to the span.

(h) Clipping Droppers: The droppers shall be clipped on the contact wire only after a minimum duration of 48 hours from the time the automatic tensioning device is brought into action. Shorter periods may, however, be allowed by the purchaser.

(i) Auto Tensioning Device: The auto -tensioning device shall be erected with the correct height of the counter weight above rail level with corresponding distance between the pulleys of the device for a temperature of 35°C before it is connected to the overhead equipment and put into action. The installation of the device shall be such as to permit free, easy and

unobstructed movement of counter-weight.

(j) Cut- in Insulators: All insulators in out of run shall be so positioned that they are away from the swept zone of the pantographs and will not foul with them. The live parts of these insulators shall also be so located that they are at least 2m away from structures other than these supporting tractions overhead equipment.

(k) Section Insulators: All section insulators shall be so located that they are beyond the swept zone of the pantograph running on adjacent tracks and there is no unusual sag due to the same. Where section insulators are installed, the contact plane of the runners of the insulators as well as those of overhead equipment connected to it shall be parallel to the track plane.

(l) Anti-wind Clamp: Anti-wind clamp shall be provided as shown in drawing (Annexure).

(m) Connections: All jumper connections including anti-theft jumpers shall be made properly with parallel clamps and finished neatly without any loose wire or cables. The length of flexible jumpers shall be adequate to avoid any disturbance to overhead equipment or restraint in the relative movement of conductors, but the jumpers should not be excessively long. The ends of jumpers shall be tinned, including the portion inside the first parallel clamp.

(n) Separation between OHE: In erection, the physical separation required between overhead equipment and bracket assemblies on the same structure at insulated overlaps shall be ensured.

(o) Gradient of Contact Wire: The gradient of the contact wire on either side of over line structures with restricted clearances shall be correctly adjusted and adequate clearance maintained between the over line structure and live equipment

(p) Adjustment at turnouts etc: Careful adjustment of equipment shall be made on equipment at turn-outs cross over, diamond crossings, overlaps and special locations for position of bracket assemblies, stay arms and height of contact wire to ensure that pantographs of electric rolling stock on the run will not foul with any parts of the bracket assemblies and changeover of the contact wire is affected smoothly.

(q) For wiring in large yards, the contractor shall prior to the execution of works, submit to the purchaser's Engineer for his approval the sequence of stringing of catenary and contact wires to arrange for proper crossing of wire. Endeavor will be made to arrange for traffic blocks to suit approved sequence of wiring.

2.6.11 Isolators: Isolator switches shall normally be so mounted that when the switches are operated, the operator faces the directions of the motion of trains. The operating handles and contact blades shall be correctly aligned for easy operation.

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2.6.12 Bus-bars and Connections: Bus-bars and connections shall be neatly shaped and bent to give a good appearance.

a) The busbars connections on the incoming side, shall be as tight as possible, all similar connections in adjacent bays being uniformly shaped and bent to give a good appearance. The tubular aluminium bus bars shall be supported data uniform height thought out. Wherever tubular busbars are required to be bend, the radius of the bend shall not be less than 375mm.

(b) All aluminium bus bar joints shall be made carefully. The contact surface of the busbars and connectors shall be cleaned vigorously either by hand with a dry coarse emery cloth or by power driven wire wheel brush. The surface shall be smeared with a suitable corrosion-inhibiting joint compound approved by the purchaser. The joint closed up as possible thereafter and a final light application of joint compound shall be made. Similar procedure shall be followed by conducting the equipment terminals to the bus bar by means of bi-metallic connectors.

2.6.13 Earthing: The copper earth strips of MS flat used for earthing shall be bent and shaped neatly before connection to the structure or frame work of equipment. The connection of MS flat to steel work shall be made at a height not exceeding 15 cm from the datum level of a switching station. Before making earth connections the ends shall be cleaned copper strips. All junctions shall be properly secured to void loose contact. Portions of copper earth strips which remain visible above the ground level should be painted with suitable paint to make them inconspicuous.

2.6.14 Tolerance: The permissible tolerance in dimensions for erection from those included in the appropriate drawings or schedules for different items are given below:

(a) Measurements: The span length shall not vary more than $\pm 50\text{mm}$ as measured along the appropriate rail.

The cumulative error of measurement of all spans in a kilometer shall be not more than 1000 mm.

(b) Setting of Structures: The setting of structure shall be not less than that included in the appropriate cross- section drawings, especially those with the minimum setting of 2.36m. A tolerance of $\pm 20\text{mm}$ will be permitted subject to minimum specified value, if the structure is not located in between tracks.

(c) Height of Contact Wire: $\pm 20\text{mm}$ will be permitted to the height of contact wire at point of supports as shown in the relevant structures erection drawing, except under over line structures where no tolerance will be permitted.

(d) Stagger: Generally, $\pm 20\text{ mm}$ will be permitted for stagger.

(e) Dropper Lengths: $\pm 5\text{mm}$ will be permitted for dropper length.

Dropper location: $\pm 100\text{mm}$ will be permitted for dropper locations.

2.6.15 Supplementary Instructions: Further working instructions will be issued if considered necessary by the purchaser, should be considered that the standard of work of the contractor requires to be improved.

2.6.16 Cabling

a) Laying of cables

All PVC cables provided outdoor shall be either laid in trenches or neatly clamped to the structures as approved by the purchaser. If it become necessary to take the cables connections along the steel supports for the equipments, the cable shall be laid through bent or shaped GI Pipes embedded in concrete while the foundation are being cast. All cables in the cable trenches and along the structures shall be neatly secured with proper clamping arrangement at suitable intervals. Each cable trench/ on the structure shall also be proved at suitable intervals with identifications tables of durable materials bearing indelible engraved or punched marking to facilitate easy identification.

b) Termination of cables

The cables shall be terminated neatly and cores arranged and dressed properly. Suitable terminal strips and ferrules made of PVC or other durable material shall be provided on terminals and wire ends respectively to facilitate identification. The marking on terminals strips and ferrules shall be either in graved or punched so as to be indelible

c) Indoor wiring

As far as possible all cables shall be laid in trenches /pipes proved for the purpose in control room. Where ever necessary indoor wiring on walls shall be clamped neatly on teak wood battens / MS flats fixed to the wall by means of rag bolts grouted in the wall.

PART – II (For OHE)

CHAPTER –VII

INSPECTION AND TESTING

2.7.1 Scope: This chapter deals with the inspection and testing of completely erected overhead equipment, Feeder Wire Equipment, switching stations, booster transformer stations and LT supply transformer stations.

2.7.2 Overall Performance: The overall performance of the overhead equipment should be such as would permit collection of current by electric rolling stock with full load at speeds, up to and including the maximum specified for the design of overhead equipment, smoothly, without mechanical shocks or prejudicial sparks and without undue heating in the case of other equipment.

2.7.3 Responsibility: The general tests of overall performance stipulated below are only supplementary to other tests on structures, foundations, equipment, components and fittings as specified in Part -II, Chapter -II, III and IV. Any testing and acceptance by the purchaser of overall performance shall be subject to the general terms and guarantee which shall continue to be valid as provided for in Part -I, Chapter- II.

2.7.4 Test on OHE:

(a) General: As soon as a section is ready for inspection and testing, the Contractor shall advise the Purchaser in writing. Tests to be carried out by the Purchaser will be done in the presence of the Contractor's representative and shall include the following apart from other reasonable tests that the purchaser may like to conduct with a view to ensure, himself of the soundness of the equipment and their erection in strict compliance with the specification.

(b) Insulation: The strength of the insulation and the dielectric strength of the entire equipment as installed shall be tested with a 2500 V Megger.

(c) Continuity: The electrical continuity of the line and the existence of bad contacts, if any, will be tested with a Megger.

(d) Electrical Independence: The electrical independence of individual elementary sections in relation to one another shall also be tested with a megger.

(e) Switches: All isolators shall be tested for smooth and trouble-free operation.

(f) Tension Device: All automatic tensioning devices installed shall be tested for sensitive functioning and adjustment.

(g) Stagger and Height: The stagger and height of contact wire over the entire section of completed overhead equipment and the clearance available shall be measured and the measurement shall be checked against

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approved drawings. These measurements shall be carried out at low speed with a vehicle or device to be arranged by the Purchaser, the movement of which will follow the track levels as closely as possible. Tolerances that will be permitted on the dimensions indicated in the approved drawings.

The actual position of the two contact wires, relative to each other, at overlaps and turnouts shall also be checked. Special attention shall be paid to a smooth movement of Pantographs over section insulators, particularly those which are likely to be frequently traversed.

(h) Mechanical Behavior: The mechanical behavior of the entire equipment shall be tested at various speeds under normal pantographs pressure without energizing the overhead equipment.

(i) Energizing: If the overhead equipment, after being subjected to the above tests in an unexercised condition, is found to be satisfactory, it will be energized with the normal 25 kV AC supply.

(j) Power Collection: Tests shall then be conducted to check if the power collection performance of the overhead equipment is satisfactory after ensuring that the contact wire is adequately clean. For this purpose, an observation car shall be attached next to the electric locomotive. The behavior of the overhead equipment will be watched at various speeds. Power collection shall be considered unsatisfactory if a long blue flash is observed, indicating that the contact between the contact wire and the pantograph is not continuous.

2.7.5 Inspection and Testing of Switching Stations Etc:

(a) Visual Inspection: Visual inspection which shall include check for satisfactory workmanship shall cover all connections, painting, plastering, cleanliness of all insulators etc. and compliance with INDIAN ELECTRICITY RULES.

