
Name of work:
Design, Supply, Erection, Testing and Commissioning of Traction Over Head Equipment at Madurai Junction, including modification to the existing OHE at various part of the Dindigul-Madurai section, introduction of feeder arrangement between TSS & OHE at Samayanallur station and provision of PTFE Neutral Section at near TSS Dindigul in Madurai division of Southern Railway.

VOLUME II

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Dy. Chief Electrical Engineer,
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Book No.
INDIAN RAILWAYS
RAILWAY ELECTRIFICATION

CONDITIONS, SPECIFICATION,
ANNEXURES AND FORMS TO
THE OHE CONTRACT

VOLUME 2

(Annexure to
Tender No. ETR/252/RE/OT/2013-14/4 dated
10.04.2014)
<table>
<thead>
<tr>
<th>Part</th>
<th>Chapter No</th>
<th>Subject</th>
<th>Ref No</th>
<th>Page No</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART-I</td>
<td>Chapter I</td>
<td>Instruction to Tenderers and Conditions of Tender</td>
<td>1.1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Chapter II</td>
<td>Conditions of Contract</td>
<td>1.2</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Chapter III</td>
<td>Prices and Payment</td>
<td>1.3</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Chapter IV</td>
<td>Explanatory Notes of Schedule I, Schedule of Prices.</td>
<td>1.4</td>
<td>53</td>
</tr>
<tr>
<td>Part–II</td>
<td>Chapter I</td>
<td>General Specifications</td>
<td>2.1</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>Chapter II</td>
<td>Foundations</td>
<td>2.2</td>
<td>103</td>
</tr>
<tr>
<td></td>
<td>Chapter III</td>
<td>Structures</td>
<td>2.3</td>
<td>108</td>
</tr>
<tr>
<td></td>
<td>Chapter IV</td>
<td>Equipment’s Components and materials</td>
<td>2.4</td>
<td>113</td>
</tr>
<tr>
<td></td>
<td>Chapter V</td>
<td>Designs &amp; Drawings</td>
<td>2.5</td>
<td>122</td>
</tr>
<tr>
<td></td>
<td>Chapter VI</td>
<td>Erection and Installation and Equipments</td>
<td>2.6</td>
<td>130</td>
</tr>
<tr>
<td></td>
<td>Chapter VI</td>
<td>Inspection &amp; Testing</td>
<td>2.7</td>
<td>140</td>
</tr>
<tr>
<td>Part–III</td>
<td></td>
<td>(See Vol. I)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part–IV</td>
<td></td>
<td>Annexures 1,3,4,5,6</td>
<td></td>
<td>157</td>
</tr>
<tr>
<td>Part–V</td>
<td></td>
<td>Forms of Tenders Etc.  (Form – 1 see Vol. I)</td>
<td></td>
<td>158</td>
</tr>
</tbody>
</table>
PART – I

CHAPTER – I

INSTRUCTION TO TENDERERS AND CONDITIONS OF TENDER

**Note**: Following Instructions & Conditions are created in conjunction with the General Conditions of Contract (GCC) exists in Indian Railways. However, if there arise any variance on any terms in GCC and in the Special Conditions made for this Works Contract, the Special Conditions will prevail.
### PART – I

### CHAPTER – I

**INSTRUCTIONS TO TENDERERS & CONDITIONS OF TENDER**

<table>
<thead>
<tr>
<th>Para No.</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.1</td>
<td>Tender Papers</td>
</tr>
<tr>
<td>1.1.2</td>
<td>Interpretations</td>
</tr>
<tr>
<td>1.1.3</td>
<td>General</td>
</tr>
<tr>
<td>1.1.4</td>
<td>Clarifications</td>
</tr>
<tr>
<td>1.1.5</td>
<td>Earnest Money</td>
</tr>
<tr>
<td>1.1.6</td>
<td>Income Tax Clearance Certificate</td>
</tr>
<tr>
<td>1.1.7</td>
<td>Form of Tender</td>
</tr>
<tr>
<td>1.1.8</td>
<td>Prices</td>
</tr>
<tr>
<td>1.1.9</td>
<td>Deleted</td>
</tr>
<tr>
<td>1.1.10</td>
<td>Specifications and Drawings</td>
</tr>
<tr>
<td>1.1.11</td>
<td>Schedule of Work</td>
</tr>
<tr>
<td>1.1.12</td>
<td>Signing of Tenders</td>
</tr>
<tr>
<td>1.1.13</td>
<td>Tenderer’s Address</td>
</tr>
<tr>
<td>1.1.14</td>
<td>Erasure or alteration</td>
</tr>
<tr>
<td>1.1.15</td>
<td>Result of Tender</td>
</tr>
<tr>
<td>1.1.16</td>
<td>Purchaser not bound to accept any Tender</td>
</tr>
<tr>
<td>1.1.17</td>
<td>Tender in Agreement</td>
</tr>
<tr>
<td>1.1.18</td>
<td>Tenders Confidentials</td>
</tr>
<tr>
<td>1.1.19</td>
<td>Canvassing and bribery</td>
</tr>
<tr>
<td>1.1.20</td>
<td>Indian Labour and Material</td>
</tr>
<tr>
<td>1.1.21</td>
<td>Tenderer’s Credentials</td>
</tr>
<tr>
<td>1.1.22</td>
<td>Submission of Tender</td>
</tr>
<tr>
<td>1.1.23</td>
<td>Opening of Tender</td>
</tr>
<tr>
<td>1.1.24</td>
<td>Joint Venture</td>
</tr>
<tr>
<td>1.1.25</td>
<td>Miscellaneous</td>
</tr>
</tbody>
</table>
PART - I
CHAPTER – I
INSTRUCTION TO TENDERERS & CONDITIONS OF TENDER

1.1.1 TENDER PAPERS

a. The instructions to Tenderers and Conditions of Tender Conditions of Contract, Prices and Payment and Explanatory Notes, Specifications and Forms for Tenders, included in Part I to V shall, hereafter, be collectively referred to as the Tender Papers.

b. The intending Tenderer is advised to study the Tender Papers carefully. The Tenderer shall also acquaint himself with the local conditions means of access to the site of work, nature of work and all other matters pertaining thereto.

c. The submission of Tender shall be deemed to have been done after careful study and examination of the Tender Papers with a full understanding of the implications thereof.

1.1.2 INTERPRETATIONS

a. The following terms wherever occurring in the Tender Paper and wherever used throughout the execution of the work, shall, unless excluded by or repugnant to the context have the meaning attributed thereto as follows :-

b. “Contract” means the Contract resulting from the acceptance by the Purchaser of this Tender either in whole or in part.

c. “Contractor” means the successful Tenderer i.e. the Tenderer whose Tender has been accepted either in whole or in part.

d. “Contractor’s Agent” shall mean the person or persons authorised under a duly executed Power of Attorney to take all actions relating to the work, as could be taken by the Contractor himself. In the case of the firm of Contractors, the Agent shall have the same powers as that of the Managing Director of the Farm.

e. “Contractors Representative” shall mean a person in supervisory capacity who shall be so declared by the Contractor and who shall be authorised under duly executed Power of Attorney to receive materials issued by the Purchaser to the Contractor for the works. He shall be responsible for proper execution of work at each or all places and shall take orders from Purchaser’s Engineers and carry out the same. “Engineer” shall mean the Dy.Chief Electrical Engineer or the Executive Electrical Engineer in executive charge of the Railway Electrification works and shall include the superior officers of the Railway Electrification Department. He is responsible for ensuring that all field works covered by the contract are carried out in accordance with approved designs, drawings and specifications and conditions of contract as agreed to. He is also responsible for prices and terms of payment.

f. “Equipment” means all or an equipment considered necessary by the purchaser’s Engineers for the satisfactory operation, as a whole of the installation, including structures, foundations etc.

g. “Chief Project Manager, Railway Electrification” means the Officer in Administrative charge of this Railway Electrification and shall mean and include the officers to whom the functions are delegated. His Postal address shall be intimated to the successful Tenderers in due course.

h. “Month” Means any consecutive period of thirty days.

i. “Materials” means all equipments, components, fittings and other materials including raw materials required to complete the work.
j. “Purchaser” means the President of India acting, through his accredited officers or any one of them. The Chief Project Manager, Railway Electrification in charge of this Railway Electrification (Whose address will be intimated in due course) shall be deemed to be one of such accredited officers.

k. “Purchaser’s Engineers” means the Engineers appointed by the purchaser as indicated in Part III of the Tender Papers who will decide all matters relating to design, manufacture, installation and commissioning of the plant and equipment at site.

l. “Railway” means the Railway (s) in whose territorial jurisdiction the work is to be carried out and includes the Government of India, Ministry of Railways. (Railways Board) and or General Manager of the Railway concerned.

m. “Sub-Contractor” means an individual or a firm of Contractor or a company registered under Indian Company Act or an approved supplier of materials to whom the Contractor sublets portions of the contract after obtaining specific prior approval of the purchaser in writing to sub-letting of contract.

n. “Site” means the areas to be taken up by the permanent works, together with any other areas or areas as shall be determined by the Purchaser’s Engineers, which may be placed at the disposal of the Contractor for the purpose of the contract and also such area or areas used for store yards, work yards or workshop in proximity of the works as the Purchaser’s Engineers may have authorised as an extension of the site, irrespective of the terms and conditions under which they are occupied by the Contractor.

o. “Tenderer” means and includes any firm of engineers or Contractors or any company or body, corporate or otherwise who submit the Tender which has been invited.

p. “Work” or “Works” means all or any of the items of the work for which the Tenderer/ Contractor has tendered/ contracted according to the specifications drawings and annexures thereto or to be hereafter specified or required in such explanatory instructions and drawings being in conformity with the original specifications, drawings, annexures and schedules and also such instructions and drawings additional to the aforementioned as may from time to time to be issued by the purchaser’s Engineer during the progress of the contracted work.

q. “Writing” includes all matters written typewritten or printed either in whole or in part.

1.1.3 GENERAL

(a) All documents to be submitted in connection with this Tender SHALL BE WRITTEN IN ENGLISH AND IN INK.

(b) All Prices shall also be expressed in words wherever indicated.

(c) METRIC:- Dimensions, Weights etc. SHALL BE QUOTED IN METRIC system. The term “tonne” = 1,000 kg. Shall be used to indicate a metric tonne.

1.1.4 CLARIFICATIONS:- Any clarification required by the Tenderer may be obtained from the Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600008 or his successor/ nominee (whose address will be intimated in due course.)

1.1.5 EARNEST MONEY

(a) The Tenderer shall deposit in favour of the Senior Assistant Financial Adviser, Railway Electrification, Chennai Egmore-600 008 or his successor nominee (whose address will be intimated
in due course) as mentioned in preamble (3 of Preamble) as Earnest Money. Tender unaccompanied with requisite earnest money deposit shall be summarily rejected. The said earnest money shall comprise the following:

Tenderers shall hold the offer open for a period of four months from the date fixed for opening the same it being understood that the tender documents have been sold/issued to the tenderer and the tenderer has been permitted to tender in consideration of the stipulation on his part that after submitting his tender he will not resale from the offer or modify the terms and conditions thereof, in any manner not acceptable to the Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008 or his successor/ nominee (whose address will be intimated in due course) Should the tenderer fail to observe to comply with the foregoing stipulation the aforesaid amount mentioned in para 3 of the Preamble shall be liable to be forfeited to the Railway.

(b) The receipt shall be incorporated in the original copy of the Tender. The earnest money should be paid in cash or in any of the following forms:

(i) Deposit receipts, Pay order and Demand Drafts. These forms of earnest money could be either of the State Bank of India or of any of the Nationalized Banks. No confirmatory advise from the Reserve Bank of India will be necessary.

(ii) Deposit receipts executed by the Scheduled Banks (other than the State Bank of India and the Nationalised Banks) approved by the Reserve Bank of India for this purpose. The Railways will not however accept deposit receipt without getting in writing the concurrence of the Reserve Bank of India.

(c) Earnest money may be accepted in the following forms:

(i) A deposit in cash,

(ii) Government securities at 5% below the market value,

(iii) Deposit receipts or demand drafts of the Nationalised/Scheduled Banks,

(iv) A deposit in the Post Office Saving Bank,

(v) National Savings Certificates,

(vi) Twelve Year National Defense Certificates,

(vii) Ten Year Defense Deposits,

(viii) National Defense Bonds,

(ix) National Savings Certificates,

(x) Time Deposit Account which came into force on 16-3-1970 and notified under Ministry of Finance, Notification No. F3(7)NS/70 dated 28-2-1970

(xi) IRFC Bonds

Note:- (vi) to (vii) These certificates / bonds may be accepted at their surrender value.

In case the earnest money is deposited in cash. The payment should be made to the Chief Cashier/Southern Railway/Park Town, Chennai-600008 or his successor/ nominee (Whose address will be intimated in due course) and cash receipts obtained from him should be furnished along with the Tender.

(d) No interest will be paid on the Earnest Money. It will be refunded in full to the un-successful Tenderer on application. In the case of successful Tenderer/s the deposit will be retained as part of payment of the Security Deposit, or will be returned on payment of the full security deposit for due fulfillment of the Contractor in terms of para 1.2.17.

(e) The total earnest money shall be forfeited without prejudice to other rights and remedies available if the Contractor fails to execute the agreement or start the work within a reasonable time (to be determined by the Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008 or his successor / nominee (whose address will be intimated in due course) after the notification of the acceptance or his/ their tender.

1.1.6 Minimum Eligibility Criteia:-
i) The tenderer(s) shall be eligible only if he/they fulfill minimum Eligibility criteria of having received total contact amount during the last three financial years and in the current financial year with a minimum of 150% of the advertised tender value.

ii) Authentic certificates shall be produced by the tenderer(s) to this effect which may be an attested certificate from the employer/client, Audited balance sheet duly certified by the chartered Accountant etc.

1.1.7 FORM OF TENDER

(a) The Tenderer shall submit his Tender in Two Copies, Each copy of the Tender shall be complete in all respects. The copies should be marked “Original” and “Duplicate”. All Duplicate copy of the Tender shall be replica of the Original in all respects except as specified in note below. The Tenderer may submit his tender on his own paper but he shall strictly adhere to the forms for Tender included in Part V of the Tender Papers. The nomenclature and Part numbers of various components and materials as used in the Tender papers shall be strictly adhered to. The tender and its contents shall be FOOLSCAP/ QUARTO size. Tenders not submitted in the proper form are liable to the rejected. Both copy of the Tender shall consist of the following.

1. Offer Letter complete with summary of prices, duly filled in (Form 1)
2. Memorandum of the Tenderer (Form 2)
3. Complete technical data and particulars of the equipment offered, as specified in the Tender Papers together with Descriptive literature, leaflets etc. (Form 3)
4. Deviations from the Tender Papers - Deleted - (Form 3)
5. Alternative proposals of the Tenderer (Form 4)
6. Prices:
   - Schedule 1 - Deleted - (Form 5)
   - Schedule 2 - Deleted - (Form 6)
   - Schedule 3 - Deleted - (Form 7)
   - Schedule 4 - Deleted - (Form 8)
   - Schedule 5 - Deleted - (Form 8)
   - Schedule 6 - Deleted - (Form 9)
7. Tenderer’s scheme of work and time schedule (See para 1.1.11) (Form 10)
8. Name of manufacturer/s place of manufacture and inspection of supplies. (Form 11)
9. Tenderer’s Credentials (See para 1.1.20) (Form 12, 12A & 12 B)
10. Cash receipt for Earnest Money or Demand Draft for EMD (Form 13)
11. Income Tax Clearance Certificates for the last 3 years
12. Drawings, if any, complete with list.
13. The Tenderer shall submit the latest Solvency Certificate issued by the revenue department in the name of the Firm/Tenderer duly attested by Notary Public. Those Tenderers who are not in a position to obtain solvency Certificate from Revenue Department may Submit other forms of Certificates for their financial status duly attested by Notary Public.

Note: I) A copy of the Tender Papers duly signed in ink by the Tenderer on each and every page in token of his having studied the Tender Papers carefully shall be attached with the Tender.

ii) The original and duplicate copies of the Tender shall be signed on each and every page in ink.

iii) The original copy of the deposit receipt for Earnest Money and Notarised copy of the Solvency Certificate and ITCC (if available) shall be incorporated in the original copy of the Tender. Other copies of the Tender shall contain true copies of the deposit receipt and Notarised copy of the Solvency Certificate and ITCC (if available).

(b) MEMORANDUM OR DESCRIPTIVE MATTER - DELETED –

(C) DEVIATIONS FROM THE TENDER PAPERS - DELETED –

(D) ALTERNATIVE PROPOSALS

Should the Tenderers have alternative proposals for basic arrangements typical designs and specifications drawings for components and materials (See para 1.1.10) which the Tenderer considers would improve the operating performance of the equipment or would reduce the cost of the equipment he shall incorporate them in the Tender for consideration by the Purchaser (Form 4). He shall clearly indicate in detail the technical and/or financial advantages which would accrue to the Purchaser specifically for each alternative proposal suggested by him.

1.1.8 PRICE:- This is a Works Contract. The prices to be paid for supply and erection of various items of work or for materials and other amount payable, shall be in accordance with accepted schedules or prices or rates as governed by the terms and conditions of payment included in Part —I, Chapter – III – Prices and Payment.

1.1.9 Deleted

1.1.10 SPECIFICATIONS AND DRAWINGS:- The Tenderer shall follow the LATEST standard general arrangement drawings and other drawings & specifications relating to the equipment components and fittings specified in the Tender Papers. A list of standard drawings and specifications is enclosed in Annexure-I, Part – IV. Copies of the above standard drawings are available for inspection in the drawing office of the Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai or his successor/nominee (whose address will be intimated in due course). If the Tenderer so desires he may purchase full sets of drawings and specifications from the Office of the Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600008 or his successor nominee (whose address will be intimated in due course) on payment. However if the Tenderer desires to purchase individual drawings and Tenderer desires to purchase individual drawings and specifications he may do so from Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008. Successful Tenderer should collect the latest specifications from Chief Project Manager office, Egmore, Chennai-600 008 before submitting the quantity assessment.

1.1.11 SCHEDULE OF WORK

(a) The Tenderer shall indicate the Period in months within which he would complete the work in the section, assuming that the letter of Intent for the work is issued to him is week Zero.
(b) **TIME PROGRESS GRAPH**

The Tenderer shall enclose with his offer the scheme of work and time schedule (See Form 10 Part V) on graph paper showing the period of time that he will take for the various items of work listed therein. The Tenderer shall indicate in the Form of notes to the schedule the assumptions and the basis adopted for the preparation of the time schedule. Detailed time schedule as required under para 1.2.18 shall be based on this time schedule. Any reduction offered by the Tenderer in the period allowed for completion of works will be taken into account while examining the offers.

**1.1.12 SIGNING OF TENDERS**

(a) Any individual or individuals signing the Tender or other documents connected therewith should specify whether he is signing:

i) As a sole proprietor of the concern of the attorney or
ii) As a partner or partners of the firm or,
iii) For the firm per procreation, or
iv) As a Director, Manager or Secretary in the case of limited company.

(b) In the case of firm not registered under the Indian Partnership Act, all the partners of the Attorney duly authorised by all of them should sign the Tender and all other connected documents. A copy of the document empowering the individual or individuals to sign should also be sent with the Tender. In any case the Tenderer should disclose his constitution fully and copies of all necessary legal documents in support thereof should be submitted with the Tender and originals thereof should be produced as and when called for.

(c) Should the Contractor be a partnership firm and in the event of the Contract becoming inoperable due to the death of its partner or partners and Purchaser shall have the right to enter into a separate Agreement with the surviving partner or partners of the firm to continue the execution of the work under the terms and conditions of this agreement.

**1.1.13 TENDERER’S ADDRESS:** Every Tenderer shall state in the Tender his postal address fully and clearly. Any communication sent to the Tenderer by post at his address shall be deemed to have reached the Tenderer duly and in time notwithstanding the fact that the communication did not reach the Tenderer at all or in time for whatever reason. Important documents shall be sent by Registered Post.

**1.1.14 ERASURE OR ALTERATION:** No erasure or alteration in the text of the Tender Papers is permitted and any such erasure and/or alteration will either be disregarded or render the whole Tender void at the option of the Purchaser. Any correction made in rate for work shall be initialed by the Tenderer in ink and dated.

**1.1.15 RESULT OF TENDER:** The successful as well as unsuccessful Tenderers will be advised by letter. No tender shall be deemed to have been accepted unless such acceptance shall have been notified in writing to the successful Tenderer by the Purchaser.

**1.1.16 PURCHASER NOT BOUND TO ACCEPT ANY TENDER:** The Purchaser shall not be bound to accept the lowest or any Tender or to assign any reason for non acceptance or rejection of a Tender. The Purchaser reserves the right to accept any tender in respect of the whole or any portion of the work specified in the Tender Papers or to sub-divide the work among different Tenderers or to reduce the work or to accept any Tender for less than the tendered quantities without assigning any reason whatsoever. In case the overall value of the tender by Central Public Sector undertakings is upto 10% higher than the lowest acceptable tender of private sector tenderer, subject to cost of tender being in excess of five crore, the Railway reserves the right to give purchase preference to the tender of such Central Public Sector undertakings ignoring the lowest. However, such public enterprises which shall
avail benefits of the purchase preference would be subjected to adequate penalties for cost over-runs etc.

1.1.17 TENDER IN AGREEMENT:- The fact of the submission of the Purchaser of the Tender shall be deemed to constitute an Agreement between the Tenderer and the Purchaser whereby such Tender shall remain open for acceptance either in part or in full or as may be modified by negotiation, by the Purchaser for a period of modified by negotiation, by the Purchaser for a period of 120 days from the date of which Tenders are opened, during 120 days from the date of which Tenders are opened during which period the Tenderer shall not withdraw his offer nor amend impair or derogate there from. The Earnest Money deposited in accordance with para 1.1.5 above shall be forfeited if the Tenderer unilaterally withdraws, amends, impairs or derogates from the Tender and in any respect within the said period of 120 days. The Tenderer shall be deemed to have agreed as aforesaid in consideration his Tender being considered by the Purchaser in terms hereof provided the same has been duly submitted and is otherwise in order. When the successful Tenderer is notified in writing at his address given in the Tender within the said period of 120 days that his Tender has been accepted by the Purchaser either in whole or in part he shall be bound by the terms of agreement constituted by his Tender and such acceptance thereof by the purchaser until a formal Contract has been executed between him and the purchaser in replacement of such Agreement as provided for in para 1.2.16.

1.1.18 TENDER CONFIDENTIAL:- The Tenderer (Whether his tender be accepted or not) shall treat the contents of his tender as private and confidential. He shall treat the prices quoted by him as strictly confidential till the tenders are opened (See para 1.1.23)

1.1.19 CANVASSING AND BRIBERY

(a) No Tenderer shall canvass any Government Official or the Purchaser’s Engineers in respect of this or any other Tender. Contravention of this condition will involve rejection of the Tender. This clause shall not be deemed to prevent the Tenderer from supplying the Purchaser any information asked for by him.

(b) Any bribe, commission, gift or advantage given, promised or offered by the Tenderer, or his partner Agent or servant or any one of his or their behalf to any officer servant, representative or Agent of the Purchaser or any person on his or their behalf, in relation to the obtaining of this or any other contract with the Purchaser shall in addition to the criminal liability he may in our under the prevention of corruption Act (1908) subject the Tenderer to the cancellation of this and all other Tenders. Any question or dispute as to the commission of any offense under the present clause shall be decided by the Purchaser, in such manner and on such evidence or purchaser, in such manner and on such evidence or information as may be thought fit and sufficient and his decision shall be final and conclusive in the matter.

(c) Should the Tenderer be a retired Engineer of the gazetted rank or any other gazetted officer working before his retirement whether in the executive or Administrative capacity or whether holding a pensionable post or not in any Department of any of the Railways owned and administered by the President of India for the time being or should a Tenderer being a partnership firm have as one of its partners a retired Engineer or a retired gazetted officer as one of its directors or should a Tenderer have in his employment any retired Engineer or retired gazetted officer as aforesaid the full information as to the date of retirement of such Engineer or gazetted officer from the said service and in cases where such Engineer or officer had not retired from Government Service at least two years prior to the date of the submission of the Tender as to whether permission for taken such contract, or if the Contractor be a partnership firm of an incorporated company to become a partner or Director as the case may be or to take employment under the Contractor has been obtained by the Tenderer or the engineer or the officer as the case may be from the President of India or any officer duly authorised by him in this behalf shall be clearly stated in writing at the time of submitting the Tenders (see offer letter Form 1) Tenders without the information above referred to or a statement to the effect that no such retired engineer or retired gazetted officer is so associated with the Tenderer as the case may be, shall be rejected.
1.1.20 **INDIAN LABOUR AND MATERIALS:-** The Tenderer shall utilize Indian labour including supervisory staff, for the execution of this contract to the maximum possible extent. The Tender shall be prepared on the basis that all materials indicated in Schedule 3 are procured from indigenous sources in full.

1.1.21 **TENDERER'S CREDENTIALS:-** The Tenderer shall include his credentials in his tender (Form 12, 12A & 12 B) The Tenderer shall be well experienced in this field and should have done contracts of similar nature of single OHE work as mentioned in the eligibility criteria detailed in the preamble to the tender at para 11.

1.1.22 **SUBMISSION OF TENDER:-** The Tender consisting Two Volumes shall be submitted enclosed in sealed cover superscribed "Tender for "____________ a"(Name of the work) and addressed to the Deputy Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008 or his successor/nominee (whose address will be intimated in due course) not later than the date, and time prescribed in the preamble to the Tender Papers. Such Tender as cannot be dropped in the Tender Box due to large size shall be handed over to the Deputy Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600008 or his successor/nominee (whose address will be intimated in due course) in person not later than the prescribed date and time and a receipt thereof obtained. Firms whose registered office are situated in foreign countries and who have no branch offices in India may submit their Tender by Registered Post, Acknowledgment due, so as to reach the office of Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600008, or his successor/nominee (whose address will be intimated in due course) not later than prescribed date and time. If any item is excluded by the tenderer while submitting his tender, the tender is liable to be rejected.

1.1.23 **OPENING OF TENDER:-** Tender will be opened in the office of the Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008 or his successor/nominee (whose address will be intimated in due course) in the presence of such of the Tenderers or their representatives as may be present at the prescribed time and on the date specified in the preamble to the Tender Papers.

1.1.24 **JOINT VENTURE**

(Applicable for Advertised Tender value exceeding Rs. 5 crores and less than Rs. 15 crores)

**GUIDELINES AND CONDITIONS FOR JOINT VENTURE:**

1. Following stipulations shall be applicable for joint venture (JV) of firms (hereinafter called JV):
   - Separate identity / name should be given to the Joint Venture Group.
   - Maximum number of parties in the Joint Venture shall not be more than four.
   - In case of JV with Foreign Partner the Indian Partners shall have a minimum share of 51% as a whole in JV Group.
   - The members of JV will not be permitted to tender as an individual Firm and at the same time as a part of any other group. No individual / firm can be a member of more than one JV group.
   - Tender should be purchased and submitted in the name of JV only. EMD shall also be in the name of JV only.
   - A copy of Memorandum of Understanding as per the format in "Form : JV/4" shall be submitted along with tender. No JV will be accepted after submission of the tender bid. Failure to do so will be treated as breach of contract with consequent liability and damages.
   - Once the tender is submitted the Memorandum of Understanding shall not be modified / altered / terminated during the validity of the tender. In case the tenderer files to observe / comply with the above stipulation the full Earnest Money amount shall stand forfeited in favour of the Railways.
   - Further once the tender is awarded to the JV group the constitution of JV shall not altered during the currency of contract and till such time all liabilities related to the contract are discharged and failure to observe the above stipulations shall be deemed to be breach of contract with all consequential penal action as per contract conditions.
   - In case of award of tender to JV, a single Performance Guarantee will be required to be submitted by JV group as per contract conditions.
v) It shall be noted that for all the guarantees related to the contract like performance Guarantee, Bank Guarantee for Mobilisation Advance etc only single guarantee from JV group as a whole will be accepted for each of the purpose and no splitting of guarantees between the partners of the JV will be permitted.

Memorandum of Understanding and Agreement for Joint Venture

i) The Memorandum of Understanding between JV Partners shall be submitted along with the tender document as per the format in ‘Form : JV/4’

ii) Once the tender is awarded the JV agreement will be required to be executed amongst JV partners and got registered before the Registrar of firm or any nominated authority under the law of the land and the same shall be submitted to Railways before signing of contract agreement for the work. The joint venture agreement should be The draft format of Joint Venture Agreement shall be as per “Form : JV/5”.

iii) The Agreement shall indicate one of the partners responsible for executing the major component of the proposed contract to be nominated as the lead partner and shall be authorized to incur all liabilities and receive instructions for and on behalf of the Joint Venture clearly specifying the details of authorities, powers, rights and duties given to him. This authorization shall be with further stipulation that it shall be valid for the entire period of the completion / extended period of the work including maintenance period.

iv) The Joint Venture Agreement should invariably contain clauses related to following subject / issues in the manner specified herein below.

a) Joint & Several Liability:- The parties hereto shall if awarded the contract for the project, be jointly and severally liable to Employer for execution of the project in accordance with General & Special conditions of the contract. The parties hereto also undertake to be liable jointly and severally for the loss, damages caused to the Railways in course of execution or due to non execution of the contract or part thereof arising out of the contract.

b) Duration of the Joint Venture Agreement: It shall be valid for the entire period of the completion / extended period of the work including maintenance period.

c) Notices and correspondences: All correspondences and notices to the Joint Venture shall be addressed to M/s (Shri __________________________ at the address stated herein below):


d) Governing Laws:- The Joint Venture Agreement shall be in all respect be governed by and interpreted in accordance with Indian Laws.

e) Authorised Partner / Person:- M/s (Shri.) __________________________ shall be authorized partner/person on behalf of the Joint Venture to deal with tender, to sign the agreement or enter into contract in respect of the said tender, to receive the cheques/money to pass on the receipt for the payment, to witness joint measurement of work done, to sign measurement books with Employer in respect of the said tender / contract.

f) Assignability:- No party to the Joint Venture has the right to assign or transfer the interest right or liability in the contract without the written consent of the other party and that of the Railways in respect of the said tender / contract.

g) Execution on Non Judicial Stamp Paper:- The Joint Venture Agreement must be on Non Judicial Stamp paper of Rs. 100/- or as per Stamp act of the concerned State where agreement has been executed. Documents to be enclosed at the time of tender submission:

i) The attested copies of documents in support of the Joint Venture should be submitted.

ii) In case of one or more parties to the Joint Venture Agreement are Partnership firm/s the following documents should be enclosed.

a) Certified copy of Partnership Deeds.

b) Power of Attorney for authorized signatory of JV partners as per “Form : JV/2”

c) Power of Attorney in favour of one of the partners to act as lead partner of Joint Venture as per “Form : JV/3”

iii) In case one or more parties are Proprietary firm or HUF: the following documents should be enclosed.