(b) Operation Test: This test will be conducted on every individual item of equipment such as interrupters, isolators, relays etc. to ensure that the equipment as a whole is functioning properly and is mechanically sound, e.g. in the particular case of isolators, the fixed contact and knife blade have been correctly aligned and operation does not cause undue strain on the equipment. The operation tests will be carried out with the high-tension installation dis-connection from the supply, but by actuating power devices where such are provided. Continuity test of high-tension connections after setting such interrupter and isolator in their respective positions shall also be conducted as part of the operation test.

(c) Insulation: The strength of insulation of the various items of equipment and of the entire installation as whole shall be tested with a 2500 V/500 V megger as required.

(d) Isolators: All isolators will be tested for smooth and trouble-free operation.

2.7.6 Earthing:

- (a)** Earth wires will be checked for continuity and electrical isolation every 1000 m approx.
- (b)** Clearances between earth wires and out-run wires of overhead equipment and signals shall be checked.
- (c)** Earth resistance shall be measured separately for each earth electrode. In this case of interconnected earth electrodes, the net resistance of the interconnected electrodes shall also be measured.

2.7.7 Detailed Procedure for Tests: The detailed procedure for inspection and testing will be furnished to the Contractor. The contractor shall submit the result of tests in the Performa which will be furnished by the Purchaser, in quadruplicate.

PART-II CHAPTER-VIII (For OHE)

WIRING PROCEDURE

2.8.1 Wiring Procedure: This section deals with the wiring procedure which may be adopted for erection of normal overhead equipment.

The following procedure for erection of overhead equipment has been formulated with a view to ensure that:

- (i) bracket assemblies (brackets) and regulating equipment are correctly installed in their final position.
- (ii) the conductors are correctly tensioned, and
- (iii) the need for final adjustments of overhead equipment immediately before energization and commissioning, is virtually eliminated.

2.8.2 General: In the case of regulated equipment when the regulating equipment are in action, the tension in the conductors should remain constant, irrespective of variations in the ambient temperature. As the regulating equipment are brought into action a few days after the stringing of conductors the equipment is unregulated in the intervening period. Any of the following two procedures may be followed for tensioning and clamping of conductors of regulated overhead equipment during stringing operations, i.e., before the regulating equipment are brought into action.

(i) The catenary in tension to 1,200 Kgf, the stipulated tension at the mean temperature of 35° C, whatever may be the ambient temperature during the stringing operations. In this case, at the time of clamping the catenary to the bracket, the bracket should be placed at angular positions corresponding to temperature at the time of clamping and the proportionate to their distance from the anti-creep.

(ii) The aluminum alloy catenary is tensioned at the calculated tension to corresponding to 1200 Kgf. the stipulated tension at the mean temperature of 35° C whatever may be the ambient temperature during the stringing operations.

(iii) The catenary is strained to a stringing tension corresponding to the ambient temperature for the equipment span of the tension length. In this case the brackets are placed in the mean position, i.e., at right angles to the track, when the catenary is clamped or the regulating equipment commissioned.

The advantage of the second method is that once the catenary is strung at the proper tension, there would be no necessity to adjust each bracket separately at the time of clamping the catenary or commissioning the regulating equipment. The erection work is, thus considerably simplified and the possibility of errors greatly reduced. This is also applicable to erection of unregulated overhead equipment.

2.8.3 Erection of Brackets: After the brackets are fabricated correctly in the contractor's depot, in accordance with the approved structure erection drawings, and provided with indelible labels or/painted marking indicating the intended locations for each bracket, they are removed to the site of work and erected on traction masts or supports. The brackets are swiveled to a position at right angles to the track and secured in that position by means of steel wires tied to similar brackets located on the opposite side of the track or other suitable means.

2.8.4 Anti-Creep: The anti-creep of the tension length is then installed in its final position.

2.8.5 Locking the Regulating Equipment: In the case of regulated overhead equipment, the regulating equipment are erected on the terminal masts or structures and their movement locked by suitable means in the middle position, with the distance between the pulleys of the regulating equipment corresponding to 35° C.

2.8.6 Temporary Arrangement: A pulley approximately 30 cm dia is attached to the overhead equipment end of the regulating equipment by means of temporary accommodation fittings at both ends of the tension length to be wired. Over this pulley a flexible stranded wire is passed over. At each end of the wire two ending clamps, one for catenary and one contact wire, are attached. The wire is also clipped in the middle by 'U' - clamp. The length of this temporary arrangement from the regulating equipment to the extremities of the stranded wire passing over the temporary pulley shall be a little longer than the distance between the regulating equipment and the ends of the catenary and contact wires in their final position, to permit easy clamping of terminal fittings during the final termination of the wire.

2.8.7 Stringing Catenary: The catenary is initially terminated in the ending clamp of the temporary arrangement at one end of the tension length. The catenary is thus paid out from the reel of the wiring train and run on pulley blocks hung from the suspension clamp eyes of brackets until the terminating point at the other end of the tension length is reached.

2.8.8 Tensioning of Catenary: The catenary is strained up to the 'stringing tension' corresponding to the 'equivalent' span of the tension length and the ambient temperature at the time of stringing with the aid of a dynamometer, end terminated at the tension. For this purpose, the ambient temperature shall be deemed to be the temperature registered by a thermometer tied to a length of catenary wire 3 to 4 meters long, laid flat on the top platform, on one of the wagons of the wiring train. Subsequently the tension in the wire is checked by measurement a sag with the help of leveling lathe attached to suspension points and to the catenary at mid span by a ladder working party. The sag shall be measured in two spans, each preferably greater than 54 meters, and situated on either side of anti-creep approximately midway between the anti-creep and the termination points. The value of sag measured by this method should be within $\pm 5\%$ of the theoretical value for the corresponding stringing tension, and the temperature at the time of this measurement. In case of discrepancy is noted, the tension

should be adjusted again and sag re-checked as above. After the sag is checked, the catenary is terminated at the ending fitting of the temporary arrangement at the terminating point.

In order to restrict the duration of traffic blocks to the minimum, in the first block, the catenary is strained to the stringing tension with the aid of dynamometers and the catenary is terminated. In a subsequent block, the sag is checked and the Tension readjusted with ladders, if necessary.

2.8.9 Clamping the Catenary: The catenary is clamped on the brackets placed at right angles to the track.

2.8.10 Dropper: Droppers are fitted to the catenary at the correct locations. At the contact wire ends these droppers May be provided with small pulleys or hooks to act as temporary supports when the contact wire is strung. Hooks made of scrap contact wire, suspended from the catenary wire, may also be used as temporary supports.

2.8.11 Stringing Contact Wire: The contact wire is initially terminated in the contact wire ending clamp of the temporary arrangement at one end of the tension length. The wire is then paid out from the reel wagon of the wiring train and supported on the pulleys hung from droppers or on hooks until the terminating points at the either end of the tension, length is reached. In curves, the contact wire shall be registered on pulleys located at traction masts or supports corresponding to the approximate final position of the wire. The axes of these pulleys should be more or less vertical.

2.8.12 Tensioning of Contact Wire: The contact wire is strained to a tension on approximately 1.2 times the tension corresponding to the ambient temperature and terminated in the ending clamp of the temporary arrangement.

2.8.13 Regulating Equipment in Action: The regulating equipment is put into action with the counter weight at the correct height above rail level with distance between pulley or the regulating equipment corresponding to a temperature of 35°C. The regulating equipment is then released and brought into action. The 'U' clamp connecting the flexible stranded wire passing round the temporary pulley is also removed.

2.8.14 Final Adjustment: The entire installation is left in this condition as long as it is possible, preferably for a period not less than 15 days. The temporary pulleys are removed and the conductors terminated in the permanent ending fittings, compensating plates, insulators and turnbuckles. The equalizer plate is kept vertical or at a vertical or at a slightly inclined position (by 2 or 3 cm the contact wire being shorter than the catenary) and the position of the regulating equipment is checked in relation to, the temperature at the time. The contact wire is clipped on to droppers (in the vertical position) and on the steady arms. Contact wire height at the bracket is adjusted as also the stagger and register arm clearance.

2.8.15 Concluding Remarks: If the above method is followed with care, no further adjustment may be needed.

NOTE:

(1) It should be ensured that sagging is done carefully and accurately. The adjustment of tension in the catenary after checking of sag, if required, would be easy if a temporary turnbuckle is inserted in the temporary termination. The use of leveling lathes is recommended for the following reasons:

- (i)** The accuracy of adjustment is greater than that with dynamometers.
- (ii)** No traffic block is required for this operation.
- (iii)** It obviates the necessity of initial tensioning of the catenary accurately thus permitting a reduction in the period of traffic block required for the wiring train.

(2) If feasible, without any hindrance to progress of works, the catenary may be maintained at stringing tension for a period of 48 hours before checking sag and clamping it to the brackets. This would ensure equalization of tension in the different spans. Before clamping the catenary to the brackets, the sag should however, be checked in two spans as indicated.

(3) If it is difficult to obtain separate traffic block for stringing contact wire, the wire may be paid out at the same time, as the catenary, with the following precautions:

- (i)** The contact wire is run and suspended from independent pulleys hooked on the brackets, separately from the catenary pulleys, to avoid twisting together of the two conductors.
- (ii)** The contact wire should not be suspended from the catenary until the later is clamped on the brackets.
- (iii)** The tension in the contact wire before termination should be about 1,500 Kgf. This will ensure that sag is not excessive.
- (iv)** The adjustment of tension and checking of sag of the catenary wire is carried out as if the contact wire had not been strung. Only after adjustment of tension and checking of sag is completed, the contact wire is transferred to the pulleys attached to the droppers or to hooks suspended from the catenary and the tension is adjusted.

(4) When the contact wire is under tension creep takes place which results in an increase in the length of wire and, consequently, the droppers and the equalizer plates would become oblique.