Affidavit on Stamp paper of appropriate value declaring that his concern is a Proprietary concern and he is sole proprietor on the concern OR he is in position of ‘KARTA” of Hindu Undivided Family and he has authority, power and consent given by other co-partners to act on behalf of HUF.
iv) In case one or more parties are limited companies the following documents should be submitted.
Certified copy of minutes of meeting of the directors of the company in which resolution was passed to the
effect.
   a) Of entering into the Joint Venture Agreement.
   b) Of authorizing Managing Director/One of the Director/Manager of the company to sign the Joint Venture
   Agreement.
   c) Of authorizing MD/Director/Manager or any other person to sign all other documents, contracts,
agreements etc and create liability against the company and / or to do any other act on behalf of the
company.

v) Copy of Memorandum and articles of Association of the Company.

vi) Power of Attorney by the Company authorizing person to do / act mentioned in the para 1.7 (iv) ©

Credentials:- Every member of JV should have sufficient credentials either by way of technical or
financial support. Adequate proof in support of this should be furnished. Technical and financial
capacity of the JV shall be adjudged based on satisfactory fulfillment of the below mentioned clauses.

A Essential Qualifying Criteria:
   i Solvency:- Solvency of all the Partners/Parties/Firms should invariably be submitted along with tender
document. All the Members of Joint Venture put together shall be collectively solvent to the extent of
minimum 20% of advertised tender value.

   ii Execution of single similar nature of work:- The Partners of JV put together must have satisfactorily
completed in the last three financial years (i.e. current financial year and three previous financial years)
up to the date of opening of tender -
   a) One similar single work for a minimum value of 35% of advertised tender value.
   or
   b) Two similar single works each for a minimum value of 20% of advertised tender value.
   Or
   c) Three similar single works each for a minimum value of 15% of advertised tender value
   Note: Single similar works need not have been completed by one JV partner only and the similar single
works completed by different JV partners will also be considered.

   iii Turnover :- The arithmetic sum of contractual payments received by all the members of Joint Venture in
last three financial years (i.e. Current financial year and three previous financial years up to the date of
opening of tender) shall be minimum of the amount mentioned in the eligibility criteria mentioned in the
tender.

B The Joint Venture shall qualify in all items of “Essential qualifying Criteria” to get short listed.

1.1.25 MISCELLANEOUS:- Tender documents are not transferable and the cost of Tender Papers is
not refundable.

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<table>
<thead>
<tr>
<th>Para No.</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2.1</td>
<td>Scope</td>
</tr>
<tr>
<td>1.2.2</td>
<td>Conditions of Contract</td>
</tr>
<tr>
<td>1.2.3</td>
<td>Purchaser’s Representative</td>
</tr>
<tr>
<td>1.2.4</td>
<td>Contractor’s Representative</td>
</tr>
<tr>
<td>1.2.5</td>
<td>Contractor’s Office &amp; Address</td>
</tr>
<tr>
<td>1.2.6</td>
<td>Purchaser’s Address</td>
</tr>
<tr>
<td>1.2.7</td>
<td>Deleted</td>
</tr>
<tr>
<td>1.2.8</td>
<td>Taxes</td>
</tr>
<tr>
<td>1.2.9</td>
<td>Bribery</td>
</tr>
<tr>
<td>1.2.10</td>
<td>Railway Pass</td>
</tr>
<tr>
<td>1.2.11</td>
<td>Laws of India</td>
</tr>
<tr>
<td>1.2.12</td>
<td>Force Majeure</td>
</tr>
<tr>
<td>1.2.13</td>
<td>Notice under local laws</td>
</tr>
<tr>
<td>1.2.14</td>
<td>Determination of Contract</td>
</tr>
<tr>
<td>1.2.15</td>
<td>Loss in Transit</td>
</tr>
<tr>
<td>1.2.16</td>
<td>Agreement</td>
</tr>
<tr>
<td>1.2.17</td>
<td>Security Deposit</td>
</tr>
<tr>
<td>1.2.18</td>
<td>Performance Guarantee</td>
</tr>
<tr>
<td>1.2.19</td>
<td>Scheme or Work</td>
</tr>
<tr>
<td>1.2.20</td>
<td>Quality of Materials &amp; Erection</td>
</tr>
<tr>
<td>1.2.21</td>
<td>Specified Railway Stores</td>
</tr>
<tr>
<td>1.2.22</td>
<td>Other Railway Stores</td>
</tr>
<tr>
<td>1.2.23</td>
<td>Contractor’s Organisation</td>
</tr>
<tr>
<td>1.2.24</td>
<td>Contractor’s drawing etc.</td>
</tr>
<tr>
<td>1.2.25</td>
<td>Sub Contractors</td>
</tr>
<tr>
<td>1.2.26</td>
<td>Quality Assurance</td>
</tr>
<tr>
<td>1.2.27</td>
<td>Cranes</td>
</tr>
<tr>
<td>1.2.28</td>
<td>Work Trains</td>
</tr>
<tr>
<td>1.2.29</td>
<td>Traffic Blocks</td>
</tr>
<tr>
<td>1.2.30</td>
<td>Default and Delay</td>
</tr>
<tr>
<td>1.2.31</td>
<td>Loss sustained due to default &amp; delay</td>
</tr>
<tr>
<td>1.2.32</td>
<td>Correctness of work and materials</td>
</tr>
<tr>
<td>1.2.33</td>
<td>Contractor’s responsibility for discrepancy</td>
</tr>
</tbody>
</table>
1.2.34 Additions and alterations to erected equipment
1.2.35 Variation in quantum of Work & Vitiation
1.2.36 Competent Supervisors
1.2.37 Training of Purchaser's Staff
1.2.38 Work by other Agencies
1.2.39 Access to work site
1.2.40 Infringement of Patents
1.2.41 Insurance
1.2.42 Accidents
1.2.43 Contractor's Liability for costs damages
1.2.44 Safety measures
1.2.45 Recovery for delay in completion
1.2.46 Extension of time
1.2.47 Provisional acceptance
1.2.48 Defective equipments to be changed
1.2.49 Use of rejected equipment
1.2.50 Guarantee
1.2.51 Final Acceptance
1.2.52 Payment
1.2.53 Site Clearance
1.2.54 Components & Materials received for work
1.2.55 Arbitration
1.2.56 Payment during Arbitration
1.2.57 Refund of Security Deposit
1.2.58 Contract Labour act central rules
1.2.59 Provision of apprentices act
1.2.60 Rescinding of contract – Risk & Cost Clause.
1.2.61 Jurisdiction of Court

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1.2.1 **SCOPE:-** This Chapter deals with the conditions of Contract under which the various works coming under the purview of this contract are to be executed by the Contractor. The work involved are detailed in the preamble to the tender papers. However the following works are involved in the execution of works.

i) The OHE designs have to be finalised with Engineering Plan/ Site details taken from spot. Casting of foundation, Mast erection are to be done even without the track in position. However, the adjustments are to be done on OHE for every change in the track alignment till the commissioning of the track. No separate payment will be made for such works.

ii) If wiring of any line is to be done may also to be done without the track is position. Contractors may evolve suitable methods to do the work without the Rail crane to perform the above works manually.

1.2.2 **CONDITION OF CONTRACT :-** If the Tender submitted by a Tenderer is accepted and the Contract awarded to the Tenderer the various works coming under the purview of the Contract shall be governed by the terms and conditions included in the Tender Papers covering the following :

i) Preamble to the Tender Papers

ii) Instruction to Tenderers and conditions of tendering as included in Part I, Chapter I.

iii) Conditions of Contract, as included in this Chapter

iv) Prices and Payments as included in Part I Chapter III

v) Explanatory notes of schedule 1, Schedule of Prices Part I Chapter IV

vi) General specifications, as included or referred to in Part II and

vii) Particular specifications, as included or referred to in Part III and

viii) Annexures under Part IV and Forms under Part V and as modified or amended by the Letter of Acceptance of Tender.

ix) General conditions of contract with up to date correction slip. *Southern Railway’s General Conditions of Contract* (hereinafter referred to as GCC) pertaining to Works Contract issued in October 2003 (to be suitably modified, if superseded) vide booklet no. CE.496/GCC (Rec. 2003) (to be modified, if superseded) shall be considered as forming a part of this agreement. On signing this agreement, the contractor shall be deemed to have fully read and acquainted himself with the GCC. Where any clause(s) of the GCC is/are at variance with any of the specific clause(s) included in this agreement, the latter shall supersede the former only in respect of those clause(s) of this agreement, which is/are at variance with GCC. The GCC can be obtained on payment from any Divisional Railway Manager’s office.
1.2.3 PURCHASER'S REPRESENTATIVE:— Subject as otherwise provided in this Contract all notices to be given on behalf of the Purchaser and all other action to be taken on his behalf may be given or taken as the case may be on his behalf by the Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008 or his successor.

1.2.4. CONTRACTOR'S REPRESENTATIVE :- The Contractor's representative shall be a person as defined in Para 1.1.2

1.2.5 CONTRACTOR’S OFFICE & ADDRESS:- The Contractor shall within a month of issue of Letter of Intent/ Acceptance of Tender, establish an office at a convenient place indicated in Part III for progressing designs and drawings and field work expeditiously in consultation and with the approval of the purchaser the address thereof in which all correspondence shall be sent. Any communication sent to the Contractor by post at his said address shall be deemed to have reached the Contractor duly and in time. Important documents shall be sent by Registered Post.

1.2.6 PURCHASER’S ADDRESS:- The list of addresses to which correspondence and documents relating to the Contract should be sent, is included in Part – III.

1.2.7 Deleted

1.2.8 TAXES

(a) The Contractor and all personnel employed by him shall pay such taxes like Income Tax as are payable under Statutory laws of Indian and the Purchaser WILL NOT ACCEPT any liability for the same.

(b) Deduction of Income Tax at source as per provision of Finance Act and Income Tax Act in force may be made from the Contractor/ Sub Contractor and the amount so deducted may be credited to the Central Government.

1.2.9 BRIBERY:- Any bribe, commission, gift or advance given, promised or offered by the Contractor, or his Partner, Agent or servant or any one of his or their behalf to any officer, servant representative or Agent of the Purchaser or any person on his or their behalf in relation to the obtaining or the execution of this or any other contract with the Purchaser, shall in addition to the criminal liability he may incur under the prevention of Corruption Act (1908) subject the Contractor to the cancellation of this and all other contracts and also to payment of any loss resulting from any such cancellation to the like extent as is provided in case of cancellation due to other causes and the purchaser shall be entitled to deduct the amounts so payable from any moneys otherwise due to the Contractors under this or any other contract as envisaged under Para 1.2.42. Any question or dispute as to the Commission of any offence under the present clause shall be decided by the Purchaser, in such manner and on such evidence or information as may be thought fit and sufficient and his decision shall be final and conclusive in the matter.

1.2.10 RAILWAY PASS:- No Railway Pass for the conveyance of the Contractor or his agents or his labour and/or stores will be granted. The Contractor may, however, carry free of charge but at his own risk such labour, supervisory staff and stores as far necessary for the execution of work by work trains, (See para 1.2.22 and 1.2.27) and site of work.

1.2.11 LAW OF INDIA

(a) This contract shall be governed by the laws for the time being in force in the Republic of India.

(b) Deleted

1.2.12 FORCE MAJEURE:- If at any time, during the continuance of this contract the performance in whole or in part, by either party of any obligation under this contract shall be prevented or delayed by reason of any war, hostility, acts of the public enemy civil commotion, sabotage, fires, floods, earthquake, explosions, epidemics, quarantine restrictions, strikes, lock outs, any Statutory Rules, regulations,
orders or requisitions issued by any Government Department or competent authority or acts of God (thereinafter referred to as "event") then provided notice of the happening of any such event is given by either party to the other within twenty one days from the date of occurrence thereof neither party shall be reason of such event be entitled to terminate this contract nor shall either party have any claim for damages against the other in respect of such nonperformance or delay in performance and the obligations under the Contract small be resumed as soon as practicable after such event has come to an end or ceased to exist PROVIDED FURTHER that if the performance in whole or part of any obligations under the contract is prevented or delayed by reasons of any such event beyond a period as mutually agreed to by the purchaser and the Contractor after any event or 60 days in the absence of such an agreement whichever is more contract provided also that if the contract is so terminated under this clause the Purchaser will at the time of such termination take over from the Contractor at prices as provided for in the contract all erected equipment or equipments under erection as also all or any portion of unused, undamaged and acceptable equipments whether in storage or in the course of manufacture at Schedule rates or at prices mutually agreed to, where schedule rates are not available.

1.2.13 NOTICES UNDER LOCAL LAWS:- The Purchaser shall throughout the continuance of the contract and in respect of all matters arising out of the contract serve all notices and obtain all consents and way leaves, approvals and permissions required to be a taken by the Purchaser under any regulations and by laws of the local or other authority which shall be applicable to the works.

1.2.14 DETERMINATION OF CONTRACT

(a) Notwithstanding the provisions under para 1.2.12 the purchaser may at any time by a notice in writing summarily determine the contract without liability to pay and compensation to the contractor in respect thereof in any of the following events.

(i) INSOLVENCY:- Partner of the Contractor’s firm shall at any time be adjudged insolvent or shall have a receiving order or orders for administration of his estate made against him or shall take any proceedings or liquidation or compensation under any law relating to insolvency for the time being in force or make any conveyance or assignment of his assets or enter into any arrangement or composition with his creditors or suspend payment, or if the firm be dissolved under the Partnership Act.

Or

(ii) LIQUIDATION:- If the Contractor being a Company shall pass a resolution or the court shall make an order for the liquidation of its affairs or a receiver or Manager on behalf of the debenture holders shall be appointed or circumstances shall have arisen which entitled the Court or debenture holders to appoint a receiver or Manager.

Or

(iii) BREACH OF CONTRACT:- If the Contractor commits and breach of this contract not herein specifically provided, for provided always that such determination shall not prejudice any right of action or remedy which shall have accrued or shall accrue thereafter to the purchaser and provided also that the Contractor shall be liable to pay the Purchaser any extra expenditure which the Purchaser is thereby put to, but shall not entitled to any gain or repurchase. In the event of such determination without prejudice to the other rights and remedies of the purchaser including the rights forfeiting the security Deposit the purchaser shall be entitled to have the work of remainder thereof performed, executed and/or carried out by any other agency at the cost and risk of the Contractor and hold the Contractor liable for reimbursement in the event of any loss on this account.

Or

(iv) If at any time after the submission of the Tender the Tenderer/ Contractor being a partnership firm admits as one of its partners or employees under it, or being an incorporated company, elects or nominates or allows to act as one of its Directors or employees under it in any capacity whatsoever any retired engineer of the gazetted rank or any other retired engineer of the gazetted rank or any other retired gazetted officer working before his retirement whether in the executive or administrative capacity whether in the executive or administrative capacity whether holding any pensionable post or not in any Department of any of the Railways for the time being owned and administered by the President of India before the expiry of two years from the date of retirement from the said service of such engineer or officer, unless such engineer or officer has obtained permission from the president.
of India or any officer duly authorised by him in this behalf to become a Partner or a Director or to take employment under the Contractor, as the case may be,

Or
v) If the Contractor fails to furnish at the time of submitting the said tender:
   a) the correct information as the date of retirement of such retired engineer or retired officer from the said service or as to whether any such retired engineer or retired officer was under the employment of the Contractor at the time of submitting the said Tender,
   or
b) the correct information as to such engineers or officers obtaining permission to take employment under the Contractor,
   or
c) being a partnership firm the correct information as to whether any of its partners was such a retired engineer or a retired officer,
   or
d) being an incorporated company correct information as to whether any of the Directors was such a retired engineer or retired officer of

vi)a. If the Contractor having such a retired engineer or retired officer suppresses and not discloses at the time of submitting the said Tender the fact of his being such a retired engineer or a retired officer or makes at the time of submitting the said Tender a wrong statement in relation to his obtaining permission to take the contract or if the contractor be partnership firm or an incorporated company to be a partner of Director of such firm or company as the case may be to seek employment under the Contractor.

b.) EXCEPTIONS:- Termination of Contract will not arise in case of voluntary liquidation meant for amalgamation or re-organisation provided the newly formed company takes over the full responsibilities and liabilities of the liquidated firm and it is acceptable to the purchaser.

c.) Termination of Contract under this para and 1.2.29 will not arise in case of breaches of defects of a minor nature. The General Manager or his successor shall be the sole authority to decide whether breaches and defects are of minor nature.

1.2.15 LOSS IN TRANSIT:- If loss or damage occurs to the stores or any part thereof during transit by rail, the Contractor shall have only such remedy as is available to the public against the carrier under the Indian Railway (Amendment) Act 1961 No. 39 of 1961.

1.2.16 AGREEMENT
a) The successful Tenderer shall within 30 days from the date of issue of Letter of Acceptance (LOA) to execute an agreement based on accepted rates and conditions in such forms as the purchaser may prescribe, and lodge the same with the purchaser together with the conditions of contract specifications and Schedule or Prices referred to therein duly completed. The form for agreement is included in Part V (Form 14). In no case, signing of Agreement is permitted beyond 60 days of issue of LOA, and the EMD will be forfeited on 61st day of issue of LOA, if an Agreement is not signed by the successful Tenderer.

b) If a work is transferred from the jurisdiction of one Railway to another Railway or to a project authority or vice versa while the contract is in subsistence the successor Railway/ Project in the same manner and take effect in all respects as if the Contractor and the effect in all respects as if the Contractor and the successor Railway/ Project were parties thereto from the inspection and the corresponding officers of the competent authority in the successor Railway/ Project will exercise the same powers and enjoy the same authority as conferred to the Predecessor Railway/ Project under the original contract/ Agreement entered into.

C) If for administrative or other reason the Contract is transferred to the successor Railway/ Project the contract shall notwithstanding anything contained herein contrary thereto be binding on the Contractor and the successor Railway/ Project in the same manner and take effect in all respects as if the Contractor and the Successor Railway/ Project had been parties thereto from the date of this contract.

1.2.17 SECURITY DEPOSIT:- The Earnest Money deposited by the Contractor with his tender will be retained by the Railways as part of security for the due and faithful fulfillment of the contract by the contractor.
The balance to make up the security deposit, the rates for which are given below, may be deposited by
the Contractor in cash or may be recovered by percentage deduction from the Contractor’s “on
account” bills. Provided also that in case of defaulting contractor the Railway may retain any amount
due for payment to the Contractor on the pending “on account bills” so that the amounts so retained
may not exceed 10% of the total value of the contract

(1) Unless otherwise specified in the special conditions, if any, the Security Deposit / rate of
recovery / mode of recovery shall be as under:-

(a) Security deposit for each work should be 5% of the contract value.
(b) The rate of recovery should be at the rate of 10% of the bill amount till the full security deposit
is recovered.
(c) Security Deposits will be recovered only from the running bills of the contract and no other
mode of collecting SD such as SD in the form of instruments like BG, FD etc shall be accepted
towards Security Deposit

(2) Security Deposit shall be returned to the contractor after the physical completion of the work
as certified by the Competent Authority. The Competent Authority shall normally be the
authority who is competent to sign the contract. If this Competent Authority is of the rank
lower than JA Grade, then a JA Grade Officer (concerned with the work) should issue the
certificate. The certificate, inter alia, should mention that the work has been completed in all
respects and that all the contractual obligations have been fulfilled by the contractors and that
there is no due from the contractor to Railways against the contract concerned. Before
releasing the SD, an unconditional and unequivocal no claim certificate from the contractor
concerned should be obtained.

(3) No interest will be payable upon the Earnest Money and Security Deposit or amounts payable
to the Contractor under the Contract, but Government Securities deposited in terms of Sub
Clause (1) of this clause will be payable with interest accrued thereon.

1.2.18 PERFORMANCE GUARANTEE:

a) The successful Tenderer shall submit a Performance Guarantee (PG) in the form of an irrevocable
bank guarantee amounting to 5% of the contract value within 30 days from the date of Issue of
Letter of Acceptance (LOA). Another 30 Days extension may be allowed to execute the Agreement
subject to the condition that a penalty interest @15 % per annum on the PG amount will be
charged for the delay from the 31st day of issue of LOA. No extension beyond 60 days will be
permitted to execute the Agreement. In such cases the LOA issued stands terminated, the EMD
submitted by the Tenderer & any due to the Contractor will be forfeited on the 61st day of issue of
LOA, and the Tenderer will be debarred from participating in the re-tender of the same work.

b) A Performance Guarantee shall be submitted by the successful bidder after the letter of
acceptance has been issued, but before signing of the agreement. The agreement should
normally be signed after submission of Performance Guarantee. This guarantee shall be initially
valid upto the stipulated date of completion plus 60 days beyond that. In case, the time for
completion of work gets extended, the contractor shall get the validity of performance Guarantee
extended to cover such extended time for completion of work plus 60 days.

c) The Performance Guarantee (PG) shall be released after the physical completion of the work
based on the ‘completion Certificate’ issued by the competent authority stating that the contractor
has completed the work in all respects satisfactorily. The security deposit, however, shall be
released only after the expiry of the maintenance period and after passing the final bill based on
‘No Claim Certificate’.

d) Wherever the contract is rescinded, the security deposit shall be forfeited and the Performance
Guarantee shall be encashed and the balance work shall be got done independently without risk
and cost of the failed contractor. The failed contractor shall be debarred from participating in the
tender for executing the balance work. If the failed contractor is JV or a partnership firm, then every member/partner of such a firm shall be debarred, from participating in the tender for the balance work either in his/her individual capacity or as a partner of any other JV/partnership firm.

e) The Engineer shall not make a claim under the Performance Guarantee except for amounts to which the President of India is entitled under the contract (not withstanding and/or without prejudice to any other provisions in the contract agreement) in the event of:

i) Failures by the contractor to extend the validity of the Performance Guarantee as described herein above in which event the Engineer may claim the full amount of the Performance guarantee.

ii) Failure by the Contractor to pay President of India any amount due, either as agreed by the contractor or determined under any of the Clauses/Conditions of the agreement, within 30 days of the service of notice to this effect by Engineer.

iii) The contract being determined or rescinded under provision of the GCC the performance guarantee shall be forfeited in full and shall be absolutely at the disposal of the President of India.

1.2.19 SCHEME OF WORK

a) Within a period of 15 days beginning from the date of issue of Letter of Acceptance of Tender, the Contractor shall submit to Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008, the following documents (See para 1.1.11)

i) Detailed time schedule for design and submission of various documents enumerated in Part II Chapter V. designs and Drawings to be supplied by the Purchaser shall also be included in the time schedule of make it comprehensive. The comprehensive schedule shall be planned in a manner such that the entire basic designs and drawings for the section is/are accepted by the purchaser within a period not exceeding one third of the total period allowed for and working drawings within a period not exceeding two third of the total period allowed for completing the work. This period shall be reckoned from the date of issue of the Letter of Acceptance of Tender. The Schedule shall take into account the time required for study by the Purchaser who reserves for this purpose 15 days for verifying the designs and drawings.

Note: The above provision is applicable provided the purchaser has been able to supply all Engineering plans and other drawings and designs in a uniformly spread out manner to the maximum extent possible.

ii) TIME SCHEDULE FOR EXECUTION

A detailed time schedule in form of a PERT (Program Evaluation and Review Technique) chart consisting of adequate numbers of activities covering key phases of work, in nutshell shall indicate the interface facilities and materials to be supplied by the Purchaser dates by which those are required. The plan for each stage of work shall be done in the order of priority as given by the Purchaser and should be such as to complete the entire work within the stipulated period.

b) WORKS TO BE DONE AS APPROVED:- The planning shall be finalized in consultation with the purchaser and approved by the later in writing before commencement of the work and the Contractor shall be held responsible for executing the work in full compliance with approved designs and drawings. Designs and drawings modified at site by the purchaser’s Engineers shall be treated as approved. However such modifications shall be incorporated in the designs and drawings and resubmitted for formal approval.

c) MONTHLY PROGRESS REPORT:- The contractor shall furnish to the Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008 (as the case may be) or his successor nominee (whose address will be advised in due course during the first week and third week of every calendar months a progress report showing progress of finalisation of designs and drawings materials and equipment received at site and the works carried out during the preceding month up to date progress of these items along with the total quantum of designs and drawings materials and equipments and the works required for the contract.
For finalizing the scheme of work outlined in above sub paragraphs the Contractor shall make use of the latest network analysis technique like CPM technique, PERT chart etc.

1.2.20 QUALITY ASSURANCE PROGRAMME IN SUPPLY AND ERECTION

a) All materials used in the work shall be of the best quality and of the class most suited for the purpose specified and procured from the sources approved by Research Design of Standards Organisation/ Railway Electrification. It is essential that manufacturer from whom supply is arranged should have long experience of design and manufacture of equipments, components, materials and fittings. The requisite facility for testing prototypes supplied against this contract should be available with the manufacturer. In the case of those equipments components or fittings for which the requisite facilities for testing of prototypes are not available with the manufacturer the manufacturer shall arrange to carry out the prototype test at his own cost in a Testing Laboratory approved by the Purchaser. Only tested quality steel shall be used. The Contractor shall ensure that the Purchaser’s prescribed Quality Assurance Standards are rigidly followed in the manufacture and erection/ installation of all the materials, Components and fittings/ equipment required for the work.

b) Placement of educational/developmental orders: Wherever sources have been approved under Part I and Part II, ordering of Part II sources shall not be more than 15 % of the total quantity and this will be within the procurement quantity. Ordering on new sources in such cases shall be restricted to 5 % and this could be within or outside the procurement quantity. Each educational /developmental order should not exceed 33 % of the quantity ordered on any of the approved sources in a tender case.

c) All erection work carried out shall also be of the best quality acceptable to the Purchaser.

1.2.21 SPECIFIED RAILWAY STORES:- The materials which will be supplied by the purchaser are listed in Annexure – 4 (Vol-I) to this tender paper.

1.2.22 OTHER RAILWAY STORES:- If any material other than those specified in Para 1.2.20 is supplied by the Purchaser either at the Contractor’s request or suo moto in order to prevent any possible delay in the execution of the work due to the Contractor’s inability to make adequate arrangements for supply thereof or otherwise recovery may be made from Contractor’s bill at the issue rate or market rate prevailing at the time of supply whichever is higher plus 5% on account of initial freight and 2% on account of incidental charges together with supervision charges at 12 ½% of the total cost inclusive of material freight and incidental charges of Schedule-3 rate whichever is higher. Freight between the Purchaser’s source of supply and the Contractor’s depot shall be to the Contractor’s account. If however the material required by the Contractor is not available in Purchaser’s stock or the Purchaser decides not to supply the same, be that for whatever reason, the purchaser shall not be bound to arrange for the supply at cost quoted above or at any other cost nor will this fact be accepted as an excuse for delay in execution of works.

Note: If the Contractor could not receive the materials in time for the work due to reasons beyond his control and if such materials are available in Purchaser’s stock the material may be spared by the Purchaser to the Contractor who will claim only erection charges or return the materials prior to claiming 5 % progress bill or during reconciliation, which ever is earlier.

1.2.23 CONTRACTOR’S ORGANISATION:- In addition to the establishment of an office as per para 1.2.5 the Contractor shall set up at least one main depot for receiving and storing steel work and other materials and establish a workshop for small fabrication and assembly work if considered necessary by the Contractor. If he and the Purchaser deem it necessary, sub depots may be set up to case operation of work trains and distribution of materials. The location of Contractor’s depot sub depots will be mutually agreed upon by the purchaser and the Contractor. For the main and sub depots the purchaser shall offer open space reasonably level and workable and suitable for storage of materials free of charge, inside Railway premises which will be convenient from the point of view of operation. The depot/s shall as far as possible be located such as to be accessible by road.
Note:  

a) All expenses for providing covered and enclosed storage and workshop accommodation other facilities and running the establishment shall be borne by the Contractor.

b) The main depots will be located at stations as indicated in Part – III. The proposed location/s of sub depot is to be given by the Tenderer for scrutiny and approval by the Purchaser.

c) The Contractor shall hand over the depot, sub depot area complete within a period of one year from completion of the work cleaned of all Contractor’s stores, rubbish unless otherwise agreed to by the purchaser.

d) The Contractor will be responsible for transfer of materials from main depot or sub depots between depot/s and workshops except where otherwise stated. The Contractor will be responsible for all loss and / or damage in the transfer of materials and no loss damage or expenses incurred on this account will be reimbursed by the Purchaser.

e) Electricity may be supplied at places where spare capacity is available for running machinery and for lightning. The Purchaser will entertain no complaints on the non-availability of power supply. The contractor shall provide his own distribution system in consultation and with the approval of the purchaser. The Contractor shall pay the cost of providing connections and of energy consumed to the Purchaser in accordance with relevant rules and prevailing rates of the Railway.

f) At places where piped water supply is available the purchaser may supply water to the contractor at convenient points for his office, workshops and stores if necessary in commencing with the work. The contractor shall arrange to lay his own pipelines for distribution in consultation and with the approval of the Purchaser. The Contractor shall be charged for consumption by the Railways. The Contractor shall arrange water at the work site at his own cost.

g) The Contractor shall arrange at his own cost all tools plant and facilities as necessary for erection and testing of the equipment, in compliance with the specification.

h) No conservancy cess charges will be recovered from the Contractor. The Tenderer should take not of this while quoting rates.

1.2.24 CONTRACTOR’S DRAWING ETC.:– 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 required for a particular basic design/ employment schedule. In case of new developments in designs comments on Research Designs and Standards Organisation (herein after called RDSO’s) basic drawings/ designs/ employment schedules will be submitted by the Contractor to the purchaser. If the RDSO’s drawings/ designs/ employment schedules to the Railway alteration/ deviation in standard drawings, he shall submit the retraced drawings with full calculations and justification of the change of the Purchaser. The purchaser if convinced of the need of the alteration, shall approach RDSO for necessary approval.

1.2.25 SUB CONTRACTORS

a) The Contractor should have his own workmen for all types of works including foundation, mast erection, wiring etc. However, the contractor may sublet a part of the works under this contract and enter into contract with supplier for supply of materials as per conditions at para (b) below.

b) The names and credentials and experience of all sub contractors proposed to be employed for execution of work or any part thereof shall be submitted by the Contractor to the Purchaser and got approved by him before the Contractor enters into an agreement with the Sub contractor’s for the purpose. The components and fittings shall be purchased only from the manufacturers who are approved by RDSO/ CORE.

c) The Contractor shall arrange for effective supervision of Sub Contractor’s work and remain solely responsible for materials supplied and for quality of works carried out on his behalf by the Sub Contractor/s.
1.2.26 **QUALITY ASSURANCE MATERIALS**

a) All the equipments, materials, fittings and components will be subject to quality control programme of the manufacturer being part of the Quality Assurance Program of the Contractor. All the materials, equipments, components and fittings supplied should be as per RDSO/CORE approved drawings, suitably inspected by RITES as per the applicable guidelines. The materials may also be inspected by the Purchaser or his representative, if required, either at the manufacturer works or at the Contractor's depot. The purchaser or his representative shall have the right to be present during all the stage of manufacture and shall be afforded free of charge all reasonable facilities for inspection and testing as well as to examine the stage inspection report of the manufacturer in addition to the quality audit which the contractor may institute as a part of his programme so as to satisfy himself that the materials are in accordance with specifications approved drawings, and designs and purchaser’s prescribed Quality Assurance Standards.

b) **ERECTION**

All erection work will also be subjected to the Quality Assurance Programme including inspection by the Purchaser or his representative to ensure that the work is done in accordance with the specifications and approved drawings and designs and Purchaser’s Prescribed Quality Assurance Standards.

c) **EXPENSES OF PURCHASER’S REPRESENTATIVE**

All the expenses of Purchaser’s representative shall be borne by the Purchaser whether the inspected material is finally utilized in work or not. The decision of the Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008 or his successor shall be final in respect of acceptability or otherwise of any material, fittings, components or equipment required for the work.

d) **QUALITY ASSURANCE PROGRAMME**

For proper control of quality and to ensure that the materials, equipment and fittings are manufactured according to specification and the erection is according to approved instructions, drawings, specifications the contractor shall adopt a suitable quality assurance programme to ensure quality at all necessary points whether at manufacturer’s works or in his depot or at his work site as well as during erection. Such Quality Assurance Programme shall also meet the requirement of the Purchaser’s Prescribed Quality Assurance Standards. This programme of the Contractor shall generally cover the following:

1. The Organisation to manage and implement the Quality Assurance Programme.
2. The documentation control system:
   i) Basic control system
   ii) Adopted at manufacturer’s works
   iii) Adopted at the Contractor’s Depot and work site.
3. Procedure adopted for:
   i) Stores Inspection.
   ii) Incoming raw material inspection.
   iii) Verification of materials purchased.
   iv) Fabrication controls.
   v) Site erection controls.
4. Inspection and Test Procedure for:
   i) Manufacturer and quality control procedure.
   ii) Field activities.
5. System of handling and storage.
7. System of maintenance of records.
8. For the purpose of obtaining ‘On Account Payment’ (See para 1.3.9) the Contractor shall submit along with the invoice, the documents indicated in the prescribed Quality Assurance Standards which should inter alia cover the following as many be applicable in each case.
   i) Factory test results as required under the specification.
   ii) Quality audit report including test check report of Purchaser’s representative if any.
   iii) Manufacturer’s drawings & Instruction/Maintenance manual, if any.
1.2.27 **CRANES:**- No Crane will be provided by the Purchaser. All heavy materials like Masts, Structures, Portals, Conductor Drums, Transformers, Interrupters etc. will be unloaded by the contractor at the Depot at his own cost if anything is supplied by the Purchaser (the exact site and location of which will be decided and intimated later). The Contractor has to make his own arrangements for transporting of Masts/Structures, Booms, Equipments to the site for erection.

1.2.28 **WORK TRAINS**

a) No work train will be provided by the purchaser. All the wiring materials like conductor drums and steel structures for erection should be transported to the site by the contractor by his means for erection.

b) **LADDER TROLLEYS**

The Contractor may use light ladder trolleys on tracks for carrying out installation of droppers and adjustments of traction overhead equipment. The ladder trolleys shall not weigh more than 200 kg and should be capable of being removed from the track easily and quickly. The detailed drawings of these should be submitted within (one) month from the date of issue of Letter of Intent/Acceptance of Tender to enable the purchaser to obtain approval from the competent authorities for the use of such trolleys on tracks, if required.

1.2.29 **TRAFFIC BLOCKS**

a) The Purchaser will make arrangements to obtain traffic blocks (hereinafter referred to as blocks) necessary for the running and operation of light ladder trolleys and track lorries for works to be carried out along or adjacent to the track (see 1.2.27). The Contractor shall however carry maximum amount of work possible without blocks. Works such as grouting of traction masts, muffing, and erection of brackets shall invariably be done without blocks, Installation of droppers and adjustment of traction overhead equipment may also be permitted to be carried out with light ladder trolleys protected by banner flags in accordance with general and Subsidiary Rules of Indian Railways.

b) Blocks will normally be granted any time during day or night to suit convenience of traffic operations. The contractor shall equip himself to carry out all construction during night blocks also efficiently by suitable Generator and lighting equipment. The blocks granted will ordinarily be on one track at a time over a distance covered by one or two consecutive block sections. In case of blocks to be granted after sunset, the Contractor will be informed only at short notice. The duration of blocks, normal and maximum, which would ordinarily be granted on different tracks and in different sections, during day and/or night time is indicated in Vol. I (Part III). Blocks should not be availed of by the Contractor when it is not possible for him to complete the specific field work within the block period granted by the purchaser.

c) Block periods shall be counted from the time the track is given to the Contractor’s disposal by controllers at the work spot till it is cleared by the Contractor. All blocks asked for and granted shall be reckoned in accordance with para 1.2.28. If by the contract or completion date the total reckoned period of block works out to less than the specified number of block hours per kilometer of single track to be equipped as indicated in Part-III, the Contractor shall be eligible for corresponding extension of time for completion of the work.

d) Blocks will normally be granted for carrying out other work in one block section except when the work overlaps two adjacent block sections, blocks will be granted over both the block sections. The contractor shall organize the various works so as to use fully the blocks granted to him. He shall ensure that none of the equipment obstructs at any time at any track for which he has not been granted a block.

e) The Contractor shall in consultation with the Purchaser submit a weekly block programme for works 7 days in advance of the week for which the programme has been submitted. At the end of each week a comparison shall be made between the block periods asked for by the Contractor and that availed of by the Contractor fractions of an hour in the total being ignored.

f) Blocks will be subject to normal operating conditions and rules of the Railway. All formalities of exchanging private number etc. with the traffic control will be carried out by the Purchaser’s staff and for this purpose the purchaser will depute representative for each erection gang who will be responsible for imposing traffic blocks and also removing the same after men, material and
equipment have been cleaned by the contractor from running tracks and the same declared for traffic by the Purchaser’s representative in case of works involving safety of running tracks.

g) Blocks required for carrying out works necessitated by the thefts, Pilferage, accidents or such other incidents shall be granted by the Purchaser over and above the normal requirements of block and shall not be counted for the purpose of para 1.2.28 (c).

h) Traffic blocks given after energisation (See 1.2.46) (e) shall not be reckoned for the purpose of Para 1.2.28 (c).

1.2.30 DEFAULT AND DELAY.-The Contractor shall execute the work with the due intelligence and expedition keeping to the approved time schedule. Should he refuse or neglect to comply with any responsible orders given to him in writing by the Purchaser’s Engineers in connection with the work, or contravene the provision of the Contract or the progress of works legs persistently behind the time schedule due to his neglect the purchaser shall be at liberty to give seven days notice in writing to Contractor requesting him to make good the neglect or contravention complained of and should the Contractor fail to comply with the requisitions made in the notice within seven days from the receipt thereof it shall be lawful for the purchaser to take the work wholly or in part out of the Contractor’s hands without any further reference and get the work or any part thereof as the case may be completed by other agencies at the expense of the Contractor without prejudice to any other right or remedy of the Purchaser.

1.2.31 LOSS SUSTAINED DUE TO DEFAULT AND DELAY

a) In the event of any loss to the purchaser on account of execution and/ or completion of the work or any part thereof by agencies other than the Contractor in terms of para 1.2.29 the Contractor shall be liable to reimburse the loss to the purchaser without prejudice to the other rights and remedies of the purchaser and the reimbursement in full or in part as the case may be shall be met at the option of the Purchaser from out of all or any of the following sources, viz.

i) Any amount due any payable to the Contractor by the Purchaser on any account whatsoever.

ii) the Contractor’s Security Deposit in the hands of the Purchaser as far as available and

iii) any other assets whatsoever of the Contractor.

b) In the event of reimbursement from out of sources (i) and / or (ii) above mentioned the purchaser shall have the right of appropriation sue moto.

NOTE : The above para should be read in conjunction with para 1.2.42

1.2.32 CORRECTNESS OF WORK AND MATERIALS

a) The Contractor shall be solely responsible for the correctness of the positions levels and dimensions of the works according to approved drawings, notwithstanding that he may have been assisted by the purchaser or his men in setting out the same. All the materials fall under the scope of supply by the Contractor shall be RITES certified.

b) If any dimension figured upon a drawing differs from that obtained by scaling the drawings the figured dimension should be normally taken as correct, unless it is prime facie a mistake. But all such cases shall be brought to the notice of the Purchaser’s Engineers and the discrepancy set right before execution.

1.2.33 CONTRACTOR’S RESPONSIBILITY FOR DISCREPANCY

a) All designs and drawings submitted by the Contractor shall be based on a through 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 equipments after inspection of materials after erection and adjustments to installations the ultimate responsibility for correct design and execution of work shall rest with the Contractor unless the Purchaser insists on adoption of his own designs inspite of the Contractor not being agreeable to it.

b) The Contractor shall be responsible for and shall bear and pay the costs for any alteration of works arising from any discrepancies errors or omissions in the designs and drawings supplied by him, whether such designs and drawings have been approved by the purchaser or not.
1.2.34 **ADDITIONS AND ALTERATIONS TO ERECTED EQUIPMENT:** The Purchaser may require additional installations or modifications to be carried out on the works he deems necessary either during the execution of after a part of whole of the installations coming within the purview of the Contract has been put into commercial service. Further it may be necessary and expedient to energies overhead equipment which has been completed and finally adjusted in portions in yard/s. This will necessitate erection of new equipment in the vicinity of or joining energised equipment. In case the prices for such additional works or modifications are not covered by the schedule or prices and are such that either party considers additional prices for such works justified such additional works or modifications shall be carried out only after the additional prices proposed by the Contractor are accepted by the Purchaser. In case additional installations or modifications are required to be carried out under this para the Purchaser shall grant a reasonable extension of time should it be necessary.

1.2.35 **VARIATION IN QUANTUM OF WORK AND MATERIALS**

**A) VARIATION CLAUSE**

a) The drawings referred to in the list of plans, if any, are intended only to give a rough and general idea of the location and rough details of work to be done. No claim whatsoever will be admissible in respect of any alteration/addition/deletion/change in the type of works.

b) The quantities of various items given in the schedules for the works to be executed are only approximate and are for the guidance of the contract. As far as possible, they have been assessed correctly but are likely to vary during the execution of the works.

c) For increase upto 25 % of the quantities indicated in schedule, the contractor shall not be entitled for any compensation and will be paid for such increase in the quantities at the agreement rate. In case of foundations, this limit of 25 % will, however, not apply and the contractor will be paid for the entire quantity of work as found necessary at the agreed rate.

d) In the event of any reduction in the quantities to be executed for any reason whatsoever, the contractor shall not be entitled for any compensation but shall be paid only for the actual quantity of work done, at the agreemental rates.

e) When the gross value of the work to be executed is likely to increase in excess of 25 % of the original value of the agreement, the contractor should notify the Engineer in charge at least THIRTY DAYS before such necessity arises.

f) When the operation of quantities results in the agreement value exceeding by 25 % to 50 %, for the first 15 % increase, the payment will be reduced **straightaway** by 2 % on the incremental value of the agreement and for the next 10 % increase in the value the payment will be reduced **straightaway** by an additional reduction of 2 % in the further incremental value of the agreement.

g) Notwithstanding the above, reduction, Railway reserves the right to refix the rates, by mutual consent, of those items in the schedule, where the quantities have exceeded by 25 % of the agreemental quantities.

h) Execution of quantities beyond +50 % of overall value shall not be generally permitted. The rates for quantities in excess of 50 % of the terms shall be decided between Railway and Contractor in advance of execution of the quantities involved, if in the opinion of the Railway, such quantities are also to be executed by the same contractor. In the event of mutually agreed rate not being arrived at, the Railway shall be entitled to execute the excess work by other means and the contractor shall have no claims on this account.

i) As far as SOR items are concerned, the limit of 25% would apply to the values of SOR schedule as whole and not on individual SOR items. How ever in case of NS items, the limit of 25% would apply on the individual items irrespective of the manner of quoting the rate (Single percentage rate or individual item rate)

j) The Contractor shall supply by spares and spare components and materials for maintenance the requirement for which is given in Part IV Annexure III. The supply of spares shall be completed before the planned date of energisation.

k) The Contractor shall if called upon by the Purchaser supply equipment components fittings and materials listed in Schedule 3 for other requirements upto a maximum of 5 % of the total
value of supplies of the contract at prices included in Schedule 4 during the currency of the contract. Bulk requirements of the Purchaser under this sub para would be intimated within 3 months from the date of issue of Letter of Acceptance of the Tender. Delivery of such materials shall be effected by the Contractor from ready stock if available or otherwise after procurement from the manufacturers.

l) Individual NS item in contract shall be operated with Variation of plus or minus 25% and payment would be made as per agreement rate.

m) In case of increase in quantity of an individual items by more than 25% of the agreement quantity is considered as unavoidable, negotiation will be held to arrive reasonable rate for additional quantity in excess 125% of the agreement.

n) The limit for varying quantities for minor value items shall be 100% (as against 25% prescribed for other items). A minor value item for this purpose is defined as an item whose original agreement value is less than 1% of the total original agreement value.

c) No such quantity variation limit shall be apply for foundation items

(B) VITIATION CLAUSE:- In the event of Vitation occurring due to increase or decrease in quantities, among the first, second and third lowest valid tenderers, the vitiation shall be to contractor's account. The total value of the work done shall be calculated at the rate offered by those tenderers and the amount payable shall be limited to the lowest aggregate value as worked out. Vitation as above shall be worked out as a whole for agreement including all variations in quantities.

1.2.36 COMPETENT SUPERVISORS
a) The erection of all equipment according to the specifications will be done by the Contractor at his cost. For this purpose the Contractor shall employ competent representatives to supervise the erection of the equipment and for carrying out the works at all stages. The said representatives shall be present at site during working hours and any written orders or instructions which the Purchaser’s Engineer may give to the said representatives of the contractor shall be deemed to have been duly given or communicated to the Contractor.

b) The Contractor or his representative will accompany the Purchaser’s Engineers on inspection or proceed to their offices whenever called upon to do so.

c) The Contractor’s representative shall give the necessary direction to his workmen and ensure that they execute their work in sound and proper manner. He shall employ only such supervisors workmen and labourers for the execution of any of the works as a careful and skilled in their respective trades and callings. If and whenever required by the Purchaser Engineer the Contractor shall submit a correct return showing the means of all personnel employed by him for the contract. In the event of the Purchaser’s Engineer being of the opinion that the Contractor is not employing a sufficient number of competent staff as is necessary for the proper execution of the works within the time prescribed, the Contractor shall forthwith on receiving intimation to this effect take on the additional number of staff as advised by the Purchaser’s Engineer.

1.2.37 TRAINING OF PURCHASER’S STAFF:- Necessary training shall be given minimum 3 Engineers of Railway with regard to the operation of the monitoring Equipments, free of cost by the contractor.

1.2.38 WORK BY OTHER AGENCIES
a) Any other works undertaken at the same time by the Purchaser or the Railway direct or through some other agencies 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 there undertaken by other Contractors or the Railway without being entitled on this account to any extra charge.

b) The Contractor shall not be entitled to any extra Payment due to hindrance resulting for normal Railway operations, such as delay on account of adequate number of and duration of blocks not being granted operational delay in movement of work trains etc. but the purchaser shall grant a reasonable extension of time to the Contractor.
c) The Contractor shall take note that owing to works being carried out by the Purchaser and others, there may be breaks in the continuity of the locations for work owing to works such as track remodeling being undertaken. But the Contractor shall not be entitled to claim any extra payment on account of such breaks. However, such breaks in the continuity of work would be reasonable ground for extension of completion date/s for the work.

d) If the Purchaser in 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.

e) In cases where the lines to be electrified are not in their final position the Purchaser will furnish the remodeling plans for such lines to the Contractor to enable preparation of designs and assessment of quantities of components required for the work. However the Contractor may undertake field work as necessary and possible in consultation with Purchaser on such track till they are in final position. The Contractor shall not be entitled to any compensation in case of delay in such remodeling work, but the Purchaser will grant a reasonable extension of the time for completion.

f) In course of checking the overhead equipment layout plans the Contractor shall prepare a list of infringements, if any exist, and advise the Purchaser in time. The Purchaser will arrange for removal of these infringements. If not possible by Railways, the Contractors may be asked to remove the same for which no extra payment shall be made. The works which will be carried out by the purchaser are detailed below.

i) alterations of slewing of tracks to accommodate traction structures of overhead equipment or to suit the Railways requirement.

ii) alterations to over bridges, tunnels, foot-over bridges and irrigation troughs, raising of bridges or troughs or lowering of track to give sufficient clearance for overhead equipment.

iii) Deleted

iv) in cuttings, any work necessary to provide clearance for traction structures

v) at viaducts and bridges any alterations required to enable traction structure to be accommodated.

vi) alterations to station buildings signal gantries signal cabins and other similar construction which may be required for erection of overhead equipments with requisite electrical clearances.

vii) Deleted.

viii) removal of signal telegraph power lines and guys to enable overhead equipment to be erected, with requisite electrical clearances.

ix) any blasting work required for excavation in rock other than for foundations.

x) any rail strapping or other similar works necessary for the installation of track structures and overhead equipment on bridges and over bridges.

xi) dismantling and drilling of piers of bridges and walls, supply and grating of dowel pins or holding down bolts, in the piers or bridges or walls.

xii) clearing the way and removing all infringement for erection of 25 kV feeder lines from grid sub stations.

g) In the course of checking layout plans and general arrangement drawings for switching and/or booster stations, the Contractor shall prepare a list of infringements if any exist, and advise the Purchaser in time. The purchaser will arrange for removal of these infringements. If not possible by Railways, the contractor may be asked to remove the same for which extra payments shall be made.

1.2.39 ACCESS TO WORK SITE

a) Access to the site for the purpose of this contract shall be afforded to the contract by the Purchaser at all times. In the execution of the work no person other than the Contractor or his duly appointed representative or approved sub contractor and bonafide workmen shall have access to the site. Access to the site of work at all times shall be allowed by the Contractor to officials or approved representatives of the Purchaser or to Railway staff for purpose of maintenance.

b) The purchaser or his authorised representative shall have the right to refuse admission to the work site of any person employed by the Contractor whom the purchaser or his Engineer may consider undesirable.
c) The Purchaser or his Engineer shall be at liberty to object to the employment of any person as Contractor’s Agent/ Representative, approved Sub contractor’s supervisors workmen or labourers for execution of this contract on the ground of misconduct, incompetence or negligence. The Contractor on receipt of notice of such objection in writing from the Purchaser or his Engineer shall forthwith remove the person so objected to and provide in his place any other competent person and shall not allow the persons so objected to, to enter the site of work subsequently or remain in the execution of the contract. The Purchaser will not be liable to pay any cost or damage on this account.

1.2.40 INFRINGEMENT OF PATENTS

a) The Contractor is forbidden is use any patents or registered drawings process or patterns 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 rights that may exist on such processes, drawings or patterns which he may use of his own accord.

b) In the case of patents taken out by the Contractor of the drawings or patterns registered by him, or of those patents drawings or patterns 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 competent parts recurred 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) INDEMNIFICATION BY CONTRACTOR:- In the event of any claim or demand being made or action being brought against the purchaser for infringement of latter patent in respect of any equipment machine plant work or thing used or supplied by the Contractor under this contract or in respect of any method of using or working by the purchase of such equipment, machine, plant work of thing the Contractor shall indemnify the purchaser and keep him indemnified and harmless against all claims, costs, charges and expenses arising from or incurred by reason of such claim provided that the purchaser shall notify the Contractor immediately any claims made and that the Contractor shall be at liberty if he so desires with the assistance of the purchaser if required but at the Contractor’s expense, to conduct all negotiations for the settlement of the same or any litigation that may arise therefrom and provided that no such equipment, machine, plant, work or thing shall be used by the purchaser for any purpose or in any manner other than that for which they have been supplied by the Contractor and specified under this contract.

1.2.41 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 Purchase at common law or under any statute in respect of accidents to persons who shall be employed by the contractor’s offices for the purpose of carrying out the works on the site. The Contractor shall also take out and keep in force a policy or policies or Insurance against all recognized risks to their offices and depots. Such insurance shall in all respects to be the approval of the purchaser and if he so requires in his name.

b) INSURANCE OF MATERIALS AND INSTALLATIONS:- The Contractor shall take out and keep in force a policy or policies of insurance for all materials in storage and traction installations excluding foundations under erection and/or erected until such materials and installations are provisionally handed over to the purchaser. For this purpose, the traction installations in a section (See para 1.2.46) shall be deemed to have been provisionally handed over when a provisional Acceptance Certificate is issued for the section are commissioned or on the expiry of three months after installations are given ready in all respect for handling over
as per para 1.2.46(a) whichever is earlier for commercial use. The Contractor shall not be liable for losses damages to equipments erected, in the course of erection or in store at the Contractor's depot in consequence of mutiny or other similar causes over which the Contractor has no control and which cannot be insured. Such losses or damages shall be the liability of the Purchaser and if required by the purchaser be made good by the Contractor at the cost of Purchaser.

c) The Contractor should, however, insurance the store brought to site, against risks in consequence of flood and invasion as required under the Emergency Risk (goods) Insurance Act in force from time to time.

d) The Contractor shall take out all insurance covers in connection with this contract with the General insurance Corporation of India.

e) Deleted

f) For purpose of enabling the Contractor to take the insurance cover in connection with this contract the purchaser will advise the approximate price of all the railway supply materials one month before the same are handed over to the Contractor at his depot. However, the recovery in case of shortages of such materials will be made in accordance with the provision specified in Note at the end of para 1.4.6 (f).

1.2.42 ACCIDENTS

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 and liabilities incurred under workman's Compensation Act, the Factories Act and the payment of wages Act and rules made thereunder from time to time or under any other labour and industrial legislation made from time to time.

b) The Contractor shall indemnify and keep the purchaser indemnified and harmless against all actions, suits claim, demands, costs charges or expenses arising in connection with any death or injury sustained by any person or persons within the Railway premises and any loss or damage to 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 contract 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 of the part of the Contractor and further the liability of the Contractor will be limited to Rs. 25 lakhs for any one accident.

d) The Contractor shall be responsible for all repairs and rectification of damages to traction installations erected or under erection due to railway accidents thefts, pilferage or any other cases, without delay to minimize or to avoid traffic detentions, in a section until the installations are provisionally handed over to the purchaser (See Para 1.2.46)

e) CLEARING DAMAGED INSTALLATIONS:- The Contractor shall at his cost arrange for expeditious clearing of the Railway track/s of traction installation obstructing or fouling the track/s when they are damaged as a result of railway accident or any other cause, upon the oral/telephonic/written instructions from the purchaser’s representative until installations are provisionally handed over the purchaser. If the Contractor fails to clear the tracks expeditiously and within reasonable time the purchaser will arrange to clear the track/s of the damaged installations and recover the expenses incurred form the contractor. If during such clearance operations further damage is caused to the installations the purchaser is not liable to reimburse the contractor the cost of such further damage in the installations.

f) The Contractor shall arrange for temporary slewing of overhead equipment for crane operations for derailment of rolling stock due to accidents for which the contractor is not responsible if required by the Railway or the Purchaser, at the cost of the Purchaser (Item 31 of Schedule 1) until the installations are provisionally handed over to the Purchaser. If the Contractor fails to slew the overhead equipment within reasonable time the purchaser will arrange to slew the equipment and recover the extra expenses if any, incurred from the contractor. After the crane operations are completed the Contractor shall restore the overhead equipment to its normal position.
1.2.43 CONTRACTOR’S LIABILITY FOR COSTS AND DAMAGES

a) Whenever any claim or claims for payment of a sum of money arises out of or under the Contract against the Contractor the Purchaser shall be entitled to withhold and also have a lien to retain such sum of sums in whole or in part from the Security if any deposited by the contractor entitled to withhold the said cash security deposit or the security if any furnished as the case may be and also have lien over the same pending finalisation or adjudication of any such claim. In the event of the security being insufficient to cover the claimed amount or amounts or if no security has been taken from the contractor the purchaser shall be entitled to withhold and have lien to retain to the extent of such claim amount or amount referred to supra, from any sum or sums found payable or which at any time thereafter may become payable to the Contractor under the same contract or any other Department of the Central Government pending finalisation or adjudication of any such claim. It is an agreed term of the contract that the sum of money or monies so withheld or retained under the lien of under the contract is determined by the Arbitrator (if the contract is governed by the Arbitration clause) or by the competent court as the case may be and that the contractor will have no claim for interest or damages whatsoever or any account in respect of such withholding or retention under the lien referred to supra and duly notified as such to the Contractor. If the contractor is a partnership firm or a limited company, the purchaser shall be entitled to withhold and also have lien to retain towards such claimed amount or amounts in whole or in part from any sum found payable to any partner/limited company as the case may be whether in his individual capacity or otherwise.

b) Lien in respect of other contracts:- Any sum or sums of money due and payable to the contractor (including the security deposit returnable to him) under the contract may be withheld or retained by way of lien by the purchaser against any claim or this or any other Railway or any other Department of the Central Government in respect of payment of a sum of money arising out of or under any other contract made by the Contractor with this or any other Railway or any other department of the Central Government.

It is an agreed term of the contract that the sum of money so withheld or retained under this clause by the purchaser will be kept withheld or retained as such by the purchaser will till the claim arising out of or under any other contract is either mutually settled or determined by the Arbitrator if the other contract is governed by the Arbitration clause or by the competent court as the case may be and that the contractor shall have no claim for interest or damages whatsoever on this account or any other grounds in respect of any sum of money withheld or retained under this clause and duly notified to the contractor.

1.2.44 SAFETY MEASURES

a) The contractor shall take all precautionary measures in order to ensure the protection of his own personnel moving or working on the Railway premises, but shall then conform to the rules and regulations of the Railway. If and when, in the course of the work there is likely to be any danger to persons in the employment of the contractor due to running traffic while working in the Railway sidings and premises, the Contractor shall provide necessary protection i.e. Flagmen, Flag etc. required in block working. Competency for the above shall, however, be given by the Railway authorities. The purchaser shall remain indemnified by the contractor in the event of any accident occurring in the normal course of work, arising out of the failure of Contractor or his men to exercise reasonable precaution at all places of work.

b) Blasting of rock or old concrete foundation work shall be done only after due notice is given to the purchaser and time/s and date/s for blasting operations agreed to by the Purchaser. Blasting if required to be done in the vicinity of the track shall not be undertaken until the purchaser’s Engineer is available at site and necessary steps taken to protect track and is adequately protected to the contractor against damage by blasted rock. The contractor shall follow detailed instructions which will be issued to him regarding blasting operations in the vicinity of tracks.

c) During stringing operations every care shall be taken to prevent conductors hanging low over tracks on which traffic block has not been given. All conductors shall be pulled out before traffic block is cleared so that such conductors do not infringe with moving traffic.
d) Ladder trolleys shall be used with caution. They shall not be put on tracks until the purchaser’s supervisor is on duty. The contractor shall provide his own flagman with flag for protection of the trolleys and the purchaser’s representative authorities in writing for the trolleys to be put on the tracks. Ladder trolleys shall be promptly removed on instructions from the purchaser’s representative and well in advance or trains. No claim shall rest on the purchaser in the event of a ladder trolley being run over by train. The flagmen for the above job will be provided by the contractor.

e) The contractor shall abide by all Railway regulations in force for the time being and ensure that the same are followed by his representatives agents or sub contractors or workmen. He shall give due notice to his employees and workers about provision of the para.

f) While working within station limits specially on passenger platforms, the contractor shall ensure that at all times 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.

g) 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 or damage any Railway equipment structure or rolling stock except as agreed to by the purchaser, provided that all damage and disfiguration caused by the Contractor to any Railway property must be made good by the Contractor at his own cost failing which cost of such repairs shall be recovered from the contractor.

h) 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 and recover the costs from the Contractor.

i) Moreover if any time the works to be carried out directly concerned the safety of trains the contractor’s staff must comply fully with the Railway regulations given to him by the authorised Railway staff. The contractor’s employees and workers may for no reason operate an installation concerning train safety or train movement. They shall notify the authorised representative of the purchaser who will take all necessary steps in this regard.

j) The Contractor shall be responsible for safe custody of equipments till provisional acceptance.

k) 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 the 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 lakhs for any one accident.

l) The contractor shall ensure that unauthorized careless or inadvertent operation of switch gear, which may result in accident to staff and/or damage to equipment does not occur.

m) The Contractor shall abide by all instructions issued by the purchaser from time to time in connection with protection/ safety of track/ railway installations/ personal as well as quality control. The contractor should not leave the excavated pits unfilled overnight. Due to any reason if it become necessary to leave the pit unfilled overnight, it should be filled back effectively with sand bags to the satisfaction of the purchaser’s representative.

n) The contractor shall obtain a valid electrical contractor license for HT/EHT of voltage equal or more than 25 kV from the concerned statutory authority before taking up the physical execution of work and submit a copy of the same to concerned Railway Executive official in charge of the work.