Though creep may continue for a long time, about a year, the bulk of it would occur during the days following stringing. If sufficient period of time is allowed, the contact wire may be clipped to the droppers and the equalizer plates, all in the vertical position and the necessity for any further adjustments before energization and commissioning of the OHE may be reduced to a great extent. If this precaution is not taken at the time of energization of the OHE, the droppers may not all be vertical and staff would have to be deputed for shifting the dropper clips with risk of damage to the contact wire.

(5) Before the temporary arrangement is removed, a reference mark should be made on each conductor. After final termination of the conductors, it should be ensured that two marks are in the same relative longitudinal position as they were before the removal of the temporary arrangement.

PART – III (For OHE)

PARTICULAR SPECIFICATION

Introduction: This part of the specification is complementary to Part- II & deals with general information and criteria for Design, Supply, Erection, Testing and Commissioning of OHE Electrification Bateshwar (BASR) station in connection with conversion of 'D' class station into 'B' Station in Agra Division of N.C. Railway.

3.1 Location: This work is to be executed in Agra Division of North Central Railway under Electrical Construction Unit.

3.2 Schematic Diagram: The existing Sectioning diagram of OHE work of the section along with Engineering plan will be supplied to the successful tenderer for developing modified sectioning diagram of the section.

3.3 General Particulars:

(a) The bearing capacity of the soil is likely to vary from 5500 to 22000 Kgf /Sq m. The actual bearing capacity shall however be determined in accordance with test results, procedure of test is as provided in tender Document.

(b) Access Road: The sites are mostly approachable by Kaccha/Pucca Road / from nearest Railway station.

3.4 Climatic Data Temperature:

(a) For the equipment's installation which will be in the open space, a minimum temperature 4 degree C and a maximum temperature of 65 degree C are to be considered. The mean temperature should be taken as 35-degree C.

(b) Rain Fall: Rains occur generally from June to September.

(c) Humidity: The maximum relative humidity is nearly 85%.

(d) Wind Pressure: Basic wind pressure of 155 Kgf /Sq. m is adopted for OHE design. Any revision in these figures for wind pressure will be advised in due course.

(e) Thunder Strom: This region is subject to storm and rain fall during the monsoon from June to September.

3.5 Labor & Materials: Un-skilled labor is available almost all over the section.

3.6 Contractor's Office: It is obligatory on the part of the Contractor to establish an office as convenient to purchaser in Agra for planning, designs and for expeditious finalization of particular designs & working drawings. The office should be headed by a qualified Project Manager whose credentials shall be approved by the purchaser's Engineer. In addition, the Contractor would have to establish field construction office at convenient and approved locations for co-ordination and progressing of Field works.

3.7 Contractor's Depots: The contractor shall establish a Depot at suitable
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location to be approved by the purchaser, subject to availability of land. Space available at the sub-stations may also be used by the contractor for temporary storage of materials with approval of the Purchaser's Engineer.

3.8 Rolling Stock: Electric locomotive with height not exceeding 4.398 m with the pantograph in the locked down position and diesel locomotives 4.42m (14 feet 6 inches) high, would run on this section.

3.9 Over Dimensional Consignments: The maximum height of over dimensional consignment which will ply on this section is 4.8m (15'9") at present. No restriction in the height of consignment will be imposed after electrification for movement under power condition.

3.10 Type of OHE: The existing OHE used is regulated conventional type with following span and pre-sag:

Span	Pre-sag
54 & 63 m	50 mm

3.11 Duration of Traffic Blocks: Normally track occupation may be granted at any time during day light or night hours to suit convenience of traffic operation and will ordinarily be granted on one track at a time over a distance covered by one or two consecutive block shadows. Normally the duration of block on any section will be 3 to 4 hours in a day for all the tracks in the section taken together. In special case, track occupation may be granted during night hours. Blocks provided may be utilized for one or more working gang or track Lorries or ladder trolleys to suit convenience of work. If Blocks are granted during night hours, the contractor will make his own arrangements of lighting at his own cost for execution of work.

3.12 Tower Wagon: The tower wagon will be given free of cost by the Railway to the contractor only for adjustment of turnouts, crossovers, section insulators and tower wagon checking with the Division.

3.13 Crane:- One diesel crane of adequate capacity if required will be provided by the purchaser for erection/removal of portal booms at different location free of all charges including pay and allowances of new crew in all running expenditure. In case of damage due to accident/mishandling during the period when the crane is in the custody of contractor, the contractor shall carryout all the repairs /rehabilitation exclusively at his own cost. However, the contractor shall make his own arrangement for loading /unloading of all material at his depot or at works' site.

3.14 Addresses:

The list of addresses to which correspondence and documents relating to the Contract should be sent is as under:

i. For All Policy, Contractual & Commercial Matters.

Dy. Chief Electrical Engineer, Construction, North Central Railway, Agra.

ii. For Security Deposits:

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Dy. FA&CAO/Construction, North Central Railway, Agra

iii. For Matters relating to particular design and working drawings:

Dy. Chief Electrical Engineer, Construction, North Central Railway, Agra

iv. For matters relating to standard designs and drawings for fittings, components, and equipment's and prototype tests:

Dy. Chief Electrical Engineer, Construction, North Central Railway, Agra

v. Matters relating to progressing of field work, scheduling of quantities and submission of bills:

Dy. Chief Electrical Engineer, Construction, North Central Railway, Agra

3.15 Quantities: The approximate quantities of various items of work mentioned in Schedule.

PART - IV

LIST OF DRAWINGS AND SPECIFICATIONS

ANNEXURE – A

This Annexure contains reference to drawing number, charts, schedule specifications and other data referred to in various paragraphs of this tender paper.

All references to drawings, charts, schedules or specifications given in this annexure shall be taken to be the **Latest Version** of such drawings, charts and schedule of specifications as issued by the Purchaser.

TENTATIVE LIST OF STANDARD DRAWINGS.

Sl.No	Brief Description	Drawing		ModNo.
		Series	Number	
1.	Extra allowance for setting of structures on curves (1676 mm Broad gauge)	ETI/OHE/G	00111 Sh-1	B
2.	Standard setting of structures in the vicinity of signals (broad gauge)	-do-	00112	C
3.	Typical design of bearing foundation.	-do-	00131	-
4.	Deleted-			
5.	Typical design of cantilever mast	RE/33/G	00141 Sh.3	-
6.	Standard drilling schedule of OHE masts 9.5 m long RSJ and BFB respectively.	ETI/OHE/G	00144 Sh.3	C
7.	Span and stagger chart for (conventional OHE, Cad. Cu. Catenary & Cu. Cont. Wire) wind pressure 75,112.5 & 150 kgf/sq.m.	ETI/.OHE/G	00202	-
8.	Employment schedule for Cantilever mast regulated OHE cat.65/Cu and Cont 107/Cu,WP 112.5 kgf/sq.m. without Ex& without RC.	ETI/OHE/G	00153 Sh.1	E
9.	Employment schedule for Cantilever mast regulated OHE cat.65/Cu and Cont 107/Cu,WP 112.5 kgf/sq.m. without Ex& without RC.	ETI/OHE/G	00153 Sh.2	E
10.	Employment schedule for Cantilever mast regulated OHE cat.65/Cu and Cont 107/Cu,WP 112.5 kgf/sq.m. without Ex& with RC.	ETI/OHE/G	00153 Sh.3	E
11.	Employment schedule for Cantilever mast regulated OHE cat.65/Cu and Cont 107/Cu,WP 112.5 kgf/sq.m. without Ex& without RC.	ETI/OHE/G	00153 Sh.4	D
12.	Employment schedule for Cantilever mast regulated OHE cat.65/Cu and Cont 107/Cu,WP 112.5 kgf/sq.m. at 35 XC & 28 kgf/Sq.m. at 4xC without (E x & RC)	ETI/OHE/G	00154	D

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13.	Employment schedule of bracket tubes regulated pressure Conventional OHE(Cd catenary & Cu contact wire 1000 kgf tension Each).	ETI/OHE/ G	00158 Sh.1 (for wind pressure 75 kgf/sq.m.)	-
		-do-	Sh.2(for wind pressure 112.5 kgf/sq.m.)	
		-do-	Sh.3(for wind pressure 150 kgf/sq.m.)	
14.	Dropper schedule for – uninsulated Overlap spans.	-do-	00169	A
15.	Dropper schedule for – insulated Overlap spans.	-do-	00170	A
16.	Dropper schedule for conventional regulated OHE. With Zero 160resage (1400/1400).	-do-	00177	A
17.	Adjustment chart of Regulating equipment 3-pulley Type 3:1 ratio.	-do-	00195	A
18.	Schematic arrangement of regulated OHE	-do-	02101	A
19.	Schematic arrangement of uninsulated overlap(3&4 span overlaps)	-do-	02121 Sh.4	A
20.	Schematic arrangement of insulated overlap.	ETI/OHE/ G	02131 Sh.3	A
21.	Termination arrangement of OHE with 3 pulley type regulating equipment (3:1 ratio).	ETI/OHE/ G	04212	B
22.	General distribution of droppers.	ETI/OHE/ G	00161	-
23.	Outline of Pantograph (Broad gauge and meter gauge)	RE/33/G	00181	A
24.	General formation of single track Embankments and cutting (Broad gauge)	RE/33/G Sh.1	01101	A
25.	General formation of double track in Embankments and cutting (Broad gauge)	-do-	01102 Sh.1	A
26.	General formation of multiple tracks (1675mm. Gauge).	-do-	01103 Sh.1	A
27.	Standard anchor arrangement	-do-	01401	E
28.	Anchor arrangement with drawf mast.	ETI/OHE/ G	01402	B
29.	Schedule of anchor block for BG track	-do-	01403 Sh.1	D
30.	Double guy rod arrangement with anchor block for BG track..	-do-	01403 Sh.2	C
31.	Schedule of anchor block for BG track (Black cotton soil).	-do-	01403 Sh.3	B
32.	Standard guide tube arrangement on	ETI/OHE/	01505	-