1.2.45 RECOVERY FOR DELAY IN COMPLETION:- If the contractor fails to execute and complete the work within the time specified in the Agreement or within the period of extension granted under para 1.2.45 except in so far as the delay is on the purchaser’s account, the Contractor shall accept reduction in the total amount payable to him by the Purchaser at the rate of Rs. 4000/- per day for the actual delay occasioned beyond the appointed time by which the work shall have been completed under the time by which the work shall have been completed under the contract. Such reduction shall be accepted by the purchaser in full satisfaction of the Contractor’s liability arising from delay only. This recovery for delay in completion will be applicable separately for each stage of completion of overhead equipment switching stations or booster transformer stations when two or more
stages completion are specified in contract. Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008 or his successor shall at his sole discretion to specify a time limits within which the unfinished portion of the work shall be completed after serving on contractor a notice of the purchaser's intention to effect the said recovery in the Form 17 (Part V). In the event of failure of the contractor the purchaser shall be at liberty to take action in accordance with provisions in Part 1.2.29 and 1.2.30. The competent authority while granting extension to the currency of contract may also consider levy of token penalty as deemed fit based on the merit of the case.

Note : Deleted

1.2.46 EXTENSION OF TIME:- If such a failure as aforesaid shall have arisen from any cause which the purchaser may admit as being a reasonable ground for extension of time the Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008 or his successor(s)/ nominee shall allow such additional time as he may in his absolute discretion consider to be reasonably justified by the circumstances of the case. Such extension shall be granted by the purchaser in the Form No. 18 (part V). The Contractor will apply for extension at least 15 days before the expiry of the period of completion.

Note : 1) Form 18 will be applicable in case extension is on Purchaser's account
2) Form 18 will also be applicable in case of Contractor's account but the purchaser should be reasonably satisfied that the Contractor cannot be penalized for such delay.

1.2.47 PROVISIONAL ACCEPTANCE

a) Immediately after completion of works at each station, the contractor shall certify and advise the Purchaser in writing that the section/ station is (I) Complete (ii) ready for satisfactory commercial service and (iii) ready to be handed over. He will also place at the disposal of the Purchaser the required staff for checking it and putting it into operation.

b) The test or tests as stipulated in Part II Chapter VII of the specification excluding power collection tests which would be carried out subsequently in connection with the taking over by the Purchaser of the equipment and installations shall be carried out jointly by the purchaser and the Contractor within a month after the receipt of the contractor's notification as stated in sub para above.

c) After inspection and satisfactory conclusion of tests and when the purchaser is satisfied with the satisfactory working of the installations he will issue a ‘Provisional Acceptance Certificate’ which would be signed by both the parties. The provisional Acceptance Certificate will not be withheld for any minor defects.

d) Should the result/s of inspection and the test/s be not satisfactory, and 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.

e) 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 he deems it possible to use in a reasonable manner any section or any part of the section even if some installations of the sections 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 expense all necessary steps to complete the works in accordance with the provisions of the contract. In case 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 indicated in sub para/s above.
NOTE : 1) Provisional 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 energisation of the lines within the date of contractor notification the issue of Provisional Acceptance Certificate shall not be delayed and shall be issued within a maximum time of 3 months after notification under para 1.2.46(a)(iii) has been given. The power collection tests shall normally be carried out for the entire group/s within three months of the date of energisation of the last section in the Group/s.

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

1.2.48 DEFECTIVE EQUIPMENTS TO BE CHANGED

a) Notwithstanding the issue of Provisional Acceptance Certificate and partial or full use of any equipment of 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 fulfil 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 forth with 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 aspect to make it satisfactorily 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 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 the 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 contractors 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 a reasonable time the Contractor’s liability under this clause shall be satisfied by the repayment by the contractor of all money paid by the purchaser to him in respect of such rejected equipment. Rejected/ defective materials shall be returned to the contractor to the extent possible.

b) Provisions of this para will apply only in respect of the equipments and components supplied by the contractor or his sub contractor.

1.2.49 USE OF REJECTED EQUIPMENT:- In the event of such rejection as aforesaid, the purchase 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 energisation (1.2.14) 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.

1.2.50 GUARANTEE

a) The Contractor shall guarantee satisfactory working of the installations erected by him, for a period of thirty months from the date of supply of materials or twenty four months from the date of commercial operation or from the date of Provisional Acceptance of each section (1.2.46) by the purchaser whichever is earlier. The guarantee for spares should be coincident with the guarantee for erected equipment.

b) During the period of guarantee the contractor shall keep available an experienced Engineer and necessary equipment to attend to any defective installation 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 substitution 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 Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008 or his successor (s)/ Nominee.

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 in the part of the contractor provided always that such replaced items are promptly returned to the contractor if so required by him at his (contractor's) own expenses. In case of type defects in contractor's equipment and component detected during guarantee period, contractor shall replace all such items irrespective of the fact whether all such cost of repairs carried out on his behalf by the purchaser at site. In such a case the contractor shall be informed in 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 and renewed until the expiry of the six months from the date of such replacement or of renewal or until the end of the above mentioned period (see Sub para 1.2.49 (a)) whichever is later. Such extension shall not apply in case of defects of a minor nature the decision of the Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008 or his successor/ nominee being final in the matter. If any defect be not remedied within a reasonable time during the aforesaid period the purchaser may proceed to do work at the contractors 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 renewed parts shall be delivered and erected at site free of charge to the purchaser.

f) Any materials, fitting, components or equipments supplied under 1.2.34 shall also be covered by the provisions of this paragraph. The liability of the contractor under the guarantee will be limited to re-supply of equipments, components and fittings made under Part IV Annexure III. Such re-supply shall be effected at the contractor's depot or in the event of closure of the depot at the stores depot of the Engineer in charge of maintenance of overhead equipment of the section covered by the contract.

g) In the case of materials, components fittings and equipments supplied by the purchaser under 1.2.20 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 final reconciliation over and above allowance as per Part I Chapter IV.

1.2.51 FINAL ACCEPTANCE

a) The final acceptance of the entire equipment installed on the Group shall take effect from the date of expiry of the period of guarantee as defined in paragraph 1.2.49 of the expiry of the last of the respective periods of guarantee of various sections for which Provisional Acceptance Certificates are issued or brought into commercial operation, provided in any case that the Contractor has complied fully with his obligations under clause 1.2.49 in respect of each section of the Group, provided also that the attention has been paid by way of maintenance by the Purchaser.

b) If on the other hand the contractor has not so complied with his obligation under para 1.2.49 in respect of any section the purchaser may either extend the period of guarantee in respect of that section until the necessary works are carried out by the contractor or carry out those works or being them carried out suo-moto on behalf of the contractor at the contractor’s expenses. After expiry of the period of guarantee for each section, a certificate of final acceptance for the section shall be issued by the purchaser and the last of such certificate will be called the last and final acceptance certificate. The contract shall not be considered as completed until the issue of final acceptance certificate by the purchaser.

c) The purchaser shall not be liable to the contractor for any matter arising out of or in connection with the contract of execution of the work unless the contractor shall have made a claim in writing in respect thereof before the issue of last and final acceptance certificate under this clause.
Notwithstanding the issue of last and final acceptance certificate the Contractor and the purchaser (Subject to sub-clause as above) shall remain liable for fulfillment of any obligation incurred under the provision of the 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 thereto.

1.2.52 PAYMENT:- Payments will be governed by the terms specified in Part I Chapter III in accordance with accepted Schedule of Prices read with relevant paras of the other parts and Chapters of the Tender Papers. The purchaser retains the right to withhold money due to the contractor arising out of this contract for any default of the contractor from other contracts which the contractor may have with the Government of India.

i) The Contractor shall whenever required to produce or cause to be produced for examination by the Purchaser any quotation/ invoice, cost of other account, book of account, voucher, receipt letter, memorandum paper or writing or any copy of or extract from any such document and also furnish information and returns verified in such manner as may be required in any way relating to the execution of this contract or relevant for verifying or ascertaining the cost of the execution of this contract (the decision of the purchaser on the question of relevance of any documents information or return being final and binding on the parties). The contractor shall similarly produce vouchers etc. if required to provide to the purchaser that materials supplied by him, are in accordance with the specifications laid down in the contract.

ii) If any portion of the work be carried out by a sub contractor or any subsidiary or allied firm or company the purchaser shall have power to secure the books of such sub contractor or any subsidiary on allied firm of company, through the contractor and such books shall be open to his inspection. The Contractor should seek prior permission from the purchaser for subletting whole and/or part of the work to any sub contractor.

iii) The obligations imposed sub clauses (i) and (ii) above are without prejudice to the obligation of the contractor under any statute rules or order binding to the contractor or other conditions of the contract.

iv) It is an agreed term of the contract that the purchaser reserves to itself the right to carry out post payment audit and/or technical examination of the works and the final bill including all supporting vouchers, abstracts etc. and to make a claim on the contractor for the refund of any excess amount paid to him if as a result of such examination any over payment to him is discovered to have been made in respect of any work done or alleged to have been done by him under the contract.

1.2.53 SITE CLEARANCE

a) At the end of each spell of work and on completion of the work, the contractor shall as part of his contractual obligation leave the tracks, switching / booster station sites and their approaches, store yards etc. cleared of rubbish and obstruction of all kinds. Besides he shall take all necessary steps in the course of the execution of the works to avoid the presence of loose earth and ballast on platforms, in drainage on the track formation and pathways in the vicinity. If within a fortnight of completion of the particular item of work the rubbish is not cleared from the site purchaser will arrange to get them removed at the cost of the contractor. However before the purchaser actually gets the site cleared he shall send an intimation in writing to the contractor expressing his intention.

b) The storage of equipment, tools and machinery used by the Contractor shall be done in an orderly manner and anything used by the contractor for execution of the works shall in no way constitute a danger or hindrance to the working of the Railway or to the movement of its staff or passengers.

1.2.54 EQUIPMENTS, COMPONENTS AND MATERIALS RECEIVED FOR WORK:- The Contractor shall utilize all equipments, components or materials procured specifically for the purpose of execution of the work in the work or other requirements. Any surplus materials left over the end of their work shall not be disposed off without prior approval of the purchaser in writing. The purchaser may within a period of six months from the date of Provisional Acceptance of the last section switching/ Booster station notify the Contractor of the Purchaser’s interest in any or all of the surplus materials and purchaser shall have the
right to take over the materials indicated at prices indicated in Schedule 3. The materials so notified by
the Purchaser shall be taken over by the Purchaser and paid for in full. The Contractor may use in any
manner deemed fit only such surplus materials which are not covered by the purchaser’s notification
after getting the approval of the purchaser in writing.

1.2.55 ARBITRATION

a) Demand for Arbitration: - In the event of any dispute or difference between the parties hereto as to the
construction or operation of this contract, or the respective rights and liabilities of the parties on any
matter in question, dispute or difference on any account or as the contractor may claim to be entitled to,
or if the Railway fails to make a decision within 120 days, then and in any such case, the contractor,
after 120 days but within 180 days of his presenting his final claim on disputed matters, shall demand
in writing that the dispute or difference be referred to arbitration.

b) The demand for arbitration shall specify the matters which are in question or subject of the dispute or
difference as also the amount of claim item wise. Only such dispute(s) or difference (s) in respect of
which the demand has been made, together with counter claims or set off shall be referred to arbitration
and other matters shall not be included in the reference.

c) The Arbitration proceedings shall be assumed to have commenced from the day, a written and valid
demand for arbitration is received by the Railway.

The claimant shall submit his claim stating the facts supporting the claims along with all relevant
documents and the relief or remedy sought against each claim within a period of 30 days from the date
of appointment of the Arbitral Tribunal.

The Railway shall submit its reference statement and counter claim(s), if any, within a period of 60
days of receipt of copy of claims from Tribunal thereafter, unless otherwise extension has been granted
by Tribunal.

d) No new claim shall be added during proceeding by either party. However, a party may amend or
supplement the original claim or defense thereof during the course of arbitration proceedings subject to
acceptance by Tribunal having due regard to the delay in making it.

e) If the Contractor(s) does/ do not prefer his/their specific and final claims in writing, within a period of 90
days of receiving the intimation from the Railways that the final bill is ready for payment, he/they will be
deemed to have waived his/ their claims(s) and the railway shall be discharged and released of all
liabilities under the contract in respect of these claims.

f) Obligation during pendency of arbitration – work under the contract shall unless otherwise directed by
the Engineer, continue during the arbitration proceedings, and no payment due or payable by the
Railway shall be withheld on account of such proceedings provided, however it shall be open for
Arbitral Tribunal to consider and decide whether or not such work should continue during arbitration
proceedings.

g) In cases where the total value of all claims in question added together does not exceed Rs. 10,00,000/-
(Rupees ten lakhs only), the Arbitral Tribunal consist of a sole arbitrator who shall be either the General
Manager or a gazetted officer of Railway not below the grade of JA grade nominated by the General
Manager in that behalf. The sole arbitrator shall be appointed within 60 days from the day when a
written and valid demand for arbitration is received by Railway.

h) In cases not covered by Clause (g) above, the Arbitral Tribunal shall consist of a panel of three
Gazetted Rly. Officers not below JA grade, as the arbitrators. For this purpose, the Railway will a send
a panel of more than 3 names of Gazetted Rly. Officers of one or more departments and contractor to
choose and send , to General Manager upto 2 names out of the panel for appointment as contractor’s
nominee. The General Manager shall appoint at least one out of them as the contractor’s nominee and
will also simultaneously appoint the balance number of arbitrators either from the panel or from outside
the panel, duly indicating the presiding arbitrator from amongst the 3 arbitrators so appointed. While
nominating the arbitrators it will be necessary to ensure that one of them is from the Account
department. An officer of selection Grade of the Account Department shall be considered of equal
status to the Officers in SA grade of other departments of the Railways for the purpose of appointment
of Arbitrators.

i) If one or more of the arbitrators appointed as above refuses to act as arbitrator, withdraws from his
office as arbitrator, or vacates his/ their office/ offices or is/are unable or unwilling to perform his
functions as arbitrator for any reason whatsoever or dies or in the opinion of the General Manager fails
to act without undue delay, the General Manager shall appoint new Arbitrator/ arbitrators to act in his /
their place in the same manner in which the earlier arbitrator/ arbitrators had been appointed. Such reconstituted tribunal may at its discretion, proceed with the reference from the stage at which it was left by the previous arbitrator(s).

j) The Arbitral Tribunal shall have power to call for such evidence by any of affidavit or otherwise as the Arbitral Tribunal shall think proper, and it shall be the duty of the parties here to do or caused to be done all such things to may be necessary to enable the Arbitral Tribunal to make the award without any delay.

k) While appointing arbitrator(s) under sub-clause (g), (h), (i) above due care will be taken that he/ they is/ are not the one/those who are had opportunity to deal with the matters to which the contract relates or who in the course of his/ their duties as Railway servants (exercised views or all or any of the matters under dispute or differences. The proceedings of the Arbitral Tribunal or the award made by such Tribunal will however, not be invalid merely the reason that one or more arbitrator had been in the course of his service opportunity to deal with the matters and which the contract relates or within the course of his/ their duties expressed views on all or any of the matters under dispute.

l) The arbitral award shall state item-wise, the sum and reasons upon which it is based.

m) A party may apply for corrections of any computational errors, any typographical or electrical errors or any other error of similar nature occurring in the award and interpretation of specific point of award to tribunal within 30 days of receipt of the award.

n) A party may apply to tribunal within 30 days of receipt of award to make an additional award as to claims presented in the arbitral proceedings but omitted from arbitral award.

o) In case of the Tribunal, comprising of three members any ruling or award shall be made by a majority of members of tribunal. In the absence of each a majority, the views the presiding arbitrator shall prevail.

p) Where the arbitral award is for the payment for money no interest shall be payable on whole or any part of the money for any period till the date on which the award is made.

q) The cost of arbitration shall be borne by the respective parties. The cost shall inter-alia include fee of the arbitrator(s) as per the rates fixed by the Rly. Administration from time to time.

r) Subject to the provisions of the aforesaid Arbitration and conciliation Act 1996 and the rules there under and any statutory modification thereof shall apply to the arbitration proceedings under this clause.

1.2.56 PAYMENT DURING ARBITRATION:- Work under the contract shall unless otherwise directed by the purchaser continue during the Arbitration proceedings and no payment due to or payable by the purchaser shall be withheld on account of such proceedings. Notwithstanding anything contained herein, the Arbitrators as the case may be shall have full authority to direct withholding of any payment if such action is considered fit and proper at any time.

1.2.57 REFUND OF SECURITY DEPOSIT

a) “security deposit shall be returned to the contractor after physical completion of the work as certified by the competent authority. the competent authority shall normally be the authority who is competent to sign the contract. if this competent authority is of the rank lower than JA grade, then a JA grade officer (concerned with the work) should issue the certificate. the certificate, inter alia, should mention that the work has been completed in all respects and that all the contractual obligations have been fulfilled by the contractors and that there is no due from the contractor to railways against the contract concerned. before releasing the SD, an unconditional and unequivocal no claim certificate from the contractor concerned should be obtained.”

b) The security deposit shall however be liable to be forfeited in case of any breach by the contractor of any of the conditions of the contract or for non completion of the full contract without prejudice to other rights and remedies of the purchaser whether specifically provided for herein or otherwise.

1.2.58 PROVISIONS OF CONTRACT LABOUR REGULATION AND ABOLITION ACT

i) The Contractor shall comply with the provisions of the contract labour (Regulation and Abolition Act 1970) and the contract labour Regulation and Abolition Central Rules 1971 as modified from time to time wherever applicable and shall also indemnify the purchaser from and against any claims under the aforesaid Act and the rules.

ii) The Contractor shall obtain a valid license under the aforesaid Act as modified from time to time before the commencement of the work and continue to have a valid license until the completion of the work.
Any failure to fulfill this requirement shall attract the penal provisions of the contract arising out of resultant non-execution of the work.

iii) The contractor shall pay the labour employed by him directly or through sub contractors the wages as per provisions of the aforesaid Act and the rules wherever applicable. The contractor shall notwithstanding the provisions of the contract cause to be paid the wages to labour indirectly engaged on the work including any engaged by his sub contractors in connection with the said work, as if the labour has been immediately employed by him.

iv) In respect of all labour directly or indirectly employed in the work for performance of the contractor part of the contract the contractor shall comply with or cause to be complied with the provisions of the aforesaid Act and the rules wherever applicable.

v) In every case in which by virtue of the provisions of the aforesaid Act or the rules the Purchaser is obliged to pay any amount of wages to a workman employed by the contractor or his sub contractor in execution of the work or to incur any expenditure in providing welfare and health amenities required to be provided under the aforesaid Act and the rules or to incur any expenditure on account of the contingent liability of the purchaser due to the contractor’s failure to fulfill his statutory obligations under the aforesaid Act or the Rules statutory obligations under the aforesaid Act or the Rules the purchaser will recover from the contractor the amount of wages so paid or the amount of expenditure so incurred and without prejudice to the rights of the purchaser under section 20 sub section (2) and section 21 sub section (4) of the aforesaid act the purchaser shall be at liberty to recover such amount or part thereof by deducting it from the deposit and/or from any sum due by the purchaser to the contractor whether under the contract or otherwise. The purchaser shall not be bound to contest any claim made against it under sub section (1) of section 20 and subsection (4) of section 21 of the aforesaid act except on the written request of the contractor and upon his giving the full security for all costs for which the purchaser might become liable in contesting such claim. The decision of the purchaser regarding the amount actually recoverable from the contractor as stated above shall be final and binding on the contractor.

### 1.2.59 PROVISIONS OF APPRENTICE ACT 1961

a) The contractor shall be responsible to ensure compliance with the provisions of the Apprentices Act 1961 and the Rules and other issues there under from time to time in respect of Apprentices directly or through petty contractors of sub contractors employed by him for the purpose of carrying out the contract. If the contractor directly or through petty contractors or sub contractors fails to do so his failure will be a breach of the contract and the Railway may, in its direction rescind the contract. The Contractor shall also be liable for any pecuniary liability arising on account of any violation of the provisions of the Act.

Note: The contractors are required to engage Apprentices when the works undertaken by them last for a period of one year or more and/or the cost of work is Rs. One lakh or more.

b) **EMPLOYMENT UNDER ELECTRICAL WORKS CONTRACTS:** Under this scheme it is proposed to get employment to unemployed Engg. Graduates/ Diploma holders with the Railway Contractors. Fresh Engg. Graduates without any experience of any kind will be taken under training by the contractor on stipend specified by the competent authority. Engg graduates/ diploma holders who have gained experience and have completed a period of 6 months will be paid at rate specified from time to time by the competent authority.

Under the above provision the Contractor is required to employ such engineers/ Diploma holders at the rates specified above and in the ratio for such employment as indicated below:

<table>
<thead>
<tr>
<th>Contract Value</th>
<th>No. of Engineer/ Diploma Holders to be employed</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rs. 10 lakhs and above</td>
<td>2 Engg. Degree holders and 2 Engg. Diploma Holders</td>
<td>Duration of the Contract</td>
</tr>
</tbody>
</table>
Under the above scheme it would be obligatory for the contractor to give a declaration alongwith his tender to the effect that the graduate Engineers/ Diploma holders having been employed by him under the particular work for which tender is submitted are in accordance with the rates and ratios specified above and none of them is related to him (contractor) failing which the tender may be disqualified. In case of wrong information having been given by the contractor which comes to light subsequently the contract may be rescinded and action taken in accordance with para 1.2.14 of Tender Papers.

1.2.60 DETERMINATION OF CONTRACT OWING TO DEFAULT OF CONTRACTOR

(1) if the contractor should ..............
   (i) Becomes bankrupt or insolvent, or
   (ii) Make an arrangement with of assignment in favour of his creditors, or agree to carry out the contract under a Committee of Inspection of his creditors, or
   (iii) Being a Company or Corporation, go into liquidation (other than a voluntary liquidation for the purpose of amalgamation or reconstruction) or
   (iv) Have an execution levied on his goods or property on the works, or
   (v) Assign the contract or any part thereof otherwise than as provided in Clause 7 of these conditions or
   (vi) Abandon the contract, or
   (vii) Persistently disregard the instructions of the Engineer, or contravene any provision of the contract, or
   (viii) Fail to adhere to the agreed programme of work by a margin of 10% of the stipulated period, or
   (ix) Fail to remove materials from the site or to pull down and replace work after receiving from the Engineer notice to the effect that the said materials or works have been condemned or rejected under Clause 25 and 27 of these conditions or
   (x) Fail to take steps to employ competent or additional staff and labour as required under Clause 26 of the conditions, or
   (xi) Fail to afford the Engineer or Engineer’s representative proper facilities for inspecting the works or any part thereof as required under Clause (28) of the conditions, or
   (xii) Promise, offer to give any bribe, commission, gift or advantage either himself or through his partner, agent or servant to any officer or employee of the Railway or to any person on his or on their behalf in relation to the execution of this or any other contract with this Railway.
   (xiii) (A) At any time after the tender relating to the contract has been signed and submitted by the contractor, being a partnership firm admit as one of its partners or employ under it or being an incorporated company elect or nominate or allow to act as one of its directors or employ under it in any capacity whatsoever any retired engineer of the gazetted rank or any other retired gazetted officer working before his retirement whether in the executive or administrative capacity, or whether holding any pensionable post or not, in the Engineering Department of the Railways for the time being owned and administered by the President of India before the expiry of two years from the date of retirement from the said service of such Engineer or Officer unless such Engineer of Officer has obtained permission from the President of India or any officer duly authorized by him in this behalf to become a partner or a director or to take employment under the contractor as the case may be, or
   (B) Fail to give at the time of submitting the said tender
      i. The correct information as to the date of retirement of such retired engineer or retired officer from the said service or as whether any such retired Engineer or retired officer was under the employment of the contractor at the time of submitting the said tender, or
      ii. The correct information as to such engineers or officers obtaining permission to take employment under the contractor, or
      iii. Being a partnership firm, the correct information as to whether any of its partners was such a retired engineer or a retired officer, or
      iv. Being an incorporated company, correct information as to whether any of its directors was such a retired engineer or a retired officer, or
      v. Being such a retired engineer or retired officer suppress and not disclose at the time of submitting the said tender the fact of his being such a retired engineer or a retired officer
or make at the time of submitting the said tender a wrong statement in relation to his obtaining permission to take the contract or if the contractor be a partnership firm or an incorporated company to be a partner or director of such firm or company as the case may be or to seek employment under the contractor, and after expiry of 48 hours notice a final termination notice (Proforma as Annexure v) should be issued.

Then and in any of the said clause, the Engineer on behalf of the Railway may serve the Contractor with a notice (Proforma at Annexure III) in writing to that effect and if the contractor does not within seven days after the delivery to him of such notice proceed to make good his default in so far as the same is capable of being made good and carry on the work or comply with such directions as aforesaid to the entire satisfaction of the Engineer, the Railway shall be entitled after giving 48 hours notice (Proforma at Annexure IV) in writing under the hand of the Engineer to rescind the contract as a whole or in part or parts (as may be specified in such notice) and adopt either or both of the following courses:-

a) To carry out the whole or part of the work from which the contractor has been removed by the employment of the required labour and materials, the costs of which shall include lead, lift, freight, supervision and all incidental charges,

b) To measure up the whole or part of the work from which the contractor has been removed and to get it completed by another contractor, the manner and method in which such work is completed shall be in the entire discretion of the Engineer whose decision shall be final:

(2) Right of Railway after rescission of contract owing to default of Contractor - In the event of any or several of the courses referred to in sub clause (I) of this clause being adopted

a) The contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased or procured any materials or entered into any commitments or made any advances on account of or with a view to the execution of the works or the performance of the contract and contractor shall not be entitled to recover or be paid any sum for any work there to for actually performed under the contract unless and until the Engineer shall have certified the performance of such work and the value payable in respect thereof and the contractor shall only be entitled to be paid the value so certified,

b) The Engineer or the Engineers’s Representative shall be entitled to take possession of any materials, tools, implements, machinery and buildings on the works or on the property on which these are being or out to have been executed, and to retain and employ the same in the further execution of the works of any part thereof until the completion of the works without the Contractor being entitled to any compensation for the use and employment thereof or for wear and tear pr destruction thereof.

c) The Engineer shall as soon as may be practicable after removal of the Contractor fix and determined ex-parte or by or after reference to the parties or after such investigation or enquires as he may considered fit to make or institute and shall certify what amount (if any) has at that time of rescission of the contract been reasonably earned by or would reasonably accrue to the contractor in respect of the work then actually done by him under the contract and what was the value of any unused, or partially used materials, any constructional plant and any temporary works upon the site. The legitimate amount due to the contractor after making necessary deductions and certified by the engineer should be released expeditiously.

1.2.61 Jurisdiction of the Court binding the contract: For the smooth operation of the contract, any suit or proceedings to enforce the rights of either of the parties here to under this agreement shall be instituted in and tried only by the courts under the jurisdiction of Honorable High Court of Madras (and its subordinate courts) and by no other court, and both the parties hereto, hereby expressly agree to submit to the jurisdiction of courts under the jurisdiction of Honorable High Court of Madras (and its subordinate courts).
PART – I

CHAPTER – III

PRICES AND PAYMENT
**PART – I**  
**CHAPTER – III**  
**PRICES AND PAYMENT**

<table>
<thead>
<tr>
<th>Para No.</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3.1</td>
<td>Scope</td>
</tr>
<tr>
<td>1.3.2</td>
<td>Schedule of Prices</td>
</tr>
<tr>
<td>1.3.3</td>
<td>Prices of equipments, components and materials</td>
</tr>
<tr>
<td>1.3.4</td>
<td>Prices of spares, spare components and fitting and additional supplies</td>
</tr>
<tr>
<td>1.3.5</td>
<td>Payment and recoveries</td>
</tr>
<tr>
<td>1.3.6</td>
<td>Invoicing procedure</td>
</tr>
<tr>
<td>1.3.7</td>
<td>Payment for designs</td>
</tr>
<tr>
<td>1.3.8</td>
<td>Advance Payment for foundations</td>
</tr>
<tr>
<td>1.3.9</td>
<td>‘On Account’ Payments</td>
</tr>
<tr>
<td>1.3.10</td>
<td>Recoveries from the contractor</td>
</tr>
<tr>
<td>1.3.11</td>
<td>Progress payments for supply and erection.</td>
</tr>
<tr>
<td>1.3.12</td>
<td>Payments for spares and additional supplies</td>
</tr>
<tr>
<td>1.3.13</td>
<td>Excise duty and Sales tax</td>
</tr>
<tr>
<td>1.3.14</td>
<td>Payments on provisional acceptance of each sub group</td>
</tr>
<tr>
<td>1.3.15</td>
<td>Payments for surplus materials</td>
</tr>
<tr>
<td>1.3.16</td>
<td>Final settlement</td>
</tr>
<tr>
<td>1.3.17</td>
<td>Measurements</td>
</tr>
<tr>
<td>1.3.18</td>
<td>Mobilization Advance</td>
</tr>
</tbody>
</table>
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. This is a works contract. 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 SCHEDULE OF PRICES

a) The rates given against various items of work in two sub-sections each of Schedule – 1, Section – 1 & 2 are the standard schedule of rates (S.O.R). The tenderers are required to quote a single percentage below/at par/above against the S.O.R cost of each sub-section separately while quoting the summary of prices (Form-1). The actual payment to be made against any item of any sub-sections of Schedule-1, Section-1, shall be derived after loading the SOR prices of that sub-sections with the tenderer’s quoted percentage for the same sub-section. The prices so obtained shall be the unit prices for the various items of work given in schedule-1.

All unit prices shall be FIRM irrespective of minor variations in basic quantities and use of alternative types of various components and fittings approved by the purchaser. Minor changes in the basic designs shall be for materials and erection, except for those materials specified in Annexure-4, Part - A, for which only erection charges will be payable and for execution of work in accordance with specifications and approved drawings and designs. Annexure – 4, Part – B details the list of equipments, fittings and finished material and their rates thereof to be supplied by Railways to the contractor. The successful tenderer shall take over the same from Railways, immediately on award of the contract duly submitting Indemnity bond and on certificate that the materials are insured for requisite value. The contractor shall carefully note the items of materials, equipments, fittings and components which will be supplied by the purchaser.

b) UNIT PRICES FOR MATERIALS:- The unit prices indicated in column 4 of Schedule 1, Section 1, are inclusive of the prices of materials including all incidental charges for transport loading/ unloading and handling of materials, commission for arranging dispatch by rail direct from manufacturers factory and completing all necessary formalities in this respect, such as submission of forwarding notes arranging of Wagon, collection of Railway receipts, all insurance premia, banker’s charges for bank guarantee, indemnity bonds, inclusive of cost of stamps etc. as also siding of shunting charges if any, levied by the Railway.

The prices shall include all taxes, duties and levies (including Octroi etc.) applicable on this works contract. Therefore, they should quote their prices taking into account the rate of taxes as leviable in the event of sale through works contract to the central Government Organisation in that state. It is clarified that required forms applicable for the purpose will be supplied to the contractor as applicable in the stats where the contract is being executed.

The prices shall also include provision for losses and wastage in transit and erection. No separate prices for supply of concreting materials shall be included against item 2 in column 4 of the Schedule 1. These shall be included in the unit prices for erection (column 5 of Schedule 1) for this item.

FOR ERECTION :- The unit prices indicated in column 5 of Schedule 1, Section 1, Shall include cost of erection and testing to be done by the Contractor to the extent indicated in Part II, Chapter VII and also cover all cost of administration of the contract insurance premia, banker’s charges for guarantees, cost of stamps, cost of storage, loading and unloading and handling of materials, and for any road transport which the contractor may use for carriage of materials between contractors depot and his works spot and of works and adjustments necessary to be done by the contractor during or after the tests carried out by the purchaser as per part II, Chapter VII.

c) COPPER FOR COMPONENTS & FITTINGS – Deleted –
d) OTHER PRICE ADJUSTMENTS

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

(ii) PRICE VARIATION CLAUSE:

1. Price variation clause shall be applicable for tenders of value more than Rs 50 lakhs irrespective of the contract completion period and PVC shall not be applicable to tenders of value less than Rs 50 lakhs.

2. Price variation clause (PVC) will not apply if the price variation is upto 5% and that reimbursement/Recovery due to variation in price will continue to be made only for the amount in excess of 5% of the amount payable to the contractor.

3. The rates quoted by Tenderer and accepted by Railway Administration shall hold good till the completion of the work and no additional individual claim will be admissible (Unless otherwise expressly stated elsewhere in the tender conditions) on account of fluctuation in market rates increase in taxes / any other levies / toll etc. except that payment / recovery for over all market situation .

4. No cognizance will be given for any sort of fluctuations in taxes and other market conditions etc., (unless otherwise expressly stated elsewhere in the tender conditions) for any individual item for the purpose of making adjustments in payments. The contract shall however be governed by the general price variation clause as under. Adjustments for variation in prices of copper shall be determined in the manner prescribed below.

5. If in any case the accepted offer includes some specific payment to be made to consultants or some materials supplied by Railway at fixed rates such payments should be excluded from the gross value of the work for purpose of payment / recovery of variations.

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

7. Price Variation is payable/recoverable during the extended period of the Contract also, provided the extension is granted on administrative ground, ie. Under Clause 17-A(i),(ii)&(iii) of GCC.

8. In case negotiations are held in the tender, the reference date for base price/indices given below shall be considered as one month prior to the date of negotiation (instead of one month prior to the date of opening of the tender as stated above)

i) STEEL AND CEMENT:- For the purpose of price variation in regard to steel and cement the following will be considered.

1) The steel quantities supplied by the contractor under item 3(a) (ii), 3 (a) (iii), 3(b) (i) and 3(c) only will be considered. The weight of steel quantities to be procured for the purpose of other item of works will not be considered for the price variation calculations. The weight of the galvanized steel for each structure/mast/component as approved by RDSO / CORE/RAILWAYS will be considered as the weight of the steel for the purpose of PVC. No price variation clause is eligible for zinc used for galvanization purpose.

2) Cement quantities used by the contractor for foundation of M-15 concrete and for grouting with M-20 concrete will be taken cement as 325 KG per cubic metre.

Prices of Steel and Cement are to be linked with the Wholesale Price Index of the respective sub groups as per RBI Index Numbers. Henceforth the formula for calculating the amount of variation on account of variation in prices of Steel and Cement would be as indicated below:-

\[ Ms = R \times (W_s - W_{so}) / W_{so} \]
\[ Mc = R \times (W_c - W_{co}) / W_{co} \]

Where,
Ms = Amount of price variation in material (Steel)
Mc = Amount of price variation in material (Cement)
R = value of steel or Cement supplied by Contractor as per on account bill in the quarter under consideration.
Wso = Index No. of Wholesale Price of subgroup (of Steel and Iron) as published in RBI Bulletin for the base period.
Ws = Index No. of Wholesale Price of sub group (of Steel and Iron) as published in RBI Bulletin for the First month of the quarter under consideration.
Wco = Index No. of Wholesale Price of sub group (Of Cement) as published in RBI Bulletin for the base period.
Wc = Index No. of wholesale price of sub group (of cement) as published in RBI bulletin for the first month of the quarter under Consideration.

The contractors bills submitted should have enclosures of evident documentary proof of steel, cement procured by the contractor for the period under consideration.

ii LABOUR

Price variation on erection will be reimbursable / recoverable on each monthly bill submitted by the contractor as per the following formula.

The price index for industrial workers (base year 1982=100) published by Reserve Bank of India / Indian Labour Journal will be the relevant index on the basis of which price variation given below is to be calculated.

Percentage increase payable on the net amount of erection of bill
\[
\frac{(L-Lo)}{Lo} \times 100
\]

Where,

L= Average of All India Consumer Price Index for Industrial workers for the previous six months prior to the six monthly period of measurement for which price variation is applicable. For measurements recorded in July to December average Index of January to June and for measurements recorded from January to June. Average Index of July to December of previous year shall be adopted.

In case due to unavoidable reasons measurements of work executed during one half yearly period are delayed beyond the next half yearly period the benefit of the price variation in erection due to such delay shall not be allowed to the contractor.

Lo= All India Consumer Price Index for the Industrial workers for the month which is one month prior to the date of opening of tender.

NOTE : Index may vary from time to time in accordance with the prevailing policy of Indian Railways.

(e) ---Deleted---
(f) ----Deleted----
(g) QUANTITIES:- The approximate estimated quantities of various items of work are included in Annexure 2 (Para 1.2.34)
EXPLANATORY NOTES:- Explanatory notes for various items of work included in Schedule 1, are given in Part – I, Chapter – IV.

NEW ITEM OF WORK:- If during the execution of the work the Contractor is called upon to carry out any new item of work not included in Schedule 1, Section, the Contractor shall execute such works at such price as may be mutually agreed with the Purchaser before commencement.

1.3.3 PRICE OF EQUIPMENTS COMPONENTS & MATERIALS:- The rates given in Schedule – 3 of the tender paper loaded by same percentage increase/ decrease quoted by the tenderer against S.O.R. rates for Schedule – 1 items shall be the effective on account rates for items given in Schedule – 3.

1.3.4 PRICE OF ADDITIONAL SUPPLIES:-- Deleted

1.3.5 PAYMENT AND RECOVERIES:-- Subject to any deduction or recoveries which the Purchaser may be entitled to make under the contract, the contractor shall, unless otherwise agreed to be entitled to get the following payments subject to the conditions stipulated in subsequent paragraphs.

i) Mobilisation advance
ii) Payment for designs
iii) Advance payments for foundations
iv) ‘On Account’ payments
v) Progress payments for supply and erection
vi) Payment for provisional acceptance for each sub – group
vii) Reimbursement on account of price variation of copper and steel.
viii) Payment for surplus materials taken over.
ix) Final Settlement.

1.3.6 INVOICING PROCEDURE

a) The Contractor shall submit his invoicing procedure for approval by the purchaser within one month from the date of receipt of Letter of Acceptance of Tender. Separate invoices shall be submitted for different types of payments mentioned above. All invoices shall be submitted with original supporting documents of certified true copies of supporting documents wherever these are acceptable to the Purchaser’s Engineer. Where copies of original documents are required in support of several invoices true certified copies of the original documents may be forwarded to the Purchaser’s Engineer with his consent.

b) Invoices shall be submitted only on the basis of agreed principles and prices, quantities and measurement of works completed and shall be approved by the Purchaser’s Engineer prior to the submission of invoices. For this purpose the schedule of quantities and measurements submitted by the contractor for approval of the Purchaser’s Engineer may be only upto the extent of work completed except in the case of payments on provisional acceptance under para 1.3.14.

1.3.7 PAYMENTS FOR DESIGNS:-- Payments for design shall be made on the basis of prices included in item 1, Schedule 1. The amount payable shall be based on assessed quantities against items 1 (a) and (b) of Schedule 1, Section 2 (Assessment 1) (See para 2.5.9) and payments shall be made in 2 installments.

The amount payable as the first installment shall be forty percent of the estimated total payments due against item I (a) and (b) of Schedule 1, Section 2 (Assessment 1). The first installment is payable only after schedule 1 Section 2 (Assessment 1 ) is approved and on submission of the OHE layout plan for at least one section.

The last installment shall be the balance amount payable to the contractor against the actual total payment due against item 1 (a) based on the final quantities for the completed work. The amount
is payable only after design work is completed and completion drawings referred to in Part II Chapter V are submitted.

1.3.8 ADVANCE PAYMENT FOR FOUNDATIONS:- Advance payment will be made on casting of foundation blocks with or without core holes to the extent of 85% of the prices for item 2 and on the total volume of foundations blocks inclusive of muffs as included in the approved cross section drawings or as installed at site with the permission of the Purchaser’s representative. For this purpose the entire section to be equipped with traction overhead equipment under the contract will be divided into convenient sub sections/ sub groups as may be mutually agreed to. In case the contractor is unable to cast all the foundation blocks in a particular sub section/ sub group, advance payments will be made to the extent of work done in the subsection/ sub group. One more supplementary advance payment may be made in respect of left over work when the work is completed.

1.3.9 ‘ON ACCOUNT PAYMENTS’

a) ‘On Account’ Payment will be made for equipments components, Masts, Portals, fittings and materials required for the execution of work and also the supply of spares, spare components and fittings and additional supplies as described below subject to a maximum of 2 ‘On Account’ bills for items costing upto Rs. 1 lakh. For items costing beyond Rs. 1 lakh, the ‘On Accounts’ bills shall not be less than Rs. 1 lakh. No ‘On account’ payment will be made on supplies of concreting materials. ‘On account’ payment made will subsequently be adjusted against progress payment (para 1.3.11) and against payments due on provisional acceptance of each sub group/ sub section (see para 1.3.14) and/ or against payment due on supply of spares and other supplies (see 1.3.12). All ‘On account’ payment shall be covered by a standing indemnity bond in the approved form (Form No. 16 Pt. V).

b) ‘On Account’ Payments for equipments components fittings and materials required for execution of the work and spares, spare components and fittings and additional supplies will be made to the contractor on receipt of the same at contractor’s depot/s at the ‘On account’ rate quoted by the Contractor’s in Schedule – 3. The contractor shall submit the following documents for obtaining ‘On Account Payments’.

1. Supplier’s Challans.
2. Inspection Certificate granted by the Purchaser’s representative/RITES/RDSO.
3. Certificate of receipt of materials at Contractor’s depot/s duly accepted by the purchaser’s engineers.
4. Certificate that the stores have been insured.
5. Instruction/Operating Manuals with relevant drawings, if any.

c) The contractor should furnish a Bank Guarantee for 10% of the amount claimed under sub para (b) above along with invoices. The bank guarantee shall be in the prescribed form the State Bank of India or from any Scheduled Bank/ Nationalized Bank duly conforming to their requirements specified in para no 1.1.5 (d) and valid till the necessary adjustment/ recoveries are completed. The Bank Guarantee will be released as and when the recoveries/ adjustments are completed. In case the contractor is unable to furnish the Bank Guarantee, equivalent cash would be held by the purchaser from the payment due to the contractor.

(d) BRIEF FOR ‘ON ACCOUNT PAYMENT’:- The total ‘On account’ payment shall not exceed 85% of the total value of the cost of supply of materials required to complete the work. For this purpose the total value of the materials required to complete the work should be total of item No. 3 to 30 of column 6 of Schedule 1 Section 2 as per the latest approved assessment of quantities (Para 2.5.9).

(e) “On Account” payments will commence only when schedule 1, section 2 (Assess-1) is approved by the Purchaser.

1.3.10 RECOVERIES FROM THE CONTRACTOR
a) 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 covering the value of supply and erection in the progress payment for erection, (See para 1.3.11) and from payment on Provisional Acceptance (See para 1.3.14).

b) The cost of materials supplied by the Purchaser under the second sub para of 1.2.20 (b) will be recovered in full by the Purchaser at the relevant price in schedule 3 or book rate or last purchase rate whichever is higher to the extent of requirement of such materials for each sub group from the payments to be made under paras 1.3.11 and 1.3.14.

c) Annexure – 4, Part – B details the list of equipments, fittings and finished material and their rates thereof to be supplied by Railways to the contractor. The cost of the material supplied to the contractor under Annexure – 4, Part – B, shall be recovered from the progress bills on pro-rata basis if any.

d) The cost of materials if supplied under para 1.2.21 will be recovered in the manner indicated in the sub para (a) above.

e) The materials supplied under para 1.2.20 & 1.2.21 shall be covered by the standing indemnity bond (See Form No. 16, Part – V).

1.3.11 PROGRESS PAYMENTS FOR SUPPLY AND ERECTION

a) Progress payments for supply and erection are payable against items 1(c) to 32 & Non – SOR items of Schedule 1. Only two progress payment (See para 1.3.8) for the each agreed sub-section. In case the contractor is unable to complete any item or work in particular sub section for reason accepted as adequate by the purchaser, progress payments will be made to the extent of work completed in the sub section. Supplementary progress payments will be made in respect of the left over works when the work is completed.

On completion of each item of work in Schedule 1 of each agreed sub section the Contractor shall be due payments to the extent of 95% of the prices for supply and/ or erection included in Schedule 1. The portion of the progress payments towards the supply shall be progressively set off against ‘On Account’ payments for supply made under Para 1.3.9 until the entire ‘On account’ payment are adjusted. Thereafter the progress payments towards erection will be made as follows:

b) FOUNDATIONS

On completion of foundations including muffs on each agreed sub section, the contractor shall receive payment to the extent of 95% of the price under item-2 Schedule-1, less advance payment made under para 1.3.8. No supplementary payment however will be admissible for muffing.

c) MAST AND PORTALS

On completion of erection of masts and portals of each agreed sub section, the Contractor shall receive payments to the extent of 95% of the prices for supply and erection of masts and portal under item 3, Schedule – 1, less ‘On Account’ payment made under para 1.3.9.

d) OTHER ITEMS OF SUPPLY AND/OR ERECTION

On completion of erection of other items included in Schedule-1, on each agreed sub section the Contractor shall receive payments to the extent of 95% of the erection prices included in Schedule – 1. All the above payments shall be subject to any recoveries which may be due under para 1.3.10.

e) Progress payment for foundations (Item 2) and for the erection of traction masts and portals/ structures (Item 3) will be made only when traction masts or structures are erected in the foundation blocks and muffing is completed. Progress payment for erection bracket assemblies (Item 4) will be made even though the register arm dropper and steady arm are not erected and final revision and adjustment are not done. 50% of the progress payment due for overhead equipment (Item 6) will be made when the catenary and contact wires are strung and droppers installed. 45% of the progress payment due for overhead equipment (Item 6) will be made only
after the catenary and contact wires are finally adjusted for proper height and/or stagger and all other items of work included in this item are fully completed (Vide explanatory notes Part I Chapter IV Section 2). Progress payments for Item 5 and 7 to 32 & Non-SOR items of Schedule 1 will however be made after the relevant equipments are in position even though the final revision and adjustment are not done.

1.3.12 PAYMENTS FOR SPARES AND ADDITIONAL SUPPLIES:-----Deleted--

1.3.13 EXCISE DUTY AND SALES TAX
a) Excise Duty, Sales Tax, Octroi and other local levies including VAT arising out of the transactions between the contractor and his sub contractors/suppliers for this work be included in the rates quoted by the contractor in the relevant schedules.
b) Deleted
c) Deleted
d) The sales tax on works contract arising out of this contract between the contractor and the purchaser for this work will be included in the prices quoted by the contractor. 4 % Sales tax on Works contract shall be deducted from the contractors bill for the works falls in Tamilnadu area for the timing and the same will be remitted to the concerned authority. However, wherever the law makes it statutory for the purchaser to deduct an amount towards any increase in sales tax on works contract or any other tax including VAT, the same will be deducted and remitted to the concerned authority.

1.3.14 PAYMENT OF PROVISIONAL ACCEPTANCE OF EACH SUB GROUP/ SUB SECTION:--On issue of Provisional Acceptance Certificate for any sub group/sub section and on completion of material reconciliation the Contractor shall receive payment of Balance 5% of the price for supply and/or erection against item 1c to 32 & Non-SOR items of Schedule 1, in each sub section (para 1.3.8) for the quantities for which progress payments under para 1.3.11 have already been made,

1.3.15 PAYMENT FOR SURPLUS MATERIALS:-- The Contractor shall receive payment on prices included in Schedule 3 for the surplus materials taken over by purchaser (See para 1.2.53) on delivery of such materials to the Purchaser.

1.3.16 FINAL SETTLEMENT:-- On expiry of the guarantee period and issue of the certificate of final acceptance of the entire installations (See para 1.2.50 and 1.2.56) the security deposit will be refunded or Bank Guarantee released to the contractor after adjustment of any dues payable by the contractor.

1.3.17 MEASUREMENTS
a) Payments for field work shall be made in accordance with approved designs and drawings and measured in relevant units except where provided for otherwise. In case the dimensions of the work are more than those shown in approved designs and drawings the contractor will not be entitled to any extra payment, unless dimensions were increased on account of physical impossibility of carrying out the work in accordance with approved drawings and designs. In case the dimensions of work are less than those shown in the approved designs and drawings and the work in accepted without being rejected payment will be made as per work actually done.

b) The measurements will be made generally in accordance with standard engineering practice and in conformity with explanatory notes for Schedule 1 (Part 1 Chapter IV).

c) It shall be open to the contractor and the Railway to take specific objection to any recorded measurement or classification on any ground within seven days of the date of such measurements. Any measurements taken by the Engineer or the Engineer's representative in the presence of the contractor or in his absence after due notice has been given to him in consequence of objection made by the contractor shall be final and binding on the contractor and no claim whatsoever shall thereafter be entertained regarding the accuracy and classification of the measurement.

1.3.18 MOBILIZATION ADVANCE:-- . Not applicable. Applicable for Advertised Tender value exceeding Rs. 25 crore. (ACS-45 to Engg.code).
PART – I

CHAPTER – IV

EXPLANATORY NOTES OF SCHEDULE – I

SCHEDULE OF PRICES
EXPLANATORY NOTES OF SCHEDULE – I

SECTION – I – GENERAL

1.4.1 Explanatory notes for various items of work in Schedule 1, Section 1 and 2 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 variations to suit erection but no adjustment in prices of Schedule 1 shall be made on that account. In estimating the prices for various items or 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 of work, indicated herein except where otherwise specified for materials supplied by the purchaser.

1.4.3 In the explanatory notes given in Section 2 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 terms ‘attachment’ wherever used is intended to cover castings, forgings, machined 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 fastening the attachment to the structural member of small parts steel work.

1.4.4 In the explanatory notes given in section 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 of a suitable aluminium alloy or copper alloy and the copper/ aluminium conductor shall be wrapped with a bimetallic aluminium/ copper strip to prevent direct contact between aluminium and copper.

1.4.5 Special notes for measurements are included in section 2 of this chapter under various items where necessary.

1.4.6 In the case of wires, conductors, etc. the prices for erection shall include any assembly work to be done in the contractor depot prior to erection at site, such as fabrication of dropper etc. to shapes and sizes required.

1.4.7 The contractor shall provide effective network communication facilities for carrying out the work during the period of contract by way of Radio trunking service working on UHF/VHF. 4 Nos of such equipment in activated condition shall exclusively be given to Railway officials at site, till 100 % works are completed from day one of the contract. No extra payment shall be made.

1.4.8 Deletion of item No.32 from section II of the schedule of price of explanatory notes of schedule-1 under Part-1 Chapter-IV

Introduction of following clause titled as item No. 32A, 32B & 32C numbered 1.4.8 in schedule of price, section-1 (general) of explanatory notes of schedule-1 under part-1, Chapter IV as follows

The amount payable for erection work carried out under power block, over and above amount payable for non power block erection rate, are arrived from amount payable for non power block erection rate for the corresponding item computed by loading the percentage over/at par/below quoted by the tenderer.

The Power block erection rates under this item will not be payable if power block is given in an elementary section/sub section for a total duration of 4 hours or more in a day. The duration can be in one or more spells. In the case of work which warrant power block in more than one line, the duration of power block will be reckoned as under.

The power block time will be commence/end from the power block is availed on the first line and to the cancelation of time of the line which ever cancelled later.
Where the price under this are applicable the contractor shall finalize the quantity 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. This rate is inclusive of provision of earth rods during power block hours for any type of work (earth rods will be owned by the contractor conforming to RDSO specification No.ETI/OHE/51/(9/97) correction slip 1) Under the clear guidance of authorized Railway Representative/Engineer at site. The power block time will be commence/end from the time power block is availed/cancelled from TPC/ASM. The Contractor shall arrange for adequate lighting with generator set/Petromax lamps at work site when the work is carried out during night.

SECTION – II

ITEM NO. 1 (A) PREPARATION OF DESIGNS AND DRAWINGS FOR OVERHEAD EQUIPMENT.

The price shall cover verification of purchasers engineering track plans indicating the layout of new lines with respect to the existing lines, which will be issued by the purchaser in stages. The preparation of layout plans and other design are to be finalized by the contractor in consultation and in close coordination with purchaser. The contractor may be asked to prepare the layout plans based on the site details if the purchaser not able to supply the Engineering track plan. The rate shall be per TKM. The price shall include the following.

i) Preparing a detailed Electrification layout plan indicating the existing track and OHE arrangements with the proposed track and OHE arrangements based on the details given in the existing OHE layout / proposed alignment track plan/ Site details taken from the site.

ii) Preparation of cross section drawings and structure erection drawings for each structure locations (See para 2.5.6) For the new locations and modified structure/ mast.

iii) 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’ (See para 1.2.37.)

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

v) Preparation of other designs and drawings including drawings of small parts steel work (other than those for which RDSO standard drawings are available) and detailed designs for booster transformer stations and Aux. transformer station (see para 1.2.23).

vi) Supply of requisite number of copies of all drawings including completion drawings specified in Part – II Chapter V.

vii) Bonding Layout Plan :-

a) Preparation of Bonding layout plan based on signaling plan and as desired by the Purchaser Engineer as per site condition

b) Any change in Bonding arrangements consequent to the OHE modifications done, shall also to be prepared for the entire kilometer length.

Note : 1) This price shall also cover soil investigation of testing in an approved manner.

2) All the designs & drawings shall preferably be done in CAD or on any other higher software.

NOTE FOR MEASUREMENTS: For the purpose of payment against this item the length of track shall be measured as under :

1. GENERAL : By the difference in the chainages of the length under consideration as incorporated in the layout plans.

2. TURNOUTS : The track taking off shall be deemed as starting from the toe of the switch of the Turnout.
3. CROSS OVERS: The length of track shall be taken as the difference in the chainages of the toes of switches of the two turnouts constituting the crossover.

4. DIAMOND CROSSING WITH OR WITHOUT SLIPS: The two tracks crossing each other shall be measured independently as per note 1 above as though there were no crossing. No extra shall be provided for slip points.

5. DEAD ENDS AND TOPS OF LOOPS: The lengths for payment under this item shall be up to the chainage of anchor mast of the terminating OHE.

6. FEEDER AND RETURN FEEDERS FROM GRID SUB STATION TO FEEDING STATION: This item will be also applicable independently in case of feeders/return feeders/conductors from grid sub station to overhead equipment feeding stations or in a case of feeders/conductors running on independent structures (not supporting OHE) along or across tracks.

NOTES FOR MEASUREMENTS:- In such a case the length of line to be considered for purpose of item 6 shall be measured by the distance between the centre of gantries of the grid sub station and feeding 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 feeder/conductors are running completely on independent structures or

By the distance between the centre of the structures supporting the OHE on either side of the first and last independent structure in case of feeders/return feeder/conductors running along with the track support OHE.

ITEM NO. 1 (B) PREPARATION OF DESIGN AND DRAWINGS FOR SWITCHING STATION.

The price shall cover on a flat rate basis per Switching Station, Survey, Investigation of Soil bearing pressure preparation of cross section drawings, preparation of General arrangement drawings, detailed Layout of equipment, bus bar connections cable run layout, detailed designs and drawings for steel work and structural support, suitable concrete plinths, for equipment and drawings for equipments, components, fittings and materials supplied by the contractor. The price shall include supply of requisite number of copies of all drawings, including completion drawings as number of copies of all drawings, including completion drawings as specified in Part – II Chapter V to the purchaser. (See para 1.2.23).

ITEM NO. 1 (C) PREPARATION OF STATION WORKING RULE DIAGRAM AND WORKING INSTRUCTION PERTAINING TO 25 KV AC TRACTION.

This includes preparing of revised station working instructions and drawings based on the revised OHE and signaling plans. This will include preparing/Altering of station working rule diagrams and instructions, pertaining to 25 KV AC Electric Traction. The Drawing size depends on the No. of Loop Lines/ Road in the stations. A minimum of 50 copies of stations rules diagram (Ammonia Copies) and 50 copies of station working instructions are to be prepared as directed by the purchaser’s Design Engineer. The rate includes supply, painting and Erection of station working rule diagram on a Milky White Decolam Sheet 4 mm thick and Aluminum Framed Board in a neat manner. Generally one Board per station is to be provided. The Board should be a minimum of 1800 mm x 1200 mm size and if the number of Loops/ Roads are more than size of the Board shall be increased as directed by the Purchaser Engineer. The rate shall also include correction to the existing Sectioning Diagrams available in Sr. SE/ SE/ CTPC/ AEE/ TRD/ SR. DEE/ TRD and at section control rooms. For sections newly electrified, new boards have to be kept in the places mentioned supra at no extra cost. If the works proposed in a contract is done in a phased manner, the rate given in the schedule includes for all the works to be done at all phases. The new board will be supplied only one time. The rate also includes corrections to be incorporated on either side stations consequent to the changes made in a station.

If the purchaser so desire that if any station have major yard having RRI cabin, station master room separately, any other cabins are to be provided with separate station working rule diagram boards, the contractor is eligible to get payment for each board as one station.
All the painting works on the White Decolam Sheets should be done with colour Fluorescent Paints as Directed by the Purchaser Engineer. For major stations having RRI cabins and SMR rooms/PF SM rooms separately, the number of such boards as required by the purchaser’s Engineer at site may be provided for which no extra payment is admissible.

**ITEM NO. 2 (A) I) CONCRETE FOR FOUNDATION AND PLINTH IN HARD SOIL**

*II) CONCRETE FOR FOUNDATION AND PLINTH 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 form work where necessary, casting concrete grouting of masts and finishing the top of concrete foundation or anchor blocks wherever under ground cable or pipes are met with the contractor should arrange to excavate with due care so as not to damage the U.G. cables/ Pipes and arrange for slight deviation of the U.G. cable to the extent necessary to cast foundation and protect the cables using PVC/ RCC pipes of adequate thickness and length as approved by the Purchaser’s Engineer. 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 contractor shall arrange for filling up of earth around foundation where the embankment is low and enough shoulder width is not available as directed by Purchaser’s Engineers. The price shall also include diverting the tracks side drains if any on account of OHE mast foundation works. The purchaser 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 excavations 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 also include the cost of cement. The cement to be used for construction of PCC/RCC should be of ISI branded ordinary Portland cement to IS269 of latest version or Portland Pozzolana cement (fly ash based) as per IS :1489 Pt-I,1991, 3rd revision or its latest.

**NOTES FOR MEASUREMENT FOR ITEMS 2 (A) i) AND ii)**

1. The payable volume of the foundations under item 2 (a) (i) and (ii) shall be the designed one as shown in the drawings for which the whole has been blasted/chiseled irrespective of the actual configuration assumed by the later due to the following.

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

**ITEM NO. 2 (B) CONCRETE FOR FOUNDATION AND PLINTH IN OTHER THAN HARD SOIL AND ROCK.**

The price shall include all works mentioned in item 2 (a) in all classes of soil except hard soil concrete or masonry drains and walls and rock.

**ITEM NO. 2 (C) REINFORCED CONCRETE FOR FOUNDATION AND PLINTH**

The price shall cover excavation for reinforced concrete work for foundations, supply of steel for reinforcement and other materials including bending, binding, laying of the reinforcement, shoring where necessary casting concrete including form 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 those for cast-in-situ piles foundations and counter weight foundations. Rails and fasteners required for counter weight foundations shall be supplied by the purchaser free at the contractors depot or workshop according to the convenience of the purchaser. The volume of cast-in-situ piles shall be added to the volume of foundation block for the purpose of payment. 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.

**Note:** Nominal reinforcement will be necessary in black cotton soil foundations. Such nominally reinforced foundation 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 of foundations 1:2:4 (See para 2.2.4)

ITEM NO. 2 (D)  - Deleted –

ITEM NO. 2 (E)  EXTRA FOR SUPPLY & SINKING OF CONCRETE SHELLS

The price shall cover extra on items 2 (a) (b) & (c) for supply and sinking of a concrete shell before casting of concrete for traction structure foundations or anchor blocks including pumping of water where necessary. Purchaser’s Engineer shall decide whether sinking of concrete shells is necessary.

Note: The above price shall be per concrete shell of standard size specified in para 2.2.7. If more than one concrete shell is used in a foundation the price shall be proportionately augmented.

NOTES FOR ITEMS 2

1. The price under item 2 shall be same for any shape of size on concrete blocks, cable trench or brick wall in calculating the individual volume of concrete and brick work, or a cubic meter beyond the third decimal shall be rounded off to the nearest third decimal.