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	a mast and structures.	G		
33.	Trapezoidal counter weight arrangement on OHE structures.	-do-	01502	-
34.	Arrangement of 3 KV & 25 KV Pedestal insulator supports on OHE masts and portals.	-do-	01601	-
35.	Standard arrangement for mounting of number plate on OHE structure.	ETI/OHE/ G	01701	A
36.	Schematic arrangement of regulated overhead equipment.	-do-	02101	A
37.	Typical arrangements of OHE on cantilever masts for double track section.	-do-	02102	-
38.	Typical arrangement for fixing of bracket assembly on 9.5 m mast and structure to suit raising of tracks(in future)	-do-	02102 Sh.3	-
39.	Mast on platforms (1676mm. Gauge)	ETI/OHE/ G	02104 Sh.2	A
40.	Details of bracket arrangement on tangent and curved tracks.	-do-	02106 Sh.1	A
41.	Details of bracket arrangement for OHE (High speed).	-do-	02106 Sh.3	C
42.	Single bracket assembly on structures and dropped arms.	RE/33/G	02107	D
43.	Box type cantilever arrangement.	ETI/OHE/ G	02108	A
44.	Arrangement at anticreep.	-do-	02111	A
45.	Standard cantilever arrangement for boom anchor anticreep location.	-do-	02113	-
46.	Schematic arrangement of uninsulated over Lap (type-I) 3 & 4 span overlaps.	RE/33/G	02121 Sh.1	F
47.	Schematic arrangement of insulated overlap.	ETI/OHE/ G	02131 Sh.1	
48.	General arrangement of regulated OHE at turnout (overlap & crossed type).	-do-	02141	C
49.	General arrangement of regulated OHE at cross over (overlap & crossed type).	-do-	02151	
50.	Arrangement of neutral section	-do-	02161 Sh.1 of 2.	C
51.	Arrangement of neutral section assembly (PTFE Type) at SWS	-do-	02162	-
52.	Arrangement of short neutral section.	-do-	02161 Sh.2 of 2	-
53.	Schematic arrangement of unregulated overhead equipment.	-do-	03101	-
54.	Standard termination of OHE (Regulated & un-regulated)	ETI/OHE/ G	03121	D
55.	General arrangement of unregulated OHE at turnout (overlap and crossed type).	-do-	03151	-
56.	General arrangement of unregulated OHE crossovers and diamond crossings (overlap and crossed type).	-do-	03152 Sh.1	-

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57.	General arrangement of unregulated OHE crossovers and diamond crossings.	-do-	03152 Sh.2	-
58.	General arrangement of head span.	-do-	03301	-
59.	General arrangement of pull off.	-do-	03201	A
60.	In span jumper connection between catenary & contact wire.	-do-	05101	-
61.	Continuity jumper connection at un-insulated overlap.	-do-	05102	C
62.	Arrangement of anti-theft jumper.	-do-	05107	A
63.	Connection at turnouts.	-do-	05103	B
64.	Potential equalizer connection at insulated overlap and neutral section.	-do-	05104	-
65.	Connections at diamond crossing.	-do-	05106	A
66.	General arrangement of connections to OHE by copper cross feeder (150)	-do-	05121 Sh.1	C
67.	General arrangement of connections at switching station on double track section by copper cross feeder (150)	ETI/OHE/ G	05122 Sh.1	C
68.	General arrangement of connections at switching station on multiple track section by copper cross feeder (150)	ETI/OHE/ G	05123 Sh.1	C
69.	Suspension of 25kv feeder (spider) on OHE masts.	-do-	05143	B
70.	Termination of feeder, return conductor and return feeder (copper & aluminum).	RE/33/G	05145-1	
71.	Arrangement of suspension of double spider 25 kv feeder and return feeder between sub-station and feeding station.	-do-	05152	C
72.	Assembly of section insulators.		051181	C
73.	General arrangement of earth wire on OHE mast.	ETI/OHE/ G	05201	A
74.	General arrangement of earth wire on OHE mast.	ETI/OHE/ G	05201-1	-
75.	Arrangement of transverse bonds	ETI/OHE/ G	05251	A
76.	Connection of return conductor to track.	-do-	05306	F
77.	Suspension arrangement of aluminum return conductor (spider) on traction structures.	-do-	05306	B
78.	Suspension of return conductor (spider) from boom of structures (with clevis type disc insulators).	-do-	05312	A
79.	Connections between OHE and aluminium return conductor at booster stations.	ETI/OHE/ G	05413	B
80.	Mounting of 25kv isolators on OHE structures (General arrangement).	-do-	05513 Sh.1	A
81.	Details of small part steel work for supporting 25kv isolator on new T.C.C. boom.	-do-	05513 Sh.2	A
82.	Connection from isolator to OHE	-do-	05516	A

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83.	Characteristics of conductors/bus bar for 25kv AC traction	-do-	05600	A
84.	Arrangement of mounting 25 KV/240,10 KVA LT supply transformer.	ETI/OHE/G	05522	-
85.	Employment schedule for cantilever mast regulated OHE Caty.65 Cu.Cont.107/CU (WP 75 kgf/sq.m.)	ETI/C	0702(OHE only)(Sh.1)	A
		ETI/C	(OHE+EW)(Sh.2)	A
		do	OHE+RC)(Sh.3)	A
		do	OHE+EW)(Sh.4)	A
86	Employment schedule for tramway type regulated OHE (WP-75kgf/sqm)without EW and without RC	ETI/C	0704	A
87	Employment schedule for 8"x8" 35lbs BFB(9.5mtr long)(WP-112.5kgf/sqm cat.65/CU &Cont.107/Cu.cantilever mast regulated OHE Caty.65 Cu.Cont.107/Cu	ETI/C	0702(OHE only)(Sh.1)	A
88	Employment schedule for OHE mast overlap central location with 3.0mtr. implantation .Cat.65/Cu & Cont.107/Cuy.WP 75kgf /sq.m	-do-	0709	A
89	Employment schedule for OHE mast overlap central location with 3.0mtr. implantation .Cat.65/Cu & Cont.107/Cuy.WP 112.5 kgf /sq.m	-do-	0710	A
90	Employment schedule for OHE mast(9.5m) overlap central location with 3.0mtr. implantation .Cat.65/Cu & Cont.107/Cuy.WP- 75 kgf /sq.m	-do-	0711	A
91	Employment schedule for OHE mast overlap central location with 3.0mtr. implantation .Cat.65/Cu & Cont.107/Cuy.WP 112.5 kgf /sq.m	-do-	0712	A
92	Employment schedule for OHE mast(9.5m) long 200x200x49.9 kgf OHE Mast overlap inter- location with 3.0mtr. implantation .Cat.65/Cu & Cont.107/Cuy.WP- 75 kgf /sq.m	-do-	0713	A
93	Employment schedule for 9.5 m long 200x200x49.9 kgf OHE Mast Cat.65/Cu & Cont.107/Cuy.WP- 112.5 kgf /sq.m	-do-	0714	A
94	Employment schedule for 9.5 m long kgf OHE Mast Cat.65/Cu & Cont.107/Cuy.WP- 75 kgf /sq.m	-do-	0715	A
95	Employment schedule for OHE mast overlap anchor location with 3.0m implantation Cat.65/Cu &	-do-	0716	A

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	Cont.107/Cuy.WP- 112.5 kgf /sq.m			
96	Employment schedule 0721for regulated OHE mast (9.5m)wind pressure 75kgf/sq.m for composite OHE (1000&1000) kgf tension .	ETC/C	0721 (OHE only)(Sh.1)	
		-do-	(OHE+EW)(Sh.2)	
		-do-	(OHE+RC) (Sh.3)	
		-do-	(OHE+EW)(Sh.4)	
97	Employment schedule for regulated OHE mast(9.5m)wind pressure 75kgf/sq.m.for composite OHE with extra setting distance overlap anchor location.	-do-	0722	
98	Employment schedule for regulated OHE mast (9.5m) wind pressure 75kgf/sq.m.for composite OHE with extra setting distance overlap center location.	-do-	0723	
99	Employment schedule for regulated OHE mast(9.5m) wind pressure 75kgf/sq.m.for composite OHE with extra setting distance anchor location.	-do-	0724	
100	Employment schedule for pre-stressed concrete mast(PC-42) 9.5m long for conventional OHE,normal location (WP-150,112.5 and 75kgf/sq.m. regulated OHE mast(9.5m) wind pressure 75kgf/sq.m.	-do-	0725	
101	Standard portal (N,O,P,R,G & Double BFB type)	ETIC/C	0064	
102	Volume chart and equivalent chart of foundation.	-do-	0058 Sh.1	E
103	-do- new pure gravity	-do-	0058 Sh.2	C
104	-do-Dry black cotton soil(NBC type)A	-do-	0058 Sh.3	-
105	-do-new pure gravity(500m,exposed)	-do-	0058 Sh.4	A
106	-do-Dry black cotton soil(NBC type)2.5m depth.	-do-	0058 Sh.5	A
107	-do-(for a direct load of 4000kg).	-doi-	0058 Sh.6	A
108	Special BFB portal for 5 tracks(general C arrangement)	ETI/C	0026 Sh.1	C
109	Protective screen at foot over bridge and road over bridge.	-do-	008	F
110	Chart for portal foundation	-do-	005/68	
111	Muff for OHE structures	-do-	007/68	D
112	Structure muff for sand core foundations	-do-	0012/69	D
113	9.5m standard traction mast (fabricated 'K' series)	-do-	0018-2	D
114	Remote control cubicle at switching station, foundation, RCC slab Building plan & steel door.	-do-	0067	B
115	9.5 standard traction mast (fabricated	ETI/C	0071	E