2. The price under item 2 (A), (B) & (C) shall apply for concreting of all pedestals, plinths and foundations for gantries/ portals and supporting steel work and cable trenches and for other civil engineering work wherever required.

3. For purpose of computation of volume of concrete and brick work under item 2 the volume of steel work embedded in the foundation block of muff shall be ignored.

4. The volume of each muff will be included in the volume of concrete for the respective foundation for purposes of computation of volume of concrete.

5. The prices shall include cost of embedment of drain pipes, conduits for cables or earthing flats where necessary.

6. In respect of concrete for cable trenches, the price shall not include the cost of cable supports and trays, which shall be supplied and erected by the contractor's and shall be paid for under item 3.

7. Dowel bars in special foundations and nominal reinforcement in black cotton soil foundations will be necessary. Such nominal reinforced foundation in black cotton soil will be payable under item 2 (B) and not under item 2 (C). The steel for nominal reinforcement and dowel bars will be supplied by the contractor and the concrete mixture, in such a case shall be as for normal foundation 1:2:4.

8. In case, the anchor foundation cast becomes redundant due to reasons beyond the control of Railways, no extra rates are admissible for the Anchor loops embedded in the anchor foundation.

9. Muffling of OHE mast/structures should be done along with grouting in order to ensure homogeneous bonding between Muffing and grouting concretes.

10. For all foundation works in OHE/Feeder/PSI works – M-15 concrete shall be used and for core – M – 20 concrete shall be used.

ITEM NO. 3 (A) (i)  ERECTION OF TRACTION MASTS AND MAIN MASTS OF SWITCHING STATIONS AND LT SUPPLY TRANSFORMER STATIONS BY MANUAL.

The price shall cover cost for manual erection, alignment and setting before grouting of individual traction mast and main mast of switching post and booster transformer stations, including dwarf mast and mast for L.T. supply transformer stations whether rolled or fabricated including those for headspan. Erection of traction
mast also includes painting with cold galvanizing paint in rusted area and also removal of the bends if any in the mast supplied by Railways. The masts released under item no (31 L) may also have to be reused. If the supply of the mast is given by Railways with in 30 KM of the site/ location it has to be transported by contractors, for which no extra payment is admissible.

**ITEM NO 3(A)(ii)**  
Supply only of fabricated mast K,B,T & S series etc excluding S1 to S8 masts.

**ITEM NO 3(A)(iii)**  
Supply only of BFB mast 8"x8", 6"x6" and RSJ 8"x6" & S1 to S8 masts

Note: For the purpose of payment, the weight of individual traction mast and masts of head span shall be determined for each type on the basis of the payable weights per metre length shown below for standard types. For special type mast the payable weight per metre length will be indicated by the purchaser at the time of approval of designs.

**PAYABLE UNIT WEIGHTS FOR STANDARD MASTS**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Types of Masts</th>
<th>Weight in Kg per metre including Galvanization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>6&quot; x 6&quot; x 25.15 BFB</td>
<td>38.03</td>
</tr>
<tr>
<td>2.</td>
<td>162 X 154 X 27.1 KG BFB</td>
<td>38.00</td>
</tr>
<tr>
<td>3.</td>
<td>200 X 200 X 49.9 BFB</td>
<td>51.20</td>
</tr>
<tr>
<td>4.</td>
<td>8&quot; X 6&quot; X 35 CBS RSJ</td>
<td>53.39</td>
</tr>
<tr>
<td>5.</td>
<td>S 1</td>
<td>53.39</td>
</tr>
<tr>
<td>6.</td>
<td>S 3</td>
<td>76.40</td>
</tr>
<tr>
<td>7.</td>
<td>S 4</td>
<td>53.39</td>
</tr>
<tr>
<td>8.</td>
<td>S 5</td>
<td>111.53</td>
</tr>
<tr>
<td>9.</td>
<td>S 6</td>
<td>53.39</td>
</tr>
<tr>
<td>10.</td>
<td>S 7</td>
<td>76.40</td>
</tr>
<tr>
<td>11.</td>
<td>S 8</td>
<td>111.53</td>
</tr>
<tr>
<td>12.</td>
<td>K 100</td>
<td>23.70</td>
</tr>
<tr>
<td>13.</td>
<td>K 125</td>
<td>30.30</td>
</tr>
<tr>
<td>14.</td>
<td>K 150</td>
<td>38.18</td>
</tr>
<tr>
<td>15.</td>
<td>K 175</td>
<td>43.72</td>
</tr>
<tr>
<td>16.</td>
<td>K 200</td>
<td>49.87</td>
</tr>
<tr>
<td>17.</td>
<td>K 225</td>
<td>57.50</td>
</tr>
<tr>
<td>18.</td>
<td>K 250</td>
<td>66.72</td>
</tr>
<tr>
<td>19.</td>
<td>B 100</td>
<td>27.71</td>
</tr>
<tr>
<td>20.</td>
<td>B 125</td>
<td>32.47</td>
</tr>
<tr>
<td>22.</td>
<td>B 175</td>
<td>44.61</td>
</tr>
<tr>
<td>23.</td>
<td>B 200</td>
<td>50.76</td>
</tr>
<tr>
<td>24.</td>
<td>B 225</td>
<td>61.50</td>
</tr>
<tr>
<td>25.</td>
<td>B 250</td>
<td>70.72</td>
</tr>
</tbody>
</table>
ITEM NO. 3 (A) & 3 (B) & 3 (C)

The purchaser reserves the right to procure the total quantum of work under 3(a)(ii) & 3(a)(iii) by the contractor in one lumpsum or on split quantities on either way as the rate being equal.

ITEM NO. 3 (B) (i) SUPPLY AND ERECTION OF FABRICATED STEEL WORK OTHER THAN MAST BY MANUAL.

The price shall cover cost of supply and erection, alignment and setting before grouting, wherever required, the portals, gantries, 2/3 tracks cantilever structures, booms. The price shall also include supply and erection of galvanized bolts, nuts washers etc. Wherever required as per approved designs and drawings. Drop arms will be paid under item No. 3(c)

NOTE FOR ITEM 3 (A), 3 (B) AND 3 (C)

(i) The price for the item 3 (a) and (b) shall also includes cost of stenciling of location number, contact wire height, staggering, implantation and Rail level including emergency telephone indication. On Mast/Portal uprights in the manner as directed by the purchaser. The price shall also include the straightening of masts/portal upright bent during transit and cutting of mast/portals to suit the site conditions. The mast/structures cut to suit site condition, proportionate weight will only be paid.

(ii) For erection under items 3(a)(i) and 3(b)(ii) the contractor can use his own road crane duly transporting the structures to site but no extra rates are admissible for this.

(iii) The mast/portals supplied under item 3 shall conforms to the following:
   i) Quality of steel – ST 42-S of IS 226, IS – 2062
   ii) Fabricated etc. – IS – 800
   iii) Electric arc welding – IS – 816.

The mast/portals which are not conforming to the standard mentioned above will be rejected.

(iv) Temporary bonding of structure by means of 2 nos. of 8 SWG wire shall be done before boom erection, where proper bonding arrangement is not available.

(v) In case of masts erected due to any modifications/alterations and where OHE wiring is not done, mast number plate and stenciling of number and other parameters as per RDSO directives have to be provided by the contractor. The cost of such number plates is included in the supply and erection schedules of item No. 3.

(vi) The quantity schedule for item no 3(a)(ii), 3(a)(iii)&3(b)(i) are prepared based on certain drawings given during preparation of schedule. The purchaser reserves the right to change quantities among item no 3(a)(ii), 3(a)(iii) and 3(b)(i) during execution of works as per site requirements.

ITEM NO.3(B)(I)(a) ERECTION OF FABRICATED STEEL WORK OTHER THAN MAST BY MANUAL.

Same as above except for supply of fabricated steel work other than mast, which will be supplied by Railways.

ITEM NO. 3 (B) (II) ARRANGING TRANSPORT CAR FACILITIES FOR INSPECTION OF SECTION BY PURCHASERS INSPECTING OFFICERS, ENGINEERS FROM NEAREST MAIN RAILWAY STATION TO SITE OF WORK AND BACK.
The exact kilometre run only will be counted for payment purpose whether the transport is arranged from same place or from distance place. The vehicle will be used for inspection of sites by Officers/Engineers of this unit.

**ITEM NO. 3 (C) SUPPLY AND ERECTION OF FABRICATED AND GALVANIZED SMALL PARTS STEEL WORK**

The price shall cover the cost of supply and erection of the above steel works including fasteners which are to be supplied by the contractor as per the approved designs and drawings.

For standard fabricated steel work for which RDSO’s approved drawings are available, the weight of steel work as specified in RDSO’s drawing shall be considered 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. All type of Drop arm with accessories, Pedestal Insulator outrigger (with mast/structure) and feeder super (individual or on portal) mast, 3121 will only be paid under this schedule. Other small parts steels provided if any are considered in the schedule of works other than 3 (c).

**ITEM NO. 3 (D) Deleted**

**NOTE FOR ITEMS 3 (A), (B) & (C)**

For the purpose of payment against items 3 (A), (B) & (C) weight for structures or fabricated steel work will be calculated according to the weight of black steel given in section books for the lengths 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. If the weight of structure received by the contractor is less than the weights specified for the standard mast, payment shall be made for less weight only.

For bridge mast 32mm dia galvanised hard steel bolts – 4 Nos. are to be used with necessary washer, nut and check nut. The bolt shall be 32x 110/300 mm. The weight of the same may be got approved by the purchaser. The cost of the bolt, washer, nut and check nut will be paid as per the weight approved by the purchaser under item 3 (C). For bridge mast if any angle/channel arrangement is provided as per purchase engineers directive. The same also will be paid under item 3 (C).

If purchaser desires to use stainless steel bolt&nuts for bridge mast, the cost of SS bolt&nut will be paid under non schedule rates under part-D

**ITEM NO. 3 (E) 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 /structure guy rod anchor fittings, guy rod with anchor attachment if any, with mast 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. Such location for anchorage, small parts steel work, complete with bolts and nuts etc. If any, for attach in the mast, guy rod fittings to the mast/structure which is also included in this schedule of work. No extra rates are payable for the small parts steel items used if any.

**COMPONENTS REQUIREMENT**

<table>
<thead>
<tr>
<th>Rly Id No.</th>
<th>Description of Components</th>
<th>Qty per unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>3232 or suitable</td>
<td>Mast guy rod fitting (welded) complete with</td>
<td>1 Off</td>
</tr>
</tbody>
</table>
with attachment 4 short bolts nuts lock nuts and washers for
with mast/structure attachment to masts/ SPS including
as the case may be appropriate fittings for portal structures of
various designs.

5001/ 5001-1/ Anchor Bolts (complete with nuts lock nuts
5001-3 and split pint) 1 Set

5002 Guy rod stirrup 1 Off

5004 or 5005 Guy rod with nut washer and split pin 1 Off
or 5006 – 1

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:
1. 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.

2. Supply and erection of guy rod assembly at anticreep, portals will also be paid for under this item.

ITEM NO. 4 (A) (I)(a) SUPPLY AND ERECTION OF A SINGLE BRACKET ASSEMBLY (INCLUDING STAY
AND BRACKET INSULATORS)

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 of high/ low level platform, in the vicinity of turnouts, over bridges or overlaps and at
locations with reduced encumbrance or terminating wires. The price shall include cost of supply of all
components galvanized steel tubes, 5 mm dropper wires including adapter small parts steel work complete with
bolts and nuts etc. if any. The price shall cover erection of all components including solid core insulators,
dropper wires and small parts steel work excluding MCC i.e., 3121 in the case of multiple cantilever locations.
This include the anticreep centre arrangement at masts/ structures. The price shall include:

<table>
<thead>
<tr>
<th>Rly Id No.</th>
<th>Description of Components</th>
<th>Qty per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>3020</td>
<td>Mast fitting for hook insulator with 2 of bolts, nuts, locknuts washers of 16 mm</td>
<td>1 set or as required</td>
</tr>
<tr>
<td>2400</td>
<td>Tubular stay arm assembly (including description of components galvanized steel tube)</td>
<td>1 set or as required</td>
</tr>
<tr>
<td>2110/2130</td>
<td>Catenary suspension bracket assembly or hook or bracket</td>
<td>1 Off</td>
</tr>
<tr>
<td>2380</td>
<td>1160/2120 Suspension clamp</td>
<td>1 Off ( as required)</td>
</tr>
<tr>
<td>2040</td>
<td>or Bracket tube assembly complete with tube cap</td>
<td>1 set</td>
</tr>
</tbody>
</table>
2080 and sleeve where required (including galvanized steel tube).

3070-1/2 Mast Bracket fitting assembly including 2 off bolts, nuts locknuts and washers of 16 for attachment to structure or to small part steel work.

2150-1/2 Register arm hook assembly complete with bolts, nuts and locknuts.

2160-1 Stay arm insulators –

6000-1 Bracket insulators -

2420 or Register arm assembly or raised register arm

2430 assembly (including galvanized steel tube).

2460 style dropper wire, complete bolts, nuts etc.

02 or 2470 style – 02

2390/2540 BFB steady arm or bent steady arm

2520 (where required) required

2360/2490-2 25 mm steady arm drop bracket/ clamp

3131 & 3076 Adoptors & Backing angle

1220/-1(Mod-F) Contact wire swivel clip or raised register arm clamp

2550-1/2 antiwind clamp

ITEM NO. 4 (A) (I)(b) SUPPLY AND ERECTION OF A SINGLE BRACKET ASSEMBLY WITHOUT INSULATORS

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 of high/ low level platform, in the vicinity of turnouts, over bridges or overlaps and at locations with reduced encumbrance or terminating wires. The price shall include cost of supply of all components galvanized steel tubes, 5 mm dropper wires including adopter small parts steel work complete with bolts and nuts, SS bolts and nuts required for fixing the insulators etc. if any except for the Insulators. Insulators will be supplied by the Purchaser. The price shall cover erection of all components including solid core insulators, dropper wires and small parts steel work excluding MCC i.e., 3121 in the case of multiple cantilever locations. This include the anticreep centre arrangement at masts/ structures. The price shall include:

<table>
<thead>
<tr>
<th>Rly Id No.</th>
<th>Description of Components</th>
<th>Qty per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>3020</td>
<td>Mast fitting for hook insulator with 2 of bolts, nuts, locknuts washers of 16 mm</td>
<td>1 set or as required.</td>
</tr>
<tr>
<td>2400</td>
<td>Tubular stay arm assembly (including description of components galvanized steel tube)</td>
<td>1 set or as required</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>Quantity</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>2110/2130</td>
<td>Catenary suspension bracket assembly or hook</td>
<td>1 Off</td>
</tr>
<tr>
<td>2382</td>
<td>bracket</td>
<td></td>
</tr>
<tr>
<td>2383</td>
<td>1160/2120 Suspension clamp</td>
<td>1 Off (as required)</td>
</tr>
<tr>
<td>2040 or</td>
<td>Bracket tube assembly complete with tube cap</td>
<td>1 set</td>
</tr>
<tr>
<td>2080</td>
<td>and sleeve where required (including galvanized steel tube).</td>
<td></td>
</tr>
<tr>
<td>3070-1/2</td>
<td>Mast Bracket fitting assembly including 2 off bolts, nuts locknuts and washers of 16 for attachment to structure or to small part steel work.</td>
<td>1 set</td>
</tr>
<tr>
<td>2150-1/</td>
<td>Register arm hook assembly complete with bolts, nuts and locknuts.</td>
<td>1 Off</td>
</tr>
<tr>
<td>2160-2</td>
<td>or Register arm assembly or raised register arm assembly (including galvanized steel tube).</td>
<td>1 Set</td>
</tr>
<tr>
<td>2420</td>
<td>or Register arm assembly or raised register arm (including galvanized steel tube).</td>
<td>1 Set</td>
</tr>
<tr>
<td>2460 style</td>
<td>Register arm dropper assembly including 5 mm dropper wire, complete bolts, nuts etc.</td>
<td>1 Set</td>
</tr>
<tr>
<td>02 or 2470</td>
<td>style – 02</td>
<td></td>
</tr>
<tr>
<td>2390/2540</td>
<td>BFB steady arm or bent steady arm</td>
<td>As</td>
</tr>
<tr>
<td>2520</td>
<td>(where required)</td>
<td>required</td>
</tr>
<tr>
<td>2360/2490-2</td>
<td>25 mm steady arm drop bracket/ clamp</td>
<td>do</td>
</tr>
<tr>
<td>3131 &amp; 3076</td>
<td>Adopters &amp; Backing angle</td>
<td>do</td>
</tr>
<tr>
<td>1220/</td>
<td>Contact wire swivel clip or raised register arm clamp</td>
<td>1 off</td>
</tr>
<tr>
<td>1370/-1(Mod-F)</td>
<td>arm clamp</td>
<td></td>
</tr>
<tr>
<td>2550-1/2</td>
<td>antiwind clamp</td>
<td>as required</td>
</tr>
</tbody>
</table>

Note: If the area falls under polluted zone, long creepage insulator of 1050 mm to be used. If the contractor is willing to use composite insulator instead of Porcelain insulator of normal/long creepage, the same can be used without extra cost with the prior approval of the purchaser.

Wherever cantilevers are supported in drop arms with track centre more than 4.72 m, drop arm cantilevers shall be with 2.35 m setting distance. The cantilevers provided on drop arm assemblies and individual mast shall invariably be provided with large bracket tube in 150 kmph wind zone areas and with standard bracket tubes in other wind zone areas with normal implantation. This is applicable to all types of bracket assemblies under item no. 4.

**ITEM NO. 4 (A) (II) EXTRA ON (I) FOR SUPPLY AND ERECTION OF ADDITIONAL FITTINGS ON A SINGLE BRACKET ASSEMBLY FOR SUPPORTING TWO OHEs**

The price is applicable as an extra to item 4(a)(i)(a) or 4(a)(v) for the provision of additional fittings required to support an additional OHE on a single bracket assembly payable under item 4(a)(i)(a) or 4(a)(v). The price shall include supply of all extra fittings including the double contract wire swivel clip, if any.

**ITEM NO. 4(A)(III)(a) SUPPLY & ERECTION OF A SINGLE BRACKET ASSEMBLY SUITABLE TRAMWAY TYPE OVERHEAD EQUIPMENT (REGULATED) INCLUDING STAY AND BKT INSULATORS.**

The price shall cover on a flat rate basis any bracket assembly on a traction mast or support on drop arm and shall include those on high level platform in the vicinity of turnouts over-bridges or overlaps and at
locations with reduced encumbrance or terminating wires. The prices shall include the cost of supply of all components including dropper galvanized steel tubes, including wires small parts steel work complete with bolts and nuts etc. If any. The price shall cover erection of all components including solid core insulator, dropper wires and small part steel work excluding MCC i.e., 3121 in the case of multiple cantilever locations. This include the anti creep arrangement at masts/structures. The price shall include:

<table>
<thead>
<tr>
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<th>Description of Components</th>
<th>Qty per unit</th>
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</thead>
<tbody>
<tr>
<td>3020</td>
<td>Mast fitting for hook insulator with 2 off bolts nuts, locknuts and washers of 16 mm</td>
<td>1 Set</td>
</tr>
<tr>
<td>2400</td>
<td>Tubular stay arm assembly (including tubular stay sleeve and tubular stay adjuster)</td>
<td>1 Set</td>
</tr>
<tr>
<td>2380</td>
<td>Hook bracket</td>
<td>1 Set</td>
</tr>
<tr>
<td>2140/1160</td>
<td>Large catenary direct clamp/suspension clamp</td>
<td>1 Set</td>
</tr>
<tr>
<td>3131 &amp; 3076</td>
<td>Adopter &amp; Backing angle</td>
<td>As required</td>
</tr>
<tr>
<td>2160-1</td>
<td>Large register arm hook</td>
<td>1 Set</td>
</tr>
<tr>
<td>2080</td>
<td>Large bracket tube assembly complete with tube cap and sleeve (including galvanized steel tube) (40/49 mm)</td>
<td>1 Set</td>
</tr>
<tr>
<td>6000-1</td>
<td>Stay arm insulators</td>
<td>1 Each or as required.</td>
</tr>
<tr>
<td>6030-1</td>
<td>Bracket Insulators</td>
<td>1 Each or as required.</td>
</tr>
<tr>
<td>3070-1/2</td>
<td>Mast bracket fitting assembly including 2 off bolts, nuts, locknuts and washers 16 mm</td>
<td>1 Each</td>
</tr>
<tr>
<td>2540-1</td>
<td>BFB steady arm assembly</td>
<td>1 Each</td>
</tr>
<tr>
<td>2550-3</td>
<td>Standard antiwind clamp</td>
<td>1 Each</td>
</tr>
<tr>
<td>1220</td>
<td>Contact wire swivel clip</td>
<td>1 Each</td>
</tr>
</tbody>
</table>

**ITEM NO. 4(A)(III)(b) SUPPLY & ERECTION OF A SINGLE BRACKET ASSEMBLY SUITABLE TRAMWAY TYPE OVERHEAD EQUIPMENT (REGULATED) WITHOUT INSULATORS.**

The price shall cover on a flat rate basis any bracket assembly on a traction mast or support on drop arm and shall include those on high level platform in the vicinity of turnouts over-bridges or overlaps and at locations with reduced encumbrance or terminating wires. The prices shall include the cost of supply of all components including dropper galvanized steel tubes, including wires small parts steel work complete with bolts and nuts etc. If any, except for Insulators. Insulators will be supplied by the purchaser. The price shall cover erection of all components including solid core insulator, dropper wires and small part steel work excluding MCC i.e., 3121 in the case of multiple cantilever locations. This include the anti creep arrangement at masts/structures. The price shall include:

<table>
<thead>
<tr>
<th>Rly Id No.</th>
<th>Description of Components</th>
<th>Qty per unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>3020</td>
<td>Mast fitting for hook insulator with 2 off bolts nuts, locknuts and washers of 16 mm</td>
<td>1 Set</td>
</tr>
<tr>
<td>2400</td>
<td>Tubular stay arm assembly (including tubular stay sleeve and tubular stay adjuster)</td>
<td>1 Set</td>
</tr>
</tbody>
</table>
ITEM NO. 4 (A) (IV) EXTRA ON ITEM 4 (A) (III) FOR SUPPORTING TWO TRAMWAY TYPE OHE (REGULATED)

The price is applicable as an extra to item 4 (a) (iii) for the provision of additional fittings required to support an additional OHE on complete bracket assembly payable under item 4 (a) (iii). The price shall include supply of all extra fittings, including the contact wire swivel clip.

ITEM NO. 4 (A) (V) SUPPLY AND ERECTION OF SINGLE BRACKET ASSEMBLY FOR COMPOSITE OVERHEAD EQUIPMENT

SAME AS 4 (A) (I)

ITEM NO. 4 (B) (I) SUPPLY AND ERECTION OF PULL OFF ARRANGEMENT FOR ONE OHE

The price shall cover supply for all components required for a pull off arrangement to pull one equipment only including head span mast fittings, complete with M.S. angle equilising plate assembly steady arm catenary, dropper clip, contact wire swivel clip and fittings, conductors, small jumper (50) wire. The price shall cover erection of all components including solid core insulators small jumper wire and conductors as required.

ITEM NO. 4 (B) (II) EXTRA FOR EACH ADDITIONAL EQUIPMENT PULLED

The price shall cover as an extra to item 4 (B) (I) or 4 (B) (iv) supply and erection of additional fittings required in case of the pull off to pull more than one equipment. The price is applicable for each extra equipment pulled.

ITEM NO. 4 (B) (III) SUPPLY AND ERECTION OF A PULL-OFF ARRANGEMENT FOR REGULATED TRAMWAY TYPE OHE.

The price shall cover supply of all components required for a pull off arrangement to pull one equipment only complete with steady arm, contact wire ;swivel clip and fittings, conductors. The price shall cover erection of all components including solid core insulators, small jumpers and conductors as required.

ITEM NO. 4 (B) (IV) - Deleted –

NOTE : No extra payment shall be admissible under item No. 4 for bracket assemblies on platform structures with extra insulators to support cantilever assemblies,

ITEM NO. 5 (A) (I) SUPPLY AND ERECTION OF MOUNTING ARRANGEMENT FOR SPAN WIRE

The price shall cover supply of all components including adjusters, terminal fittings and mast attachments required to attach a span wire of a head span wire or a cross span wire or a steady span wire or a
support span wire for supporting contact wire only at both ends to traction masts/structures or special brackets. The price shall not include the cost of small parts steel work if any. The price shall cover erection of all components including mounting arrangements for span wire and including mounting arrangements for span wire and including solid core insulators but excluding small parts steel work if any.

**ITEM NO. 5 (A) (II) SUPPLY AND ERECTION OF A SPAN WIRE.**

The price shall cover supply and erection of a span wire per metre. The payable length shall be the horizontal distance between the inner faces of all traction masts/structures on which the mast attachments are mounted.

No extra length shall be provided for Sag. The price is applicable for all types of span wires including head span wires. Erection of a metre beyond the first decimal shall be rounded off to the nearest first decimal.

**ITEM NO. 5 (B) SUPPLY AND ERECTION OF SUSPENSION OF ONE CONVENTIONAL OHE/ FROM HEADSPAN**

The price shall cover supply of a suspension assembly to carry complete all copper OHE on head spans inclusive of all dropper assemblies inclusive of dropper wire and from head span, cross span, steady wire attachment, steady arm/rod catenary suspension clamps and other fittings required to make complete suspension arrangements for copper OHE/composite OHE on head span. The prices shall cover the erection of all components, fittings and droppers for suspension of OHE from head span.

**ITEM NO. 5 (C) SUSPENSION/REGISTRATION FOR CONTACT WIRE ONLY**

The price shall cover supply and erection of all fittings required for suspension/registration of a contact wire only whether under head spans carrying other types of OHE or not or on any bracket for carrying contact wire only. The price shall include the followings.

i) Vee clamp or double vee clamp with adjuster or steady arm with steady wire clamp.

ii) Contact wire swivel clip.

**ITEM NO. 6 (A) ERECTION OF OVERHEAD EQUIPMENT (INCLUDING CONTACT CATENARY, JUMPER, 130 SQ. MM WIRE WHERE IT IS NECESSARY AND PROVISION OF ENAMEL NUMBER PLATES ON THE MAST)**

The price for above shall cover erection of (19/2.5 sq.mm) 95 sq. mm pure copper/65 sq. mm cadmium copper Catenary and Hard drawn 107 sq. mm copper contact wire, 5 mm dropper wire, 105 sq.mm jumper wire, 130 sq.mm feeder tail wire if any, and The price for above shall cover the supply of other components including dropper clips, parallel clamps for jumpering and splices (where their use is approved) dropper wire, jumper wire and terminating wire/s and including small parts steel works complete with bolts and nuts etc for attachment of number plates to mast/structure. The price shall cover erection of all components and wires and conductors including contact wire, catenary droppers jumpers and terminating wires including small parts steel work, if any.

The price shall cover adjustment of OHE height and stagger several times along with track packing/permanent way works as and when required till the final track position is set by Engineering branch.

<table>
<thead>
<tr>
<th>Rly Id No.</th>
<th>Description of components</th>
<th>Qty per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1040-2</td>
<td>Contact wire parallel clamp small</td>
<td>As required</td>
</tr>
<tr>
<td>1180</td>
<td>Contact wire dropper clip (107)</td>
<td>- do –</td>
</tr>
<tr>
<td>1192</td>
<td>Catenary dropper clip complete with bolts, nuts etc.</td>
<td>- do –</td>
</tr>
<tr>
<td></td>
<td>Enamel Structure no. plates complete with 2 S.S. bolts dia 10 x 35/30 nuts and rubber Washer for dia 10 bolts</td>
<td></td>
</tr>
</tbody>
</table>
ITEM NO. 6 (B)  ERECTION OF CONTACT WIRE ONLY WITHOUT WIRING TRAIN

The price shall cover only erection of contact wire only. The price shall exclude termination which will be paid for under item 8. The price shall include the supply of small part steel works complete with bolts and nuts for attachment of Enamel number plates to masts/structures.

<table>
<thead>
<tr>
<th>Rly Id No.</th>
<th>Description of components</th>
<th>Qty per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hard drawn copper contact wire (107 sq. mm)</td>
<td>To be Supplied by the contractor</td>
</tr>
<tr>
<td></td>
<td>Enamel number plates complete with Fastenings</td>
<td>As required</td>
</tr>
</tbody>
</table>

ITEM NO. 6 (C)  ERECTION OF CONTACT WIRE ONLY (REGULATED WITH BRIDLE WIRE BY MANUAL MEANS WITHOUT WIRING TRAIN INCLUDING CONTACT AND BRIDLE WIRE).

The price shall cover erection of contact wire only. The price shall exclude termination, which will be paid for under item 8. The price shall include provision of bridle wires/catenary wire with clamps and two droppers including clips, Enamel number plates on traction masts/structures. The price shall also include the erection of bridle wire, small part steel works complete with bolts and nuts for attachment of enamel number plates to masts/structures. The hard drawn copper contact wire and bridle wire used shall confirm to RDSO's latest specification. The other items except copper wire shall be supplied by the contractor.

ITEM NO. 6 (D)  ERECTION OF COMPOSITE OVERHEAD EQUIPMENT ONLY

Deleted

Special Note for items under 6 A, 6 B, 6 C

1. All bolts and nuts below 14 mm dia on current carrying parts of composite OHE shall be stainless steel.
2. The rate includes the erection of all materials for providing a false catenary together with contact wire, and supply and erection of contact wire ending clamp, catenary ending clamp, double strap etc under ROBs, FOBs as prescribed by purchaser’s Engineer.
3. All type of insulators shall be tested at site for Mechanical Proven test before erection.
4. All sizes of contact wire shall be drawn out of continuous cast copper rods only shall be procured.
5. Jumpers like PH, H, C and F jumpers in the IOL's/NS included under this schedule of work, shall be of 50 sq. mm flexible jumper wire.
6. Where proper bonding is not available, temporary bonding of mast/structures shall be done by means of two nos. 8 SWG GI wire, before wiring is done.
7. The rate also includes supply and erection of 25 kV restricted clearance and power block working limit caution boards as required by the purchaser. The rate includes supply and erection of fabricated/small parts steel required to erect the caution boards.
8. If the purchaser desires, insulated Catenary wire is to be provided under the over line structures, where long time clearances is less than 320 mm is available.