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	with bottom plates 'B' series)			
116	Details of OHE foundation in soft rock (bearing capacity 45,000 kgf/sq.m.	-do-	0059	A
117	Details of foundation for fencing Upright	-do-	0032	A
118	Employment schedule for switching and booster station main masts	ETI/C	0185	B
119	Drilling schedule for S-1 mast	ETI/C	0030	F
120	-do- S-2 mast	-do-	0031	D
121	-do- S-3 mast(length 11.4m).	-do-	0180	C
122	Drilling Schedule for 8"x6"x35 lbs RSJ mast 8.0m long for booster transformer station Type S-4)	-do-	0036	E
123	Drilling schedule for S-5 mast (11.4m long)	-do-	0042	E
124	-do-S-6 mast(length 12.4m)	-do-	0181	C
125	-do-S-7 mast(length 12.4m)	-do-	0182	C
126	-do-S-8 mast(length 12.4m)	-do-	0182	C
127	-do- S-9 mast (length 9.4m)	-do-	0184	C
128	General arrangement & details of fencing panels & gate for switching station.	-do-	0186 Sh.1	E
129	Details of fencing upright and anti-climbing device for switching station.	-do-	0186 Sh.2	E
130	S-100 fabricated mast for mounting LT supply transformer and dropout fuse switch.	-do-	0043	B
131	S-101 details of mast for supporting isolator inside switching station.	ETI/C	0044	A
132	Details of anchor beam for SP,SSP,&FP	-do-	0033	D
133	Details of small parts steel for switching station.	-do-	0034 Sh.1	K
134	Details of bracing for switching & B.T.masts.	-do-	0034 Sh.2	B
135	Details of small parts steel of out rigger for switching station and booster transformer stations.		0037	C
136	Details of small parts for booster transformer stations.	ETI/C	0040	E
137	Details of pre-cast cable trench for switching stations	-do-	0038	E
138	Standard 'R' type portal rod laced general arrangement.	-do-	0011/69 Sh-1	C
139	Standard 'G'type portal special upright and end piece.	-do-	0056	C
140	Short bored pile foundation for traction mast(permissible BM & volume)	-do-	0062	C
141	Chart for portal foundations in dry black cotton soil safe bearing capacity 16500kg/sq.mm.	-do-	0063	B
142	Dwarf mast foundation on wet & Dry black cotton soil	RE/ALD/O HE/SK/C	02	-
143	Typical design of new pure gravity foundation.	ETI/SK/C	131	-

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144	Typical design for side gravity foundation.	-do-	142	-
145	Rock Anchor for BG Track	ETI/SK/C	208	-
146	Bracket fitting for PCS masts capacity – 4.200 kg .m.	ETI/SK/C	214 Sh.1	E
147	SPS details of earth wire clamp of PSC masts	ETI/SK/C	214 Sh.1 of 2.	-
148	Special arrangement of OHE under over line structure.	ETI/OHE/SK	529	D
149	Earthling and bonding of PSC masts.	-do-	537 Sh.2 of 2.	D
150	Typical earthling arrangement in SPUN D PSC mast with 18mm dia rod.	-do-	537 Sh.2	B
151	Arrangement of anti theft jumper at over lap.	-do-	566	-
152	Catenary's dropper assembly.	ETI/OHE/P	1190	B
153	Parallel clamp (20/20)	-do-	1550	E
154	Standard Guide tube assembly.	-do-	5060-2	C
155	Standard anti – wind clamp.	-do-	2550-1/2	L
156	Multiple cantilevers cross arm assembly.	RE/33/P	3120	H
157	Anchor fitting assembly on rolled section.	ETI/OHE/P	3230	C
158	Anchor fitting assembly on K series , TCC masts.	-do-	3240	D
159	Anchor assembly on N and O type portal up right.	-do-	3250	D
160	Structure bonds.	-do-	7000	E
161	Earthling station.	-do-	7020	B
162	Longitudinal rail bond.	-do-	7030	F
163	Short super mast assembly.	ETI/C/P	8010	G
164	Long super mast assembly	-do-	8020	C
165	Bracket attachment assembly on portal upright (N, O,R,P, G, & BFB type)	-do-	8030	B
166	Super mast assembly on portals	-do-	8050	C
167	Medium super mast assembly	ETI/OHE/P	8060	C
168	Compensating plate	-do-	5191-1/2	D
169	Suspension clamp	RE/333/P/	1160	J
170	Double suspension clamp	-do-	1170	K
171	Double suspension lock plate	-do-	1172	C
172	Catenary splice (65)	ETI/OHE/P	1090	-
173	Typical location and schematic connection diagram for a 3 interruptor switching station	ETI/PSI/	003	E
174	Typical general arrangement of a 3 interruptor switching station	-do-	004	E
175	Typical location plan and general arrangement for sectioning and paralleling station	-do-	005	E
176	Typical location plan and arrangement for a feeding station	-do-	006	E
177	Typical general arrangement at a booster transformer station (with 4 cross feeder) type III	-do-	013	B

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178	Typical general arrangement of 280 KVA booster transformer station (with 4 cross feeder) type III	-do-	018	A
179	Typical general arrangement at a booster transformer station (without cross feeder type I)	-do-	011	C
180	Typical number plate for auxiliary transformer	ETI/PSI/P	7525	-
181	Typical fencing and anti climbing arrangement at switching station	ETI/PSI/	104	E
182	Typical ear thing layout of sub sectioning and paralleling station	-do-	201	B
183	Typical ear thing layout of sectioning and paralleling station	-do-	202	B
184	Typical ear thing layout of feeding station	-do-	203	B
185	Farthing details of interrupter LT supply transformer 25 KV lightning arrester PT type – I (S-100 masts, S-101 mast, fencing upright and main mast)	-do-	204	A
186	Typical ear thing layout at a booster transformer station (without cross feeder) for type –1& II.	-do-	211-1	A
187	Typical cable runs lay out of a sub – sectioning & paralleling station.	-do-	301	C
188	Typical cable runs lay out of a sectioning & paralleling station	-do-	302	C
189	Typical cable runs lay out of a feeding station.	-do-	303	B
190	Typical earthling lay out at a booster transformer station (with 4 cross feeder for type III, IV, and V.)	ETI/PSI/	212	B
191	Typical drawing for a terminal board.	-do-	501	C
192	36 mm Aluminum Bus terminal.	ETI/PSI/P	6480	C
193	-do – Splices.	-do-	6490	B
194	-do – Tee connector.	-do-	6500	C
195	36 mm Aluminum terminal.	-do-	6510	D
196	36/15-tap connector.	-do-	6520	B
197	36 mm Aluminum flexible bus splice.	-do-	6550	B
198	36 mm Aluminum bus splice cum connector.	-do-	6560	B
199	Typical number plate for interrupter and double pole isolator.	-do-	7520	B
200	Typical number plate for potential transformer.	-do-	7521	B
201	Typical number plate for booster transformer.	-do-	7522	B
202	Standard plan for Remote Control cubicle at switching station.	RE/Civil/B S-11/95.	-	-
203	Typical details of pressed steel door window and ventilator.	RE/Civil/S -115/95.	RI	-
204	Bolted base connection for portals located in drains.	ETI/C	0010	C
205	Details of base plate for mast on drains in station yards.	-do-	6002/68.	A

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TANTATIVE LIST OF STANDARD DRAWINGS FOR TRAMWAY TYPE OHE (REGULATED)				
206	Span and stagger chart for tram way type OHE (Regulated)	ETI/OHE/G	04201	-
207	Dealing schedule of OHE mast 8.5m & 9m long RSJ & BFB respectively	-DO-	04202 SH-1 SH-2	C
208	Schematic arrangement of tram way type OHE (Regulated)	-do-	04203	C
209	Arrangement of bracket assembly for tram way assembly (Regulator)	-do-	04204	B
210	Arrangement of anti creep for tram way type OHE (Regulator)	-do-	04205	B
211	Arrangement of anti creep for tram way type OHE (Regulated alternative arrangement)	-do-	04206	B
212	Arrangement of section insulator for tram way type OHE (Regulated)	-do-	04207 SH1	B
213	Small parts steel for supporting section insulator assembly for regulated tram way type OHE	-do-	04207 SH2	B
214	General arrangement for turn out for tram way type OHE (regulated)	-do-	04208	-
215	Adjustment chart for tram way type OHE (Regulated)	-do-	04209	-
216	Bridle wire clamp (6 mm)	ETI/OHE/P	1070-1	B
217	Large suspension clamp 20mm (with armored rod)	-do-	1580 SH2	-
218	Hook bracket	-do-	2380	C
219	BFB steady arm assembly for tram way assembly (Regulated)	-do-	2540-1	-
220	Anti wind clamp for tram way OHE (Regulated)	-do-	2550-3	E
221	Counter weight assembly (Light)	-do-	5090-3	F
222	Counter weight assembly with pulley type regulated equipment (3:1) ratio	-do-	5090-6	B
223	Employment schedule for tram way type regulated OHE without RC and EW (W.P.112.5 Kgf /sqm)	ETI/C	0705	A
224	Protective spring at FOB / ROB	- -do-	0068	F
225	Proposed height gauges at level crossing upto 7.30 m span	RE/ CIVIL / 92/84	R-2	-
TANTATIVE LIST OF STANDARD DRAWINGS FOR COMPOSITE OHE (REGULATED)				
226	Employment schedule for OHE masts un regulated OHE without RC and EW (WP =150 Kgf/ sqm at 10 degree centigrade	ETI/ OHE/G	00150	D
227	Employment schedule of bracket tube regulated conventional OHE (Cd – Cu catenary and Cu content wire) 1000 Kgs tension each) for wind pressure 150 Kgf/ sqm at 10 degree centigrade	ETI/ OHE/G	00158 Sh. 3	-
228	Employment schedule of bracket tube	ETI/	00159 Sh.	-

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	un regulated conventional OHE (Cd – Cu catenary and Cu content wire)	OHE/G	-3	
229	Schematic arrangement of un insulated over lap (Al Alloy) catenary and contact wire	ETI/ OHE/G	02121 Sh. -3	-
230	Schematic arrangement of insulated over lap (Al Alloy) catenary and contact wire	ETI/ OHE/G	02131 Sh. -2	-
231	General arrangement of regulated composite OHE at turnouts (over lap and crossed type)	ETI/ OHE/G	02141 Sh. -2	-
232	Standard termination of regulated composit OHE	-do-	03121 Sh- 2	B
233	In span jumper connection between Alu alloy catenary and copper contact wire .	-do-	05101 Sh- 2	B
234	Continuity jumper connection at un insulated over lap Alu alloy catenary and copper contact wire .	-do-	05101 Sh- 2	-
235	Connection at turnouts for composite OHE	-do-	05103 Sh- 2	-
236	Potential equalizer connection at insulated over lap and natural section (Alu alloy catenary and copper contact wire .)	-do-	05104 Sh- 2	-
237	Connection at diamond crossing for composite OHE	-do-	05106 Sh- 2	C
238	General arrangement of connection to composite OHE by cross feeder (spider)	-do-	05124 Sh- 2	C
239	General arrangement of connection at switching station on double track section for composite OHE	-do-	05125 Sh- 2	C
240	General arrangement of connection at switching station on multiple track section (with composite OHE and spider cross feeder)	-do-	05126 Sh- 2	C
241	Assembly of section insulator (with Alu. Alloy catenary and copper contact wire)	-do-	05181 Sh- 2	-
242	Standard arrangement of supporting cantilevers on boom of portals an d TTC (to avoid Bird's nesting)	ETI/C	0076	C
	Employment schedule for OHE mast (9.5m long) wind pressure 112.5 Kgf per sqm for composite OHE (1000 + 1000) Kgf tension OHE only	ETI/C/071 7	Sh-1	-
	-do- OHE + EW .		Sh-2	-
	-do- OHE + RC.	ETI/C/071 7	Sh-3	-
243	Employment schedule for OHE mast (9.5m long) wind pressure 112.5 Kgf per sqm with 3.0 implantation .			
244	- do- over lap anchor location	ETI/C/071 8		
245	- do- over lap Central location	ETI/C/071		

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		9		
246	- do- over lap inter location	ETI/C/0720		
247	Employment schedule for OHE mast (9.5m long) wind pressure 150 Kgf per sqm copper OHE .	ETI/C/	0726 Sh-1	-
248	Employment schedule for OHE mast (9.5m long) wind pressure 150 Kgf per sqm copper OHE and EW.	ETI/C/	0726 Sh-2	-
249	Employment schedule for OHE mast (9.5m long) wind pressure 150 Kgf per sqm copper OHE and RC	ETI/C/	0726 Sh-3	-
250	Employment schedule for OHE mast (9.5m long) wind pressure 150 Kgf per sqm copper OHE RC and EW.	ETI/C/	0726 Sh-4	-
251	Employment schedule for OHE mast (9.5m long) wind pressure 150 Kgf per sqm copper OHE with higher implantation over lap anchor location .	ETI/C/	0727	-
252	Employment schedule for OHE mast (9.5m long) wind pressure 150 Kgf per sqm copper OHE with higher implantation over lap central location .	ETI/C/	0728	-
253	Employment schedule for OHE mast (9.5m long) wind pressure 150 Kgf per sqm copper OHE with higher implantation over lap inter location .	ETI/C/	0729	-
254	Employment schedule for tram way type regulated OHE WP 150 Kgf per sqm without RC & EW .	ETI/C/	0706	A
255	Alu. Alloy catenary suspension clamp (MCI)	ETI/OHE/Sk	176	D
256	Double suspension lock bodhy (galvanized MCI)	-do-	205	B
257	Parallel grove clamp (14/9)	-do-	123	D
258	Parallel grove clamp (18/14)	-do-	231	D
259	Catenary dropper clip assembly with bimetallic washer.	-do-	233	D
260	Envelope type end fitting assembly for all Alu alloy standard cat. Wire (size 19/2.79 mm)	-do-	436	B
	Crimp type repair sleeve for AAA standard catenary wire.	-do-	285	C
	Catenary splice (Cone type) Alu alloy catenary	-do-	134	D
	Alu. Catenary suspension clamp assembly (MCI)	-do-	468	A
	Double suspension clamp assembly (MCI for Alu alloy catenary)	-do-	469	A
	Span and stagger chart for composite OHE.	-do-	375	A
	Double suspension clamp body for Alu alloy catenary	-do-	1171-1	A

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LIST OF STANDARD SPECIFICATIONS

Sr no	Title of specification	Specification no
1.	Annealed Standard Copper conductor for jumper wire.	ETI/OHE/3(2/94) with A&C slip no 1 of 4/95.
2.	Copper bus wire.	RE/30/OHE//5(11/60)
3.	Structural steel tubes.	ETI/OHE/11(5/89).
4.	Hot dip galvanized of steel mast (Rolled and fabricated) tube and fitting used on 25kv AC OHE.	ETI/OHE/13(4/84) with A&C slip no 1 of 5/86, 2 of 4/90 and 3 of 4/90.
5.	Stain less steel wire rope.	ETI/OHE/14(9/94) with A&C slip no 1 of 9/95, 2 of 1/97, 3(8/99) 4 of (12/99)& 5 of (10/2001.)
6.	Solid core porcelain insulator for 25 KV 50 Hz over head lines .	ETI/OHE/15(9/91) with A&C slip no 1 of 5/99, 2 of 2/2000, & 3 of 2/2000 .
7.	25 KV single and double pole isolators	ETI/OHE/16(1/94)
8.	Bolts nuts and washers	ETI/OHE/18(4/84) with A&C slip no 1 of Nov. 84, 2 of 6/87 & 3 of 9/87.
9.	Alu. Alloy section and tubes	ETI/OHE/21(9/74)
10.	Standard for drawings for traction over head equipments .	ETI/OHE/25(3/66)
11.	Section insulators assembly	ETI/OHE/27(8/84) with A&C slip no 1 of 10/92.
12.	Enameled steel plates .	ETI/OHE/33(7/88)
13.	Galvanized steel wire	ETI/OHE/36 (12/73) with A&C slip no 1 of 5/98
	Regulating equipment (a) winch type (5 :1)	ETI/OHE/48(7/84) with A&C slip no 1 of 9/87
	Regulating equipment (b) 3 pulley type (3 :1)	ETI/OHE/48A (9/85) with A&C slip no 1 of 11/87 & 2 of 8/99
15.	Fitting for 25 KV 50 Hz AC over head traction equipments .	ETI/OHE/49 (9/95) with A&C slip no 1 of (6/97) No. 1 of (4/2000) CORE -1
16.	Cadmium copper conductor for overhead Rly traction.	ETI/OHE/50 (6/97) with A&C slip no 1 of (6/97)
17.	Principal of OHE lay out plan and sectioning diagrammed for 25 KV AC traction.	ETI/OHE/53 (6/88) with A&C slip No. 4 of 8/92.
18.	All Alu. Alloy standard catenary wire (19/2.79mm)	ETI/OHE/54 (2/85) with A&C slip No. 2 of 10/92.
19.	Bimetallic (Alu/ Cu) strip for 25 KV AC traction .	ETI/OHE/55 / 4/90.
20.	Short neutral section assembly (phase break)	ETI/OHE/63 (5/91) with A&C slip No.2 of 2/94.
21.	Code of bonding and earthing for 25 KV single phase 50 Hz AC traction system	ETI/OHE/71 (11/90) with A&C slip No. 2 of 3/93.
22.	Insulated Cadmium copper catenary 19/2.10 mm dia for provision under line structures in the 25 KV AC electrical traction	ETI/OHE/75 (4/95) with A&C slip No. 1 of (7/96) & 2 (6/99)
23.	Battery charger for 110V battery 40 AH	ETI/PSI/1 (6/81)

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24.	7.5 KV lightning arrestor	ETI/PSI/3 (8/75) with A&C slip No.1 of 2/91
25.	25 KV potential transformers	ETI/PSI/8 (10/92) with A&C slip No.4 of 6/97
26.	25 KV drop out fuse switch and operating pole for use with 10 KVA and 100 KVA 230V LT supply transformer.	ETI/PSI/14 (1/86) with A&C slip No.1 of 4/87
27.	25 KV / 240V, 10 KVA LT supply transformer.	ETI/PSI/15 (08/2003
28.	1110 V 40 AH lead acid batteries	ETI/PSI/216/81) with A&C slip No.1 of 7/81
29.	150 KVA booster transformers dry type	ETI/PSI/97(6/87) with A&C slip No.1 of 2 of 9/88
	Oil filled	ETI/PSI/98 8/92) with A&C slip No.1 of 9/92 and 2 of Jan 94.
30.	25 KV single pole out door SF -6 gas instructor	ETI/PSI/167/(9/97)
31.	25 KV single pole out door vacuum interrupter	ETI/PSI/167/(9/97)
32	Joint less Grooved Copper Contact Wire 107 sqmm	ETI/OHE/76/(6/97) with A&C slip no 1.