NOTE FOR MEASUREMENTS

1. For the purpose of measurement against Item 6 (A), (B), (C) & (D) the length of over head equipment which shall include terminating wires shall be measured from the centre lines of the traction masts/structures at which the two ends of each tension length of over head equipment are anchored.
2. The length shall be the difference between the actual chainages of the two traction masts/structures which the ends of each tension lengths are anchored or by the sum of the actual spans between the same two points which ever is higher is include in the "as erected" layout plans. For purpose of progress payment reference to layout plans as approved shall be made. The price under items 6 (A), 6 (B), 6 (C) and (D) does not cover the cost of supply and erection of insulator if any, which shall be paid for under item 11.
3. In the case of splicing and extension of anchored OHE / OHE, the actual length of wire used at site from ending clamp/splice to the splice/ending clamp will be reckoned for measurement purpose under item no. 6.

ITEM NO. 7 (A) ERECTION OF ALL ALUMINUM RETURN CONDUCTOR (SINGLE SPIDER)

The price shall cover the manual erection of a return conductor made of single all aluminum bare, hard drawn conductor 19/3.99 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) but includes small parts steel work, complete for anchoring with bolts, 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 (B) Deleted

ITEM NO. 7 (C) ERECTION OF EARTH WIRE

The price shall cover the erection of earth wire made of 7/4.09 mm steel reinforced aluminium conductor (RACCOON) excluding termination which will be paid under item 8 and shall include cost of fittings on structures for supporting the earth wire including bonding of the earth wire to the structure by suitable jumpers and 40 x 6 mm bond with 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 erection of disc insulators; cut in insulators to isolate sections of earth wire and the cost of small parts steel works complete with bolts and nuts to attach the earth wire mast clamp to masts/structures, if any. The rate includes the cost of provision of flat armour tape used at the mast/structure support as per standard length with end ferrules.

ITEM NO. 7 (D) ERECTION OF 25 KV FEEDER (INCLUDING 150 SQ. MM WIRE)

The price shall cover the erection of a 25 kV feeder along or across track made of a 150 sq. mm copper wire (37/2.5 mm) Drop jumpers/Jumpers from this wire shall be of 160 sq.mm wire with 1050-3 PG clamps which will be paid under 15 (A)

NOTES FOR MEASUREMENTS

1. THE PRICE UNDER ITEMS 7 (A), (B), (C) & (D) 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 which will be paid for under item 15 and

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

2. For the purpose of payment against Item 7 (A), (B), (C) and (D) the length of feeders, return conductors or earth wire shall be measured from the centre 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 feeder 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 purposes of progress payment reference to “as approved drawings” shall be made.

ITEM NO. 8 (A) (i) SUPPLY AND ERECTION OF A REGULATING EQUIPMENT (WINCH TYPE WITH NORMAL COUNTER WEIGHT ASSEMBLY)

-- DELETED --

ITEM NO. 8 (A) (ii) EXTRA FOR REGULATING EQUIPMENT WITH TRAPEZOIDAL COUNTER-WEIGHTS

The price shall cover as an extra on item 8 (a) (i) or 8(a)(v) the additional cost of erection of a regulating equipment with trapezoidal counter weight assembly in place of normal counter weight assembly. The price shall cover supply and erection of components including trapezoidal counter weight assembly the guide tube assembly including two guide tubes. The price shall not include supply and erection of terminations which will be paid for under item 8 (b).

ITEM NO. 8 (A) (iii) SUPPLY AND ERECTION OF REGULATING EQUIPMENT (WINCH TYPE) WITH COUNTER WEIGHT ASSEMBLY (LIGHT) FOR TRAMWAY TYPE OHE (REGULATED).

-- DELETED --

ITEM NO. 8 (A) (iv) SUPPLY AND ERECTION OF REGULATING EQUIPMENT WITH CEMENT CONCRETE COUNTER WEIGHT

Same as 8 (a) (i) and 8 (a) (v) but with cement concrete counter weight in place of C.I. counter weight.

ITEM NO. 8 (A) (v) SUPPLY AND ERECTION OF REGULATING EQUIPMENT (3 PULLEY TYPE) MODIFIED WITH COUNTER WEIGHT ASSEMBLY FOR CONVENTIONAL/COMPOSITE OHE.

The price shall cover supply of regulating equipment, SS wire rope, anti falling rod of suitable length, counter weight and small part steel required for fixing with mast /structure for regulating equipment. Suitable forged/MCI clevis as approved by RDSO for fixing with mast/structures to be used instead of Al. Bronze clevis. In case of old type of regulating equipment, the same is to be replaced by new type of regulating equipment consequent to any modifications/request by the purchaser. The rate includes above also. The price shall cover supply and erection of all items given above including 665 kg of counter weight. 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 no. 8 (b).

ITEM NO. 8 (A) (vi) SUPPLY AND ERECTION OF REGULATING EQUIPMENT (3 PULLEY TYPE) MODIFIED WITH COUNTER WEIGHT ASSEMBLY FOR TRAMWAY TYPE OHE (REGULATED)

Same as 8 (a) (v) above but with counter weight assembly confirming to style 01 of the relevant termination arrangement drawing No. ETI/ OHE/G/04212 or latest.

ITEM NO. 8 (B) (i) SUPPLY AND ERECTION OF MATERIALS FOR TERMINATION OF SINGLE CONDUCTOR OF OVERHEAD EQUIPMENT
The price shall cover supply of all material necessary for the termination of single conductor of overhead equipment on traction mast or structure, including appropriate mast anchor fittings including suitable attachment with mast/structure, backing angle, cleaves assembly, adjuster, anchor double straps, ending clamp for the catenary or contact wire or terminating wire and fitting including 9 tonne composite insulator assembly but excluding terminating wire if any. The price shall cover erection of all materials including the 9 tonne composite insulator assembly and except terminating wire if any.

Note: In case if ‘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.

Adjuster with clevis type on one end is prohibited.

ITEM NO. 8 (B) (ii) SUPPLY AND ERECTION OF MATERIALS FOR TERMINATION OF DOUBLE CONDUCTOR (CONVENTIONAL/COMPOSITE OHE)

The price shall cover 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 including attachment with mast/structure, Backing angle, cleaves – assembly three adjusters, ending clamps for catenary and contact wire anchor double strap assembly, equalizing/compensating plate and fittings including 9 tonne composite insulator assembly in a FTA/RE location but excluding the termination wire if any. The price shall cover erection of all materials including the 9 tonne composite insulator assembly. When anchoring of a OHE (Both catenary and contact wire) through large span wire (130 sq. mm) is done, supply and erection rate for termination will be paid under this schedule of work.

ITEM NO. 8 (B) (iii) SUPPLY AND ERECTION OF MATERIALS FOR TERMINATION OF RETURN CONDUCTOR (SINGLE SPIDER)

The price shall cover supply of all materials required for the termination of all aluminum return conductor (SPIDER) including appropriate mast anchor fittings including attachment with adjuster, strain clamp end fitting 9 tonne composite insulator assembly and Backing angles if any. The price shall cover erection of all materials including the 9 tonne composite insulator assembly.

ITEM NO. 8 (B) (iv) SUPPLY AND ERECTION OF MATERIALS FOR ANTICREEP TERMINATION (ONE END)

The price shall cover supply and erection of all materials required for termination of Anticreep wire alone on one side. This includes appropriate mast Anchor fittings including attachment with mast/structure, Backing angle if any, clevis assembly, adjuster, distance Rod if any, 9 tonne composite insulator, wire ending clamp Double straps etc.

ITEM NO. 8 (B) (v) SUPPLY AND ERECTION OF MATERIALS FOR TERMINATION OF AN EARTH WIRE (RACCOON)

The price shall cover supply and erection of all materials required for the termination of an earthwire Raccoon including appropriate mast anchor fittings including attachment with mast/structure, adjuster, terminal clamp end fittings, and backing angles.

ITEM NO. 8 (B) (vi) SUPPLY AND ERECTION OF MATERIALS FOR TERMINATION OF TRAMWAY TYPE OHE (REGULATED)

The price shall cover supply and erection of all materials required for the termination of a single contact wire (Regulated) including 9 tonne composite insulator and will exclude the parts covered under item 8(a)(iii)/(vi).

ITEM NO. 8 (B) (vii) SUPPLY AND ERECTION OF MATERIALS FOR TERMINATION OF DOUBLE CONDUCTORS FOR COMPOSITE OHE.

- Deleted –
ITEM NO.8(B) (VIII) SUPPLY AND ERECTION OF MATERIALS FOR TERMINATION OF AN ALUMINUM CONDUCTOR OF THE COMPOSITE OVERHEAD EQUIPMENT.

- Deleted –

ITEM NO.8 (B) (IX) SUPPLY AND ERECTION OF MATERIALS FOR TERMINATION OF 25 KV TERMINATING WIRE (150 SQ.MM) COPPER CROSS TRACK/ ALONG TRACK FEEDER.

The price shall cover supply of all materials necessary for termination of terminating wire 150 sq. mm Copper on a structure for cross track or along track including appropriate anchor fittings, Backing angle, Cleaves assembly, adjuster anchor double straps, ending clamp for 150 sq. mm Copper wire and fitting including 9 tonne composite insulator assembly and but excluding terminating wire (150 sq. mm Copper) if any. The price shall also cover erection of all materials including 9 tonne composite insulator assembly and excepting terminating wire if any.

NOTES TO ITEM 8

1. Anchor fittings including suitable attachment for mast/structure and backing angle complete with bolts and nuts wherever required is included in this item.

2. The price under item 8 (b) (iii) shall not include the cost of jumper connection (i) between feeders or return conductors and (ii) or feeders or return conductor to a busbar, Overhead equipment which will be said for under item 15.

3. The price under items 8 (b) (i) to 8 (b) (vi) shall also include the cost of double eye distance rod (Id. No. 5183) if proved for any type of terminations.

4. Supply and erection of materials for terminations of catenary wire on either side of the portal at anticreep locations or at bridge face will also be paid for under this item.

5. As per site requirement if the termination 9 tonne composite insulator is to be shifted to mid span of Anchor span no extra rate for shifting at the time of erection is admissible.

6. The price including provision of spacer pipes to be provided in anti-falling device as per tension length and marking of 15°C, 35°C and 45°C marks on the mast/structures as per standard width and colour code in vogue.

7. Due to some reason or other OHE and guy rods are provided with two separate anchor fittings, no extra rates are admissible for any of the materials provided extra.

8. For all terminations – 5020 adjuster with eye type on both sides shall be used. Clevis type on one end is prohibited.

9. In regulating equipment, SS wire rope the manufacturers identification mark ferrules should be kept on cast iron weight side.

10. Erection rates under item No. 8 also includes the temporary termination of OHE/Feeder/RC wires on structures/mast during modification also during the wiring works, where temporary termination is done. – For such terminations supply rates are not admissible.

11. The composite insulator provided for terminations in normal zone should be of normal composite insulators and for polluted and red zone, it shall be 9 tonne polluted composite insulator (1050 mm creepage).

12. Anti falling device rod to be fixed as per RDSO drawing No.TI/DRG/OHE/ATD/RDSO/00009/06/0.

ITEM NO. 9 (D) (I) ERECTION OF ANTICREEP WITH PURE/CADMIUM COPPER CATEenary WIRE

The price shall cover the supply of all materials except copper Catenary wire for anticreep including adjusters, mast anchor fittings at its terminations on either side of structure, ending clamps including 9 tonne composite insulator, pure/cadmium copper catenary wire, mast anchor fitting and backing angle as required. The price shall cover erection of all materials including pure/cadmium copper catenary wire, 9 tonne composite insulators
assembly and small parts, steel work if any. Necessary cadmium copper catenary wire will also be supplied by the contractor.

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<thead>
<tr>
<th>Rly Id No.</th>
<th>Description of Components</th>
<th>Qty per Unit</th>
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<tbody>
<tr>
<td>6020-1</td>
<td>9 tonne Composite insulator assembly – Polluted zone</td>
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<tr>
<td>6020-2</td>
<td>Catenary ending clamp (65)/1360</td>
<td>As required</td>
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<tr>
<td>1120</td>
<td>Anchor double strap assembly</td>
<td>As required</td>
</tr>
<tr>
<td>5020</td>
<td>Clevis assembly</td>
<td>As required</td>
</tr>
<tr>
<td>5040</td>
<td>Mast anchor fitting including suitable attachment for mast</td>
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</table>

ITEM NO. 9 (E)  ERECTION OF ANTI CREEP WITH PURE/Cadmium Copper CATENARY WIRE SUITABLE FOR TRAMWAY TYPE OHE (REGULATED):

Same as item 9 (d) with the following changes. Id. No. 2140 large catenary contact clamp to be used in place of Id. No. 1170.

Notes for Item No. 9:

1. No extra rate is admissible for double eye distance rod provided if any.
2. As per site requirement if the termination composite insulator is to be shifted in the same wire to any other place, no extra rate is admissible.
3. Wherever Portal structures are provided, the anti-creep wire shall be terminated on uprights crossing number of tracks as required, for which no extra payment is admissible.
4. Wherever anti-creep wire passes through underneath the over-line structures as desired by the purchaser, contact wire shall be provided in lieu of anti-creep wire for suitable length. No extra payment is admissible for the above modification.
5. Anti-creep termination insulators shall be of normal composite type 9 – tonne insulators for normal zone and polluted 9 – tone composite insulator for polluted and Red zone areas.
6. Where 65 sq. mm cadmium copper Catenary wire is used for conventional /tramway OHE, the anti creep wire shall also be of 65 sq. mm cadmium copper Catenary wire. In case 95 sq. mm pure copper Catenary wire is used for conventional /tramway OHE, the anti creep wire shall be of 95 sq. mm pure copper Catenary wire.

ITEM NO. 10 (A) EXTRA ON ITEM 6 (A), 6 (B), 6 (C) AND 6 (D)

(B) FOR SUPPLY AND ERECTION OF ADDITIONAL FITTINGS

(C) REQUIRED AT A TURNOUT, DIAMOND CROSSING FOR OVERLAP.

The price shall cover on flat rate basis supply of additional components and fittings required at turnouts, crossings or overlaps (un-insulated 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 or equipment conductor at a turnout, diamond crossing, Insulated and Un-Insulated overlaps or neutral section including jumper wire. The price shall cover supply and erection of all materials including jumper wire and all adjustments required at turnouts, diamond crossing, overlaps and neutral section. The price shall not include extra bracket
assemblies overhead equipment, termination of overhead equipment and cut-in-insulators in the case of insulated overlap and neutral section which will be paid for under items 4, 6, 8 and 11 respectively.

Note: A cross over shall be paid for as 2 off of Item 10, special configuration of OHE commonly known as overlap shall be paid for as 1 off under this item. This shall apply in case of the overlap used in changing over from regulated to unregulated equipment or unregulated to regulated equipment.

ITEM NO. 11 (A)  (I) SUPPLY AND ERECTION OF COMPOSITE CUT-IN-INSULATOR:–

The price is applicable to the provision of an additional 9 tonne composite cut-in-insulator on a flat rate basis such as in a headspan, cross span or in span wire or an overhead equipment conductor at an insulated overlap, in anti-creep any additional insulators provided. The price shall cover supply of all components required for the cut-in-insulators assembly, including appropriate terminal end fittings for the conductor and the 9 tonne composite insulator. The price shall cover erection of all components, including the 9 tonne composite insulator. This price shall also be applicable as an adjustment price for non-provision of insulators under items 8 (b) (I) to 8 (b) (viii).

ITEM NO. 11 (A)  (II) SUPPLY AND ERECTION OF A COMPOSITE SUSPENSION INSULATOR:–

The price is applicable to the provision of a 9 tonne composite suspension insulator (Polluted zone type for polluted area) assembly for suspension of an all aluminum 25 KV feeder (single or double SPIDER) 150/130 sq. mm or 65 sq. mm overhead equipment conductor or 19/2.79 mm all aluminum catenary or any other similar type of suspension. The price shall cover supply of all components, required for the suspension assembly including the appropriate suspension clamp and the 9 tonne composite insulator assembly but excluding small parts steel work with bolts and nuts etc if any. The price shall cover erection of all components including the 9 tonne composite insulator assembly but excluding small parts steel work, with bolts and nuts etc. for fixing if any. The price shall include the cost of provision of a flat armour tape to be used in connection with suspension of SPIDER conductor.

ITEM NO. 11 (B) SUPPLY AND ERECTION OF A 25 KV POST INSULATOR:–

The price is applicable to the provision of a 25 kV post insulator to support copper or aluminum jumper/ busbars. The price shall cover supply of all components and fittings/ angle iron (outrigger) to support the jumpers including supply of Post insulator but excluding supply of small parts steel works with bolts and nuts etc for fixing with mast/structure if any. The price shall cover erection of all components required for the assembly, including post insulator but excluding small parts steel work with bolts and nuts etc for fixing with mast/structure if any.

ITEM NO. 11 (C) SUPPLY AND ERECTION OF A 3 KV DISC INSULATOR:–

The price is applicable to the provision of a 3 KV disc insulator for suspension of an all aluminum return conductor or any other similar type of suspension. The price shall cover supply and erection of all components required for the assembly, including 3 kV Disc insulator and appropriate suspension clamp, but excluding small parts steel work with bolts and nuts etc., if any. The price shall include the cost of provision of a flat armour tape to be used in connection with the suspension of SPIDER conductor.

ITEM NO. 11 (D) SUPPLY AND ERECTION OF A 11 KV POST INSULATOR:–

The price shall cover on a flat rate basis, supply and erection of a 11 KV post insulator with necessary fittings to support return conductor, aluminum or copper busbars or return conductor jumper connections excluding small parts steel work with bolts and nuts etc if any.

Notes for Item No. 11:

Wherever polluted zone porcelain /composite stay and bracket insulators are used the 9 – Tonne insulator used shall be of polluted zone 9-Tonne composite insulator. In case normal porcelain /composite stay and bracket insulators are used, the 9-Tonne insulator used shall also be of normal zone composite insulator.

ITEM NO. 12 (A) SUPPLY AND ERECTION OF A 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 end fittings for conductors, the section insulator assembly and the 9 Tonne
Composite insulator assembly on the catenary and dropper wires as required. The price shall cover erection and adjustment of all components including section insulator assembly 9 tonne composite insulator on the catenary and droppers. Stiffener rod of requisite length to be provided on both ends with contacts wire pieces.

<table>
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<tr>
<th>Rly Id No.</th>
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<th>Qty per Unit</th>
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</thead>
<tbody>
<tr>
<td>1120/ETI/OHE</td>
<td>Catenary ending clamp</td>
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<td>SK/436/1360</td>
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<tr>
<td>1192/ETI/OHE/SK/333</td>
<td>Catenary dropper clip assembly</td>
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<td>6170</td>
<td>Parallel clamp for double contact wire</td>
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<td>6180</td>
<td>Section insulator dropper assembly</td>
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<tr>
<td>6100</td>
<td>Section insulator assembly</td>
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<td>6020</td>
<td>Section Insulator porcelain</td>
<td>1 off</td>
</tr>
<tr>
<td></td>
<td>9 – Tonne composite cut – in – insulator</td>
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</table>

**ITEM NO. 12 (B) SUPPLY AND ERECTION OF A DOUBLE WIRE SECTION INSULATOR ASSEMBLY** - Deleted -

**ITEM NO. 12 (C)(i) SUPPLY AND ERECTION OF A SECTION INSULATOR ASSEMBLY SUITABLE FOR TRAMWAY TYPE OHE (REGULATED):** The price shall cover supply of all components, required for a standard section insulator assembly including special arrangements for supporting the equipment and terminal fittings for conductors and the section insulators assembly as required. The price shall cover erection and adjustment of all components including sectioning insulator assembly. The cantilever assembly at this location will be paid under item no. 4 A(iii)

NOTE: Whenever 9 tonne composite insulators are provided on the contact wire for bifurcation/isolation of supply, or before providing section insulator assembly erection works, erection rate for provision of 9 – tonne composite insulators will be paid under item No. 11(A)(i), as the work is to be done for sectioning purpose.

**ITEM NO 12(ii) ERECTION OF SECTION INSULATOR ASSEMBLY SUITABLE FOR TRAMWAY TYPE OHE (REGULATED):** Same as above except for supply of the section insulator assembly, which will be supplied by Railways.

**ITEM NO. 12 (D) ERECTION OF A CERAMIC BEADED GLASS FIBRE TYPE SHORT NEUTRAL SECTION ASSEMBLY:** The rate includes erection of Ceramic beaded glass fibre type short neutral section of imported make as per RDSO spec. No. TI/SPC/OHE/SNS/0000. Ceramic beaded glass fibre type short neutral section will be supplied by Railways. The contractor shall make his own arrangements for transporting the same from Railway Stores to the site. The tenderer shall only quote for erection.

**ITEM NO. 13 (A)(i) SUPPLY AND ERECTION OF 25 KV S.P. ISOLATORS WITHOUT EARTH CONTACT ASSEMBLY:** The prices under sub-items (a) and (b) shall cover supply and erection of isolator switches of approved make complete with arcing horns, operating rods, operating rod guides operating rod insulator, Pedestal Insulators, mounting base, integral lock, 6 lever naval lock and 160 sq mm jumper wires of required length, with jumper connectors. (RI – 1009) bolted types. The price shall also include 2 numbers of terminal connectors to be provided on isolators and flexible copper earth connection between isolator handle and mast/structure. The price shall also cover supply and erection of all small parts steel with bolts and nuts required for erection of Isolator on the mast/structure supporting pedestal insulators, supporting operating Rods, Handle, Jumpers, number plate of approved design etc. Any other pedestal insulator fixed for Jumper with/without rigger shall be paid under item 11 b and 3 c respectively.

**ITEM NO. 13 (A)(ii) ERECTION OF 25 KV SP ISOLATOR WITHOUT EARTH CONTACT ASSEMBLY:** Same as above except for supply of 25 KV SP isolator, which will be supplied by Railways.
ITEM NO. 13 (B) SUPPLY AND ERECTION OF 25 KV GANG OPERATED ISOLATORS.

ITEM NO. 13 (C)(i) SUPPLY AND ERECTION OF 25 KV DOUBLE POLE ISOLATOR.

The price shall cover supply and erection of a double pole isolator of approved make
double complete with mounting base operating rod and operating rod guides operating rod
insulator pedestal insulator, 6 lever naval lock, including 160 sq.mm Jumper Wires of
required length and Jumper connectors at the isolator ends. (RI – 1009 bolted type).
The price shall also include 3 numbers of terminal connectors to be provided on isolators and
flexible copper earth connection between isolator handle and mast/structure. The price shall
also cover supply and erection of Alcu Strip, number plate of approved design, small parts
steel structure, supporting operating Rods, Handle, Jumpers etc. If any other items supplied
and erected like outrigger, pedestal insulator which will be paid under item 3 (c) and 11(b).

ITEM NO 13(ii) ERECTION OF 25 KV DOUPLE POLE ISOLATOR:- Same as above except for supply of the
25KV double pole isolator, which will be supplied by Railways

ITEM NO. 13 (D) EXTRA FOR SUPPLY AND ERECTION OF AN EARTHCONTACT ASSEMBLY IN AN
ISOLATOR:- The price shall be payable as extra for supply and erection of an earth contact
assembly in an isolator. The price shall also includes the cost of supply and erection of 3 x
25 mm copper connections between the earth contact assembly and the structures.

ITEM NO.13 (E) EXTRA ON ITEM NO. 13 (A), (B) FOR AN INTERLOCKING DEVICE.: The price shall
cover supply and erection of an inter locking mechanism on an isolator along with small
parts steel if any, to permit working of two or more isolators

Note for item 13 : All Isolators are to be supplied with Insulators and with complete accessories and small
parts steel. Isolator key box of appropriate size shall be provided for at each station on the
section, one number at the nearby OHE depot in charge of the section and one number at
SSP/SP, as desired by the purchaser engineer at site.

ITEM NO. 14 SUPPLY AND ERECTION OF CONNECTION BETWEEN RETURN CONDUCTOR AND THE
RAIL:- The price shall cover supply fabrication and erection of connections between all
aluminum return conductor to cross rail/impedance bond and 2 no. of Bonds from
Buried/cross rail to the Running track in an approved manner (rail which is required will be
supplied by the purchaser free of cost at the Contractor's Depot) excluding the aluminum
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, [Galvanised items with
mast/ structure and wooden items with flat] terminal connections and covering the mild steel
flats with two coats of rod oxide Zinc Chromate Primer to IS: 2074, CNSL based and
finished with 2 coats of Bitumen 85/25 blow grade etc.

ITEM NO. 15 (A) SUPPLY AND ERECTION OF A COPPER JUMPER:- The price shall cover on a flat
rate basis the supply of all components and fittings required for providing a flexible copper
jumper connection, including parallel grooved clamps, bimetallic and aluminum copper
ALCU strips, wherever required and terminal or tee clamps at either end including jumper
wire of appropriate length. 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 included under items 6(a), 13(a) and 10 but shall be applicable for any
jumper connections in any combination between feeders, L.T. Transformers dropout
switches, Lightning arrestors for overhead equipments and outgoing busbars for switching
stations booster stations. Continuity jumper as Boom anchor anticreep will be payable under
this item. The supply of all components and fittings and the erection of all the components
and fittings including the catenary wire for providing double catenary contact
wire in place of catenary under overline structures as per Drg. No. ETI/OHE/SK/446 and
ETI/OHE/SK-529 respectively will also be payable under this item treating the double
catenary as one jumper irrespective of its length. The jumper wire shall be of RDSO's
approved supply. (including aluminum jumper wire of appropriate length). If the purchaser
desires to go in for fit & forget type PG clamps, it will be informed to the contractor at the time
of execution. The jumpers provided for continuity of supply at Feeding Post/SSP/SP and along track feeder continuity shall be of 160 sq.mm jumper of suitable length as required at site

ITEM NO. 15 (B)  SUPPLY AND ERECTION OF AN ALUMINUM JUMPER:– The price shall cover on a flat rate basis the supply and erection of an aluminum 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 aluminum jumper/connections in any combination between feeders, return conductors, overhead equipments, and outgoing busbars or switching stations and booster stations. Jumper connections for 25 KV feeders at angle tower traction sub-stations or at feeding stations will also be paid under this item.

ITEM NO. 16 (A)  SUPPLY AND ERECTION OF A STRUCTURE BOND:– The price shall cover supply of all materials including mild steel flat required to be provided in a structure bond connecting a traction mast or structures to the nearest non-track circuited rail, or (locations other than earth wire) earth electrode, including all fasteners at both ends, bonding should have suitable insulation sleeve in an approved manner. The price shall include shaping and drilling and paint of all materials including the bond. The price shall also include provision of heat shrinkable PVC sleeve of minimum length of 40 cm for structure bond under track circuited rail. This would also cover connections or earthing terminals of equipments like L.T. transformers with structures and then to Rails as per relevant drawing. The rate will be per bond.

ITEM NO.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 be provided in a longitudinal bond connecting 2 rails at the rail joint at the locations specified by the Purchaser. The price shall includes shaping and drilling and painting of the bond and erection of all components including the Bond. The rate will be per bond. In Feeding post area Longitudinal bonds shall be provided as per RDSO design. ‘U’ shaped bonds which are provided in the points and crossing will be paid under this item.

ITEM NO. 16 (C) SUPPLY AND ERECTION OF TRANSVERSE AND SPECIAL BOND:– The price shall cover supply of all materials including mild steel flats, fasteners insulation sleeve etc required to provide Impedance bonds / Transverse Impedance bond connecting rails of the same/adjacent tracks at the locations and 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 include shaping and drilling of the bond, painting and erection of all materials including the bond. This will be paid per bond. The price shall also include provision of heat shrinkable PVC sleeve of minimum length of 40 cm. Whenever it is required.

NOTE for ITEM No. 16:–
1. The OHE traction bonds should be fixed to the rail and connected in such a way that they do not interfere with tamping tools during tamping as shown in drawing No. CE/570. The traction bonds shall be connected to the rail at a distance of not more than 80 mm from the adjoining sleepers.
2. Drilling of holes in the rails shall be done only with prior approval of SE/P.Way and drilling should be done in the presence of nominated P.Way Staff only.
3. All holes drilled to the rail shall be chamfered soon after drilling.
4. Drawing No. CE/570 showing the fixing arrangement of traction bonds to be followed strictly.
5. Jointing of flats by welding is only permitted except in platforms where it is inevitable.
6. If old structure bonds, cross bonds/polarity bonds, longitudinal bonds from the existing line is to be released, for any purpose so desired by Railway engineer at site, erection rate under structure bond will be paid to the contractor. The bolt, nut and bond so released is to be accounted properly and handed over to the purchaser.
ITEM NO. 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 complete with protective concrete box and lugs suitable for directly connecting two mild steel flats of minimum size 40 mm x 6 mm. The earth resistance shall be measured and stenciled in the concrete box. The concrete box shall be, as per RDSO’s Design and may not be possible to remove unless otherwise bond fasteners are removed. The rate includes provision of Charcoal and Salt to a minimum size of 0.3 x 0.3 x 2.0 mts. in alternative layers irrespective of Soil Condition at Site.

ITEM NO. 17 (B) SUPPLY AND ERECTION OF 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 in para 2.1.49 or fixed on wooden gutters on wall. It shall include connecting the earth bus to earth electrodes and to various floor-or- wall mounted equipments 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. Welding shall make the connection of earth strips to each other. The connections of earth strips to various equipments structures of fencing post shall be made with G.I. bolts and nuts and spring washers/locknuts. This will be paid per metre length.

ITEM NO. 17 (C) SUPPLY AND ERECTION OF COPPER STRIPS FOR EQUIPMENT EARTHING:- The price shall cover supply and erection of 25 mm x 3 mm copper strips to connect the earth terminals of equipments like potential transformers, lightning, arrestors, L. T. supply transformers and booster transformers to the main masts of the gantries on which they are mounted. The price shall cover all fastenings required for fixing the copper strip along any structure member of the gantry. The flat shall be painted with suitable paint to avoid theft.

ITEM NO. 17 (D) SUPPLY AND ERECTION OF 8 SWG G.I. WIRE FOR EARTHING:- The price shall cover supply and erection of a 8 SWG G.I. Wire per metre, used for earthing at remote control cubicles and LT panels.