NOTE: -

- 1) Above drawings /specifications may be purchased from the RDSO/office of CEE/CORE/PRYJ on payment of their cost.
- 2) For structural steel (standard quantity) please refer IS: 2062 – 1992.
- 3) Any amendment in specification and drawings subsequent to LOA, if required to be carried out shall need approval of CEE/CON/ duly considering the financial implication of the same either in upward or downward direction.

ELECTRICAL (GENERAL) AGRA**LIST OF LIKELY SOURCES FOR POWER SUPPLY & GENERAL SERVICE ITEMS/ EQUIPMENT**

Sr. No.	Item	Specification/IS No.	Likely Sources
1	Transformer upto 500KVA	IS: 2026/1977 part 1 to 4	Crompton Greaves, NGEF, Kirloskar, EMCO, TESLA Kanohar, BHEL, Andrew yule, Bharat, Bijlee, Alsthom, ABB, Voltamp, Siemens, GEC, Voltas, TELK
2	11Kv/HT vacuum circuit breaker. SF-6/11Kv gas filled circuit breaker.	IS: 3427	Crompton Greaves, BHEL, Andrew yule, Alsthom (Areva), Jyoti, ABB, Siemens, GEC, Alind, L&T, Schneider, Biecco Lawrie
3	ACB (11Kv)	IS: 13118/1991 IS: 13947/1993	Crompton Greaves, Jyoti, MEI, ABB, Merlin Gerin, Siemens, GEC, Alind, L&T, Schneider, Moeller Biecco Lawrie, English electric, Legrand
4	MCCBs, MCBs, ELCBs, RCCBs, DB, ICTPN, TP, HRC fuse changing over switch, switch fuse unit	IS: 8828/96 for MCB, IS: 13947 (Part-1&5/Sec1)/93 for MCCB, IS: 12640 (Part-1)/2000 for RCCB, IS: 13703 (Part-2/sec 1)/93 for HRC fuse, IS: 13947 (Part-3)93 for SFU	Crompton Greaves, Jyoti, ABB, Merlin Gerin, Siemens, GEC, Andrew Yule, BCH, L&T, C&S, Havells, Schneider, Moeller, Indo asian, Legrand, Standard, HPL
5	LT-XLPE cable 11/33Kv grade	IS: 7098 (Part-2)/1985	Asian, NICCO, Universal, Torrent, Fort Gloster, INCAB, Industrial cable, Polycab, Finolex, Indian cable, Havells,
6	PVC/XLPE power cables up to 1.1Kv grade	IS: 694/1990 for PVC cable, IS: 1554(Part 1)1988 for heavy duty PVC cable, IS: 7098(Part-1)/1988 for XLPE cable	CCI, Universal cable, Polycab, Asian, NICCO, Torrent, Fort Gloster, Incab, Industrial cable, Finolex, Kalinga, Havells
7	Instrument voltmeter, Ammeter, PF meter	IS: 1248 for analog	Automatic Electric, Meco, Industrial meter, Motowani, Toshniwal, L&T, Siemens, Rishab, IMP, Shanti, Moeller(HPL)
8	11Kv cable End termination & jointing kits	IS: 13573/92	Raychem, 3M, Safe system, Mahindra & Mahindra, Hari consolidated (Cable seal brand), Densons (Yamuna)
9	Relays	IS: 3231/65	Siemens, Alsthom, EA SUN REY Roll, Jyoti, ABB, BHEL, Alind, GE, BCH, L&T, Minilec, Enercon
10	Luminaries, T-5 fitting & related accessories	IS: 9974 (Part-1)/81 for HPSC, IS: 10322 (Part-5), 10322 (Part 2&3)/84 for Luminaries, IS: 15111 for CFL	Phillips, Crompton Greaves, Bajaj, GE, Osram, Wipro, Havells For T-5 fitting- Phillips, Osram, Wipro, GE only
11	PVC insulated multistrands copper wires sheathed/	IS: 694/1990 for PVC cable	Finolex, Universal cable, Polycab, Asian,, Fort Gloster, Incab, Kalinga, RGP, Havells, HPL

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	unsheathed, PVC flexible LT cable multi core, single core, flat cable for submersible pumps		
12	Current transformer	IS: 2705 (Part-2)/92	Automatic Electric, CGL, C&S, MECO, KAPPA, Siemens, L&T, Schneider
13	On line UPS, servo stabilizer, inverter CVT	IS: 13314/92 for Inverter IS: 11260/85 for voltage stabilizer	AEI, BHEL, Hind Rectifier, L&T, NGEF, Siemens, HI-REL, Autometer, Enertech, pyramid, APC, Dubas, Luminous, Microtech, TATA Libert
14	Rotary switches, selector switches	IS: Relevant	Kaycee, L&T, Salzer, GE, ABB, C&S, siemens, HPL, Moeller
15	Exhaust fan/Air circulator/Bracket & pedestal fans/ceiling fan	IS: 374/79 for ceiling fan IS: 2312/67 for Exhaust fan	Crompton Greaves, Khaitan, GEC, Usha, Philips, CGL, Bajaj, Polar, Orient, Almonard.
16	Galvanized High Mast Tower/ Tubular pole/ Octagonal pole/Polygonal pole for general purpose lighting	IS: 875 (Part-3) for High mast IS: 10025/1993 for BSTN, CPE III TRT/1996 of ILE UK, Octagonal pole S355JO, IS: 2629 Galvanization IS: O-1461 BSEN	Bajaj, Philips, GE, CGL, Utkarsh
17	Electronic Energy Meter	IS: 13779/1999, IEC: 62053-21	L&T, IMP, HPL, Secure, ABB, Enercon, Havells.
18	Central Air conditioning plants & Package type plant AC unit-package.	IS: 8148/1991 for package type	Voltas, Blue star, Sidwal, Fedder Lloyd, Shri Ram, Videocon, Amtrex, Carrier, Frick, Hitachi, O General, Mitsubhisi, RC registered firms of DGS&D
19	AC unit Split/window	IS: 1391 (Part 2)/1992 for Room Air condioners Split type IS: 1391 (Part 1)/1992 for Room Air condioners window type	Daikin, O General, Hitachi
20	Capacitors PF correction for Electrical General Services	IS: 13340/93, IS: 13341/92	ABB, BHEL, Indian Capacitors, Khatau Junker, Shreem, Unistar, WS Insulators, L&T, Hind Rectifier, Voltas, siemens, Shakti, Schneider, Indian Condenser, EPCOS
21	DG Sets Portable	IS: 1001-1981/1991	Birla Yamaha, CGL, Shriram Honda
22	DG Engine	IS: 13364	Cummins, Kirloskar, Caterpillar, Ashok Leylend, Penta-volvo
23	Alternator for DG set	IS: 4722/2001 IS: 4728/1975	KEC, Stampford, Leroy-somer, BHEL, Kirloskar-Green, Cummins, Mahindra, Caterpillar
24	Induction Motor	IS: 235/96, IS: 12615/2004	Bharat, Bijlee, BHEL, CGL, GE, Jyoti, Kirloskar, Siemens, ABB, NGEF, Alsthom or similar
25	LT switchgear & control gear, Contactors & motor starters, Energy Efficient soft starter panel/earthing switch, single phase preventer	IS: 13947 (Part 1)/1993 IS: 13947 (Part 4)/1993	ABB, CGL, Jyoti, L&T, MEI, NGEF, Siemens, Telemecanique & control (india) (TC), Legrand (MDS), BCH, standard, GEC, BHEL, Minilec, Enercon, Andrewyule, C&S, N.N. planner, Power Boss, Schneider or similar
26	Pumps- Submersible	IS: 8034/2002 for submersible pump sets IS: 9283/1995 for motors of submersible pump sets	Calama, CGL, Jyoti, Kirloskar, KSB, TEXMO, Waterman, unnatti pumps, universal engineer, Lubi, Varuna, Shakti

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		IS: 14220/1994 for open well submersible pump sets	
27	Timers electronic solid state	IS: 5834/1991 Relevant	ABB, BHEL, GE, Jyoti, L&T, BCH, siemens, Minilec, Legrand
28	Water coolers	IS: 1475/2001	Blue star, Fedders, LLYOD, Kelvinator, Shriram, Sidwal, Voltas
29	Electrical accessories (Piano switch, Plugs & sockets, ceiling rose, Angle holder, holders)	IS: 3854/97 for switches IS: 1293/05 for plugs & sockets IS: 371/99 for ceiling rose IS: 1258/2005 for lamp holder bakelite	SSK (Top line), Anchor (Penta-or-net), Precision (Prime), Vinay (Clair-30), CONA (Nice-Indian), Leader, Legrand, ABB, Rider, Havells
30	Bell Buzzer	IS: 2268/1988 or latest	CONA, MAX, Anchor, Leader, SSK
31	Electronic fan regulator	IS: 11037/1984	Anchor, Usha, ERIK, Rider, Havells
32	Solar cell/Module system	IS: Relevant	TATA BP, BEL, BHEL, REIL, MOSER BEAR, CEL, Sharp Business System (India) Ltd.
33	Solar Lighting system	IS: Relevant	Tata, Reliance, UTL
34	GI/MS Pipe	IS: 1239 (Part-1)/2004/relevant latest	TATA, Jindal, TT Swastik, Prakash, Surya, BST
35	Geysers	IS: 2082/93	Bajaj, Usha, Crompton, Spherehot, Recold, Venus
36	Lifts & Escalators	IS: 14665/2000	OTIS, Thysson Krup, Shindler, KONE, Mitsubhisi
37	LEDs	IS: 16105(2012), IS: 16108(2012), IEC:62471.	NICHIA / CREE/OSRAM/ SEOUL/ PHILIPS/ LUMILEDS/LEDNIUM/BAJAJ
38	Solar Water Heaters	IS: Relevant	As per MNES approved sources
39	Solar Distilled water plants	IS: Relevant	
40	Energy savers used for lighting loads	IS: Relevant/RDSO approved	As per RDSO draft specification No. RDSO/PE/SPEC/PE/0083 (Rev.-0)/2007
41	Air cooling plants	IS: 8148/1976	Voltas, Blue Star, Carrier or similar
42	Battery charger for other than battery room for Train Lighting	IS: 2026 IS: 3895	Hind Rectifier, Usha Rectifier, Suresh Electrical, Pyramid, Automatic Electric, Delta Elect, Trinity Elect, Universal Ind. Products, Venus Engg., RS Power
43	Battery Charger for battery room	As per RDSO specification having regeneration facility	Amar Raja, EXIDE, RS power, Kirloshkar
44	PVC Conduit pipe & Casing capping for electrical wiring	IS: 9537/1980	Precision, A.K.G., Polycab, Finolex, BEC, Prestoplast, stargold, Diplast, Garware, V Plast, Modi
45	Air Curtain	IS: Relevant	Aircon, ALMONARD, Technocrate, Thermadyne, Mitzwak
46	Water purifier/aqua guard	IS: 14724/1999	
47	Air break Isolators and earthing switch (GODO)	9921-1972(Part-3)-1982(part-4)	Regular : ABB, ALIND, CGL, JOYTI, KIRON, MYSORE ELECTRIC , NGEF, SIEMENS, TRANS ELECTRICALS, ATLAS Mumbai,
48	Capacitor-Fans and motors	1709:1984	Regular: BHEL, CGL, INDIAN CAPACITORS, KHATAU JUNKER, VOLTAS, WS INSULATOR,
49	Capacitor-PF correction for electrical general services.	2834-1986 superseding by IS 13925-1988	Regular: ABB, BHEL, INDIAN CAPACITORS, KHATAU JUNKER, SHREEM,UNI STAR, WS INSULATOR, SHAKTI.
50	Induction Motor	IS: 325/1996	Regular: BHARAT BIJLEE, BHEL, CGL,

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			GE, JYOTI, KIRLOSKER ELECTRIC
51	Instrument transformers CT/PT	----	Regular: AUTOMATIC ELECTRIC, CGL, JSL IND, AREVA T&D India Ltd (Formerly ALOSTEM Ltd)
52	Air break Isolators and earthing switch (GODO)	9921-1972(Part-3)-1982(part-4)	Regular : ABB, ALIND, CGL, JOYTI, KIRON, MYSORE ELECTRIC , NGEF, SIEMENS, TRANS ELECTRICALS, ATLAS Mumbai,
53	Lightning arrestor	3070/ part 1, 1985	ELPRO/OBLUM/LAMCO/GCL (N)
54	Insulators	731	BHEL/JAYSHREE/Sheshasayayee/W.S./Bengal Potteries
55	Pumps –vertical turbine	1710:1989	Regular, JYOTI, KIRLOSKER BROS, MATHER & PLATT.
56	Timer's Electronic	5834/ 1991	Regular, ABB, BHEL, GE, JYOTI, L&T , SIEMENS
57	Transformers distribution above 500 KVA	2026: 1991	Regular, ABB, ALSTOM, BHEL, CGL, EAST INDIA, EMCO, KIRLOSKER ELECT. NGEF, SIEMENS, TESLA, VOLTA MP, VOLTAS,
58	Package Substation enclosed type		ABB, CGL ,SCHNEIDER, GEC AREVA T&D India Ltd (Formerly ALOSTEM Ltd SIEMENS,schneider
59	Engine of D.G set		Kirloskar/ Cummins/Ashok Leyland/ Greaves/ Perkins/ Wartsila
60	Alternator of D.G set		KEC/Stamford/KEL/CGL/BHEL.
61	White Hylum Sheet/Phenalic laminated sheet	IS: 2036/1995	Hylem, Formica, Super Hylem, Anchor
62	Selector Switch	IS: Relevant	Kay Cee, L&T, Salzar, Balaji
63	CFL Lamp	IS: Relevant	Philips, OSRAM, Crompton Greaves, Bajaj, GE India, Havells, Luster, C&S, Halonix, WIPRO
64	HDPE pipe	As per Explanatory Note, Relevant: IS	Carlton, Emtelle, Awadh, Gwalior, Duraline, Rex Polyextrusion Ltd-, Himayalan
65	Time Switch (Timer)	As per Explanatory Note	GIC, HDS, Legrand, Havells, GE India, JSL Industries, Industrial Kalinga, Indo Asian Fuse gear, MDS, Simens, L&T, AEG, ABB, Indo Asian
66	ACSR Conductor	IS: 398/96 or (Latest Version)	As per RC approved makes
67	Automatic Power Factor Correction system		L&T, ABB, Simens, Neptune, Havells, BCH, Schneider
68	Inverter		SUKAM, LUMINOUS or MICROTECK
69	Cabin Fan		Khaitan, Bajaj, Orient, Usha
70	HT VCB Panel (11KV)	IS: 13118 & 3427/1993	Schneider Electric India Ltd-, AREVA T&D, ABB, GE India, Crompton Greaves, Bienco Lawire Limited, L&T, ALIND, Jyoti, ECE industries
71	LED fittings	IS: 16105(2012), IS: 16108(2012), IEC:62471.	NICHIA/CREE/OSRAM/SEOUL/PHILIPS/LUMILEDS/BAJAJ/LEDNIUM Leds to IS: 16105(2012), IS: 16108(2012), IEC:62471.
72	Cable – lugs & accessories for electrical general services.	8309:1993/1998	Regular: KAMLESH IND, KSE ELECTRICAL ,UML ENGG, ALCON,CHETNA ENGG,ELECTRO CRIME,
73	Voltage stabilizers	11260/1985	V Guard, Microteck, Luminus ISI Mark

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Note:

- i.** Item which are covered under RDSO approved list to be procured as per RDSO list
- ii.** Item which are having star rating (BEE certified) to be procured as per RB's guidelines (Ref.No.2006/Elect(G)/150/5 dated 13.08.2007)
- iii.** Any change in make can only be done by approval of Dy. CEE/C/AGC.
- iv.** If any item is not indicated above, the approval of Dy.CEE/C/AGC will be required for such items before execution of work.
- v.** Any deviation from above mentioned sources from Electrical Items shall be got approved by Dy.CEE/C/AGC before procurement and erection.

CHECK LIST**Annexure -1**

1.0	The tenderer should indicate clearly replies against item including in this checklist.	
2.0	Have You	
6.0	Submitted scheme of completion of work (Annexure-4)?	Yes / No
7.0	Furnished the details of previous experience for installation of similar kind / (Annexure -5)?	Yes / No
8.0	Furnished list of works on hand (Annexure-6)?	Yes / No
9.0	Furnished the list of personal organization available and proposed to be inducted (Annexure-7)?	Yes / No
10.0	Furnished the list of Plant and machinery available and proposed to be inducted (Annexure-8)?	Yes / No
11.0	Furnished sufficient documents to prove financial capability?	Yes / No
12.0	Furnished your current ITCC (Income Tax clearance certificates)?	Yes / No
13.0	Kept your offer valid for 60 days?	Yes / No
14.0	Visited the site and have studied the methodology to be adopted for completion of the work?	Yes / No
15.0	Furnished document to support ownership/partnership of the firm?	Yes / No

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Annexure-4 (Form 8)

TENDER’S SCHEME OF WORK (Attach extra sheet if required)

- 1. Issue of preliminary layouts and site location:
- 2. Submission of layout plans for walk-outs and approvals:
- 3. Approval of layout plans:
- 4. Preparation and submission of drawings for approval:
- 5. Approval of drawings:
- 6. Ordering of Steel work on the Purchaser:
- 7. Detailed ordering for materials:
- 8. Bulk order for materials:
- 9. Foundation installation:
- 10.Delivery of steel work:
- 11.Steel work erection:
- 12.Delivery of Materials:
- 13.Erection of equipment:
- 14.Testing and commissioning:
- 15.Guarantee Period:

Month	1.	2.	3.	4.	5	6	7	8

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Annexure-4 (Form 9)NAME OF MANUFACTURER/S PLACE/S OF MANUFACTURE AND INSPECTION OF
SUPPLIES (CORE/RDSO APPROVED SOURCES)

Item	Description of Items	Name & address of Place of Manufacturer	Place of Manufacturer	Place of Inspection.
1	2	3	4	5

Declaration by the Tendered

We hereby confirmed that all the equipments, components and materials which will be supplied by us would confirm to technical and other particulars as detailed in part-II, chapter and would comply with the RDSO's specifications listed in Annexure-I with their latest version as specified in Part-IV of the tender paper. We further confirm that the equipments, components and materials except those listed below would be procured from the approved sources/suppliers approved by CORE/RDSO.

i)

ii)

iii)

Technical details conforming the scope of the concerned specifications and the details of manufacturer for the above items are enclosed in FORM-11(B).

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PART- IV**ANNEXURE - B****LIST OF ITEMS TO BE SUPPLIED BY PURCHASER TO THE CONTRACTOR**

S. No.	Description	Quantity

As per Schedule of Quantity and Rates**NOTE:**

- 1.** The prices against various items of schedule - I shall be exclusive of the cost of supply of the above items.
- 2.** All galvanized bolts, nuts, lock nuts & washers required for assembly & fastening of steel work and mounting of the above equipment's in gantries shall be supplied by the contractor.
- 3.** All the fasteners whether stainless steel or otherwise required for fittings and components shall be supplied by the contractor.

End of Tender Document