ITEM NO. 18 (A) SUPPLY AND ERECTION OF VACUUM TYPE 25 KV INTERRUPTERS:- The price shall cover supply and erection of vacuum type interrupter of indigenous, RDSO’s approved make complete with supporting framework and terminal connectors. The price for erection shall include alignment and grouting of the interrupters 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, equipment, instruments including power supply required for carrying out necessary checks, tests and commissioning shall be arranged by the contractor. The rate includes supply and erection of interlock to be provided between Isolator and interrupter and one number pad lock of 6 lever Naval for each Interruptor. The price for item 18 (A) is inclusive of 2 distinct flexible solid copper earths to be provided between Mechanism Box and the frame/ earth if any. The rate also includes supplying of 1 No. each of closing coil, Tripping coil, drum contact (auxiliary contact) for each interrupters etc. and 6 copies of operating manual and wiring diagram. In case Railways supply interruptor/circuit breaker, the same has to be erected by the contractor for which erection rate only will be paid.

SPECIAL INSTRUCTION FOR THE INTERRUPTER IF INSTALLED AT TSS:- The rate also includes providing a T-N-C switch of English Electric (or) Recon or Siemens make and indication lamp holder with lamp mounted on a separate sheet metal box duly painted with enamel paint on a separate sheet metal box duly painted with enamel paint of appropriate colour (as existing) in TSS.

ITEM NO 18(a)(ii) ERECTION OF VACUUM TYPE 25 KV INTERRUPTORS/CIRCUIT BREAKER:- Same as above except for supply of interrupter/circuit breaker, which will be supplied by Railways.

ITEM NO.19 (i) SUPPLY AND ERECTION OF 25 KV POTENTIAL TRANSFORMER :- 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 connector 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 19(ii) ERECTION OF 25 KV POTENTIAL TRANSFORMER:-**
Same as above except for supply of 25KV potential transformer, which will be supplied by Railways.

**ITEM NO.20 (A)(i) SUPPLY AND ERECTION OF 42 KV LIGHTNING ARRESTER (STATION CLASS):**
The price shall cover supply and erection of 42 KV lightning arrestors complete with all fittings and accessories as per relevant specifications including terminal connectors. The cost of erection shall include proper alignment of the lightning arrester in position. The price shall not cover supply and erection of copper jumper (65/160) which will be paid under Item 15. The price shall include the cost of the small parts steel work.

**ITEM NO 20(A)(ii) ERECTION OF 42KV LIGHTNING ARRESTER:-**
Same as above except for supply of 42 KV lightning arrester, which will be supplied by Railways.

**ITEM NO. 20(B) SUPPLY AND ERECTION OF LIGHTNING ARRESTER 7.5 KV:-**
The price shall cover supply and erection of 7.5 KV lightning arrester 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 lightning arrester in position. 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 in List ‘A’ Annexure – I.

**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 32A, 110 V 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 NO. 22 (B) SUPPLY AND ERECTION OF IRON CLAD 230 V.A.C. FUSE BOX:-**
The price shall cover supply and erection of a 15 A, 230 VAC iron clad 6 way fuse box on the wall inside the remote control cubicle for heater supply of interrupters. The fuse box shall contain six fuse carriers and bases.

**ITEM NO. 23 SUPPLY AND ERECTION OF LEAD ACID BATTERIES 110 V 40 AH AS PER LATEST RDSO SPECIFICATION.**
The price shall cover supply and erection of 110 V 40 AH Lead acid Battery as per latest RDSO specification, indigenous and RDSO approved make with suitable stand, accessories and tool board etc. The price for erection shall include installation and connecting up of the Battery, but exclude the cost of connecting cables to the supply and erection of which will be paid under item no. 25.

**ITEM NO. 24 SUPPLY AND ERECTION OF BATTERY CHARGER AS PER LATEST RDSO SPECIFICATION.**
The price shall cover supply and erection of a battery charger suitable for 110 V, 40 AH battery complete with connecting lead and plug for connection to 230 V A.C. supply as per latest RDSO specification. The price for erection, shall include mounting of the charger in position and connecting it up to the 230 V A.C. Distribution board, which will be provided by the contractor, in the control cubicles. The price shall not include supply and erection of any cable for connecting the charger to the 110 V battery which shall be paid for under item 25.

**ITEM NO. 25 SUPPLY AND INSTALLATION OF CABLES**
(a) **CONTROL AND INDICATION:-**
The price shall cover supply installation and connecting up of cables for control and indication from the interrupters to the terminal board. The price shall include supply and erection of terminal connectors at both ends, if required and conduits where necessary.
(B) HEATER SUPPLY:- The price shall cover supply installation and connecting up of heater supply cable from interrupter to interrupter or from interrupter to the 230 VAC fuse box mounted on wall inside the control cubicle and from this fuse box to L.T. distribution board provided by the Purchaser inside the control cubicle. The price shall include cost of supply and erection of terminal connectors and each end if required and conduit if any at the interrupter end.

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

(D) L. T. POWER SUPPLY:- The price shall include supply, installation and connecting up of 2 core, 70 sq. mm XLPE aluminium cable between 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.

(E) 110 V.D.C. SUPPLY:- The price shall cover supply installation and connecting up of cable between 110 V 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 each type used at a switching station shall be rounded off to the next higher metre when it is 0.5 and above only.
3. Prices under item 25 do not include cost of concrete cable trenches which will be paid for under item 2 (c).

(F) (i) & (ii) SUPPLY & LAYING OF 70 sq mm XLPE ALU. CABLE:- The price shall cover supply and laying of XLPE insulated PVC sheathed aluminium conductor armored power cable of aluminum cable of size 2 core x 70 sq. mm as per ISS: 7098 heavy duty, 1100 V with IS markings for signal purpose as per latest RDSO directives. The cable shall be laid from L.T. signaling AT to the station building AT control panel or part thereof. The cable should be of RDSO approved make. The cable should be properly clamped on walls and GI pipe of required size and length is to be provided wherever cable is taken out from the earth to surface level. The price shall include testing, connecting/jointing and commissioning of cable and it will be paid per metre length. Suitable cable indicators are to be supplied and placed at 50 meters interval in an approved manner. No intermediate joint is permitted, whatever be the length of cable used. If lower[5 kVA] capacity L.T auxiliary transformers, are to be erected, then the payment is made for the supply and laying of XLPE insulated PVC sheathed aluminium conductor armoured power cable of aluminum cable of size 2 core x 25 sq. mm as per ISS: 7098 heavy duty, 1100 V with IS markings will be paid at half the rate per metre under this item. The price shall also cover supply and erection of suitable cable glands and connectors at both ends.

(G) CABLE TRENCH CUTTING:- For laying the 2 x 70 sq mm XLPE cable trench to be excavated to a depth of 3 feet and suitable width. The cable to be laid in the RCC pipe of inner diameter 150mm, 25mm thickness with suitable collar confirming to NP2 class of IS No. 458, at a depth of 3 feet and to be covered with excavated mud. The RCC pipe joint to be covered with gunny bags and cement grouting. The mud should be kept with a heap for future settlement. The price shall inclusive of concreting of platform area to its original shape. The rate will be paid per metre length. The same rate is applicable for 2 x 25 sq. mm XLPE cable also.
ITEM NO. 26 (A) SUPPLY AND ERECTION OF BUS BARS

1. ALUMINUM BUS BARS 50/39 mm:- The price shall cover supply and erection of aluminum busbars 50/39 mm including bending, shaping and clamping on to insulators, connectors or equipment terminals.

2. SOLID COPPER BUSBAR 18 MM:- The price shall cover supply and erection of solid copper busbar 18 mm including bending and shaping.

Note: The price under item 26 (a) (i) (a) (ii) does not cover the cost of terminal connectors on the jumper and which will be paid for under item 26 (b) or (c) as applicable. The cost of terminal connector provided on Isolator end is included in the Isolator.

ITEM NO. 26 (B) (I) TO (VII) SUPPLY AND ERECTION OF ALUMINUM BUSBAR CONNECTORS:- The price shall cover supply and erection of busbar junctions and connectors of various types specified, including bolts, nuts etc., required at junctions or terminations of busbars.

ITEM NO. 26 (C) (I) TO (IV) SUPPLY AND ERECTION OF SOLID COPPER BUSBAR CONNECTORS:- The price shall cover supply and erection of solid copper busbar junctions and connectors of various types specified including bolts, nuts etc., required at junctions or terminations of solid copper busbars.

ITEM NO. 27(A) SUPPLY AND ERECTION OIL FILTRATION, TESTING AND COMMISSIONING OF L.T. SUPPLY TRANSFORMER (OIL TYPE):- The price shall cover supply and erection of 10 KVA L.T. supply transformer 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 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 for commissioning shall be arranged by the contractor. The price also includes provision of L.T. fuse box with 63 Amps to be mounted on the Aux. Tr. Mast.

ITEM NO. 27(A)(I) ERECTION, OIL FILTRATION, TESTING AND COMMISSIONING OF L.T. SUPPLY TRANSFORMER (OIL TYPE):- The price shall cover erection of 10 KVA L.T. supply transformer 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 enameled number plate of approved design. The price shall also cover oil filtration and pre - commissioning tests as approved by the Railways, if required. The Contractor shall make his own arrangement for oil filtration equipments as well as power supply required for the same, if required. All necessary tools equipments instruments required for carrying out oil filtration/checks/tests for commissioning shall be arranged by the Contractor. The price also includes provision of L.T. fuse box with 63 Amps to be mounted on the Aux. Tr. Mast.

ITEM NO. 27(B) SUPPLY AND ERECTION TESTING AND COMMISSIONING OF DRY TYPE L.T. SUPPLY TRANSFORMERS – (DELETED) -

ITEM NO. 27(C) SUPPLY AND ERECTION OF LT CONTROL BOARD FOR AT LOCATION AS PER RDSO SPEC. NO. TI/SPC/PSI/CLS/0020 WITH A&C SLIP NO. 3 (3/07):- The price shall cover supply, erection, testing and commissioning of LT control and distribution panel for colour light Signaling suitable for 10 kVA with automatic changeover supply facility as per RDSO specification No. TI/SPC/PSI/CLS/0020 with A & C Slip No. 3 (3/2007). The price also shall include provision of suitable cable termination box 63 Amps for terminating the LT cable of AT & local EB supply and out going cable to signal equipment at Cabin/Station building. The price shall also cover provision of 16 sq. mm copper leads for connecting terminal board to the LT control and distribution panel. The price shall also include supply of necessary cable glands, fasteners, grouting bolts and clamps required for fixing/grouting of panel board.
ITEM NO. 28 - SUPPLY AND ERECTION OF 25 kV DROP OUT FUSE SWITCH:-
The price shall cover supply and erection 25 kV Drop out fuse (5 amps/1 amp) switch complete with all mounting accessories and terminal connectors as required including the supply of 25 kV solid core insulator. The price shall include supply and erection of small parts steel work, fuse element and mounting base channel. The D.O fuse switch of 5 amps shall be provided for 100 kVA/50 kVA auxiliary transformers and 1 amp for 10 kVA auxiliary transformers. The rate is same for 5 amps/1 amp D.O fuse switch. The rate includes supply of the fuse element also.

ITEM NO. 28(A) - ERECTION OF 25 kV DROP OUT FUSE SWITCH:-
The price shall cover erection of 25 kV Drop out fuse (5 amps/1 amp) switch complete with all mounting accessories and terminal connectors as required. The price shall include erection of small parts steel work, fuse element and mounting base channel. The D.O fuse switch of 1 amp for 10 kVA auxiliary transformers. The rate includes supply of the fuse element also.

ITEM NO. 29 ERECTION, OIL FILTRATION, TESTING AND COMMISSIONING OF BOOSTER TRANSFORMERS:-
The price shall cover supply and erection of 100 KVA booster transformer supplied by the contractor complete with terminal connectors on a gantry. The price shall include proper alignment of the transformer on the gantry but shall exclude any steel work required for mounting the transformer. The price shall also cover supply and erection of an enameled number plate. The price shall be 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 oil filtration equipments. All necessary tools, equipments, instruments required for carrying out oil filtration/checks, tests and commissioning shall be arranged by the Contractor.

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 and finished with two coats of aluminum paints. The price shall include the cost of fasteners and the price shall be for a metre length of the panel of 2.4 m height. The price shall also include 8SWG GI wire to be provided interconnecting Fencing panels / Fencing up rights/ Earth pipe/ Earth bus.

ITEM NO. 30 (A) (II) SUPPLY AND ERECTION OF FENCING UPRIGHTS:-
The price shall cover supply and erection of fencing UP rights painted with two coats of red oxide zinc chromate primer to IS 2074 and finished with two coats of aluminum paints. The price shall be on the basis of block weight of steel.

ITEM NO. 30 (A) (III) SUPPLY AND ERECTION OF PROTECTIVE SCREEN FOR FOB / ROB:-
The price shall cover supply and erection of protective screen for one line on either side of the FOB / ROB in an approved manner. The height of the Protective screen shall be 2.5 m and width as per RDSO original drawing. The protective screen shall be painted with two coats of red oxide zinc chromate primer confirming to ISI and finished with two coats of aluminum paint. The price shall also include for supply and erection of Earth flats to be connected to the Earth pipe/ Traction Rail in an approved manner if any for ROB/FOB. However, with the latest guidelines from Railway Board, custom made protective screen are to made to cover entire length of the Bridges.

ITEM NO. 30 (A) (IV) SUPPLY AND ERECTION OF PROTECTIVE SCREEN FOR OHE MAST :-
The price shall cover supply and erection of protective screen to be provided on a OHE mast /structure their near by building / road clearance is less. The height of the protective screen shall be in such a way, the access to the OHE live portion is prevented and shall be of approved design by RDSO. The protective screen shall be painted with 2 coats of red oxide zinc chromate primer and conforming to ISS and finished with 2 coats of aluminium paint. The rate will be paid per location. The rate will be half the rate of item under 30 (a)(III).

ITEM NO. 30 (B) (I) SUPPLY AND ERECTION OF ANTI-CLIMBING DEVICE AT SWITCHING STATIONS:-
The price shall cover supply and erection of anti-climbing device consisting of
galvanized steel fixtures mounted on the fencing panels as per approved design. The price shall be per metre length of the panel.

**ITEM NO 30 (B) (II) SUPPLY AND ERECTION OF ANTI-CLIMBING DEVICE FOR B.T. STATIONS:**
The price shall cover supply and erection of anti-climbing device consisting of galvanized steel fixtures mounted on the BT structures as per approved design. The price shall be paid per BT Location.

**ITEM NO. 30 (B) (III) SUPPLY AND ERECTION OF ANTI-CLIMBING DEVICES FOR L.T. SUPPLY TRANSFORMER STATIONS:** The price shall cover on lump-sum basis the supply and erection of anti-climbing device consisting of galvanized steel fixtures mounted on each mast below the transformer. The price shall be for each mast provided with the Anti climbing device. For mast/structure erected out side the Railway premises shall also be paid under this item.

**ITEM NO. 30 (B) (IV) SUPPLY AND ERECTION OF CAUTION BOARDS ALONG WITH SUITABLE FIXING CLAMPS:** The price includes the supply and erection of Enamel caution board with suitable clamps for fixing in the Mast/structure/wall including suitable bolt and nuts as per RDSO specification.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
</tr>
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<tbody>
<tr>
<td>01</td>
<td>Public Caution Board (Regional Language/Hindi/English)</td>
<td>20 Nos.</td>
</tr>
<tr>
<td>02</td>
<td>Staff Caution Board (Regional Language/Hindi/English)</td>
<td>20 Nos.</td>
</tr>
<tr>
<td>03</td>
<td>Caution unwired Track Ahead board (English/Hindi)</td>
<td>10 Nos.</td>
</tr>
<tr>
<td>04</td>
<td>Caution unwired Turnout board – (Enamel) (English/Hindi)</td>
<td>10 Nos.</td>
</tr>
<tr>
<td>05</td>
<td>Electric Engine Stop Board (English)</td>
<td>10 Nos.</td>
</tr>
<tr>
<td>06</td>
<td>25KV Restricted clearance board</td>
<td>20 Nos.</td>
</tr>
<tr>
<td>07</td>
<td>LC danger Board</td>
<td>5 Nos</td>
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The rate will be paid as total lump sum for all the Boards as against the quantity mentioned above.

**ITEM NO. 31 MODIFICATION TO ERECTED EQUIPMENT:** The price under this item shall cover various modifications required to be carried out in a section of completely erected overhead equipment energized or fit to be energized certified as such by Purchaser’s Engineer provided such modifications are not on account of non complaint 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 modification which may be necessary in the course of the work. All works originally done shall be paid for at normal rates for item 1 to 30 of Schedule - 1, as applicable. In all the following cases the dismantled equipment, shall be handed over by the Contractor to the Purchaser’s Engineer at the Contractor Depot/ Purchaser Depot at Madurai or where ever as required by Purchaser’s Engineer. The contractor shall make his own arrangements to transport the released materials and mast to DCOS/Perambur or to any place in Chennai area as required by the purchaser. Further the released materials are to be cut in to smaller lengths as required by the purchaser. Where price under this item are applicable the Contractor shall finalize the quantities of work jointly with the site Engineer and stock verifier before taking the work in hand.

**ITEM NO. 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 or support and release of SPS DA etc. The dismantled equipment shall be returned to the purchaser along with steel works like MCC DA and consequent adjustment to overhead equipment required such as changing the droppers leveling etc. No extra rates are payable for providing new dropper wires, catenary / contract wire clips if any. The foundations and steel work and
bracket assembly for the new mast or structure will be paid for under appropriate Item 2, 3 and 4 respectively. Where ever changing of winch type regulating equipment by modified 3 pulley type regulating equipment is carried out, in addition to supply and erection of 3 pulley type RE, transfer of OHE shall be paid for transferring OHE from old RE to new RE.

ITEM NO. 31 (B) PROVISION OF AN ADDITIONAL BRACKET ASSEMBLY/ ASSEMBLIES ON A MAST OR SUPPORT:- The price shall cover dismantling of an existing bracket assembly/assemblies/ along with the steel works like MCC DA and provision of a multiple cantilever cross arm SPS wherever required and erection of bracket assemblies on the multiple cantilever cross arm/SPS. The price shall include any consequential adjustments to traction overhead equipment such as re-spacing of droppers, leveling etc. This price shall not include the price for supply and erection of any additional bracket assembling which will be paid for under Item 4.

ITEM NO. 31 (C) RE-ADJUSTMENT OF A HEADSPAN:- The price shall cover the re-adjustment of the headspan polygon to enable the additional equipment/s to be suspended from the headspan. Payment for the suspension of an additional overhead equipment shall be made for under Item 5 as extra to Item 31 (c)

ITEM NO. 31 (D) DISMANTLING OF OVERHEAD EQUIPMENT:- The price shall cover cost of dismantling of OHE equipment including terminations, tensioning devices, section insulators guy rod assemblies at the termination and Anti creep, bracket, assemblies and associated small part steel work (excluding components embedded in concrete) the dismantled equipments shall be returned to the purchaser. This item includes releasing of Earth Wire and its termination, cut in insulator, Anticreep wire also if any. If anti-creep wire alone is released at any location, half the length of Anticreep wire will be paid under this item. The rate is inclusive of Guy Rods. Terminations and SPS to be released from either end of Anticreep anchor and OHE. The rate is also inclusive of pedestal Insulators to be released from OHEs/ isolators/ Anchor Locations/ Return conductors as the case may be. The rate includes for releasing of Isolators and section insulator assembly released alongwith OHE if any.

ITEM NO. 31 (E) DISMANTLING OF FEEDER/RETURN CONDUCTOR:- The price shall cover dismantling of feeder, return feeder or return conductor including guy rods, terminations, suspension assemblies, insulators super masts and associated small part steel work.

ITEM NO. 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 shall be returned to the Purchaser's Engineer. The cost of dismantling of overhead equipment would be paid for under Item 31 (d). The extended overhead equipment shall be deemed as starting from the centre line of the splice to the extended overhead equipment and shall be paid for under Item 6(a) or 6(b) or 6(c) as applicable. Half the rate shall only be paid if and only catenary or contact wire alone is spliced and extended. In case of splicing and extension of AC wire, half the rate shall be paid. The length of the AC wire spliced will be paid based on Schedule – 3 rates applicable to the tender.

ITEM NO. 31 (G) DISMANTLING OF A SECTION INSULATOR:- The price shall cover cost of dismantling of a section insulator and also if required 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 Contractor's / Purchaser's depot's, as required by Purchasers Engineer.

ITEM NO. 31 (H) SLEWING OF EQUIPMENT:- The price shall cover for temporary slewing or lowering of erected OHE adjusted and/or unadjusted for special works, at the request of the purchaser and restoration and readjustment of the equipment after completion of special work. The price shall be per location/span or part thereof including anchoring spans. This is inclusive of RC wire and earth wire if any. Additional components or materials used during such
restoration of re-adjustment shall be paid on schedule 3 provided such use has, in the opinion of the Purchaser, become necessary due to reasons beyond the control of the contractor.

**ITEM NO. 31(I) DISMANTLING OF AN ISOLATOR:** The price shall cover cost of dismantling of an isolator including dismantling of isolator single or gang operated including dismantling of connections to the overhead equipment and associated small parts steel work in isolated cases.

**ITEM NO. 31 (J) DISMANTLING OF A PIN/PEDESTAL INSULATOR:** The price shall cover cost of dismantling of a pedestal/ pin insulator including dismantling of jumper connection, if any and associated small parts steel work.

**ITEM NO. 31(K) DISMANTLEMENT OF OHE MAST/STRUCTURE BY CUTTING:** The price shall also cover the cutting and retrieving of the old steel structure as directed by the purchaser. The price shall cover the cutting and retrieving of Old mast of any type including TTU's as directed by the purchasers Engineers at site. While releasing such TTU's proper care shall be taken in such a way that no damage occurred to the Booms. However, the dismantling of the TT boom will be paid under item 31(p). The OHE foundation must be chipped or broken to a depth of 670mm from the tip of the foundation. All the retrieved mast shall be stacked at the places to the nearest OHE maintenance depot as decided by the purchaser in the section. On completion of cutting site clearance shall be done duly back filling if there any need be. Any small part steels available in the mast/structure shall be released safely and handed over to the purchaser. No extra rate is admissible for the same.

**ITEM NO. 31(L) DISMANTLEMENT OF OHE MAST/STRUCTURE BY BREAKING THE FOUNDATION:** The price shall cover retrieving of steel mast/structure from the foundation after retrieving the OHE mast the mast hole may be filled with enough soil and as directed by purchaser's engineer. During the time of dismantling operation any deformation occurred it should be set right. The rate shall also applicable for retrieval of TTUs. All the retrieved mast shall be stacked at the place depot decided by the purchaser in the section. All the retrieved mast shall be stacked at the place to the nearest OHE maintenance depot as decided by the purchaser in the section. The deformation of mast, occurred either during the retrieval or during transport shall be removed by the contractor. If it is not removed or the mast was cut and removed by the contractor due to other reasons, then the payment will be made only under item No. 31(k).

*Note: All the dismantlement equipment, fittings SPS steel work shall be returned to the purchaser.*

**ITEM NO.31(M) DISMANTLEMENT OF BOOSTER TRANSFORMER:** The price shall cover cost of dismantling of a Booster Transformer with bus-bar arrangements and other accessories and handing over item at contractor's depot as directed by Purchaser. Note: The erection of booster transformer for the shifted location will be paid to the contractor under item No. 29 A.

**ITEM NO.31(N) DISMANTLEMENT OF GUY ROD ASSEMBLY:** The price shall cover dismantlement of guy rod assembly including Guy Rod mast fitting with V-bolt/loop in an isolated cases where guy rod alone needs to be removed.

**ITEM NO.31(O) ERECTION OF TEMPORARY MAST:** The price includes the rate for insertion of 16 feet long sleepers below to the rail and erection of temp mast (Mast and sleepers will be supplied by Railways), erection of Bracket, supporting of OHE. On completion of work transfer of OHE to new mast and releasing of Temp Mast and sleepers. The rate given includes for the work done under power block also.

**ITEM NO.31(P) RELEASING OF PORTAL BOOMS:** The rate includes releasing of portal booms, TTB’s, dismantling of booms and handing over of released materials to the purchaser as decided by the Purchase Engineer in charge. The rate given includes for the work done under power block also. In case of three legged portals, both the booms are considered as one boom.
ITEM NO.31(Q)  SPlicing AND EXTENSION OF RC WIRE:- The price shall cover splicing of terminated RC wire/Feeder wire or cut and splicing through RC wire/Feeder wire with the new RC wire/feeder wire for the purpose of proposed alignment. For the Dismantled Portion of RC wire/feeder wire, will be paid under item (31E). The price shall includes releasing of termination if any.

ITEM NO. 31(R)  RELEASING OF AUX. TRANSFORMER:- The price for releasing of plinth/pole mounted. Aux. Transformer from Location which includes releasing of Drop out fuse and Lightning Arrestor fencing panels, SPS and releasing of jumpers from OHE. The released materials are to be handed over safely to the purchaser’s Engineer.

ITEM NO. 31(S)  RELEASING OF SSP/ SP EQUIPMENTS:- The price shall cover dismantling of old interruptor, PT, Busbar, small parts steel. Fencing Up rights and Fencing panels from outside the SSP Building and also include releasing Electrical Equipments, Battery charges, Old wirings etc from inside the Released SSP/ SP. All the released equipments are to be handed over to the purchaser as decided. The Gantry mast/ mast released from SSP area will be paid under item 31 L, 31 K as the case may. The rate quoted shall be Lumpsum per SSP/ SP. The dismantling of Isolators, AT’s & Drop out fuse switch, pedestal insulators shall be paid under item 31(i), 31(r) & 31(j) respectively

ITEM NO. 31(T) SPREADING OF 20 MM BALLEST IN THE SSP/ SP SWITCH YARD.: The price shall cover supply and spreading of uniformly graded 20/25 mm Ballast stone size in the SSP yard duly leveling the area as soon as cable trench, work, Fencing work, Interruptor, Mast/ Gantry erection is over. The Ballast stone shall be of good quality and free from any dust/ dirt/ muck. Prior approval shall be obtained from the purchasers engineer for the ballast stone sample. The ballast stones shall be spread out uniformly to a depth of 10 cm or 20 cm as directed by purchaser’s Engineer/ Design Engineer.

ITEM NO. 32  EXTRA ON ERECTION RATES FOR WORK UNDER A POWER BLOCK.: Item No. 32A, 32B & 32C numbered 1.4.8 in schedule of price, section-1 (general) of explanatory notes of schedule-1 under part-1, Chapter IV as follows

The price under this item cover extra charges over and above erection rates of item 3 to 15 and 18 to 31 of Schedule 1, for erection of equipment in the vicinity of energized overhead equipment and feeders of erection of equipment which joins equipment already energized or on energized equipment which calls for a power block by switching off of traction power.

The amount payable for erection work carried out under power block, over and above amount payable for non power block erection rate, are arrived from amount payable for non power block erection rate for the corresponding item computed by loading the percentage over/at par/below quoted by the tenderer.

The Power block erection rates under this item will not be payable if power block is given in an elementary section/sub section for a total duration of 4 hours or more in a day. The duration can be in one or more spells. In the case of work which warrant power block in more than one line, the duration of power block will be reckoned as under.

The power block time will be commence/end from the time Power block is availed on the first line and to the cancelation of time of the line which ever cancelled later.

Where the prices under this item are 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. This extra rate is inclusive of provision of earth rods during power block hours for any type of works (earth rods will be owned by the Contractor conforming to RSO specification No. ETI/OHE/51 (9/87) Correction slp No.1) under the clear guidance of authorized Railway Representative/ Engineer at site. The Power Block time will commence/ end from the time Power Block is availed/ cancelled from TPC/ASM. The contractor shall arrange for adequate lighting with generator set/ Petromax lamps at work site when the work is carried out during nights.
ITEM NO. 33  CABLE TRENCH COVERS:— The price shall cover casting of cable of cable trench covers in reinforced concrete as per the standard drawings approved by the purchaser engineer. The cable trench covers shall be fabricated and cast in an iron frame angle of size 45x45x6 mm. The price shall include supply of steel for reinforcement, angle iron frame etc., The price shall include the cost of materials for concrete mixture including cement. The price shall also include positioning, leveling and dressing up of the trench covers, as required.

ITEM NO. 34  ADDITION/ALTERATION TO THE EXISTING REMOTE TERMINAL UNIT AT FP/SSP/SP LOCATION INCLUDING SOFTWARE AND HARDWARE MODIFICATION/ALTERATION IN THE MASTER STATION COMPUTER AT REMOTE CONTROL CENTRE AS WELL AS RTU FOR ACCOMODATING ADDITIONAL INTERRUPTORS AND RELAVENT INDICATIONS:— The price includes addition/alteration (Hardware and soft ware) required for the existing RTUs at switching stations and master station equipment including Mimic diagram board at remote control centre for incorporating additional interrupters/ circuit breaker and relevant indications.

EXPLANATORY NOTES OF NON-SOR ITEMS

ITEM No. 35. TRANSPORTING OF RAILWAY SUPPLY OHE STRUCTURE/MAST TO WORK SPOT.

The Tenderer shall quote the rate per MTkm for transporting of OHE mast/structure and equipment supplied by Railways. No payment will be made for Railway material transported with in 5 kM around work site. The rate quoted will be applicable whether the materials transported are full load or part load of the vehicle. The distance in KM from the place where the transportation to be carried out to the place of unloading will be based on the actual Km run by the vehicle if the material is transported through road and the actual km of rail route, if the material is transported through rail. The price shall cover leading, loading of OHE structure/mast from Railway office/premises and transportation unloading and stacking of material at site. Normally the materials have to be transported from Chennai in Tamil Nadu area or Kozhikode -Trivandrum in Kerala area. However the contractor has to transport material from anywhere to anywhere in southern Railway, if required.

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PART – II

CHAPTER – I

GENERAL SPECIFICATIONS
### Section – 1: General

<table>
<thead>
<tr>
<th>Para No.</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.1</td>
<td>Introduction</td>
</tr>
<tr>
<td>2.1.2</td>
<td>Climatic Data</td>
</tr>
<tr>
<td>2.1.3</td>
<td>Wind Pressure</td>
</tr>
<tr>
<td>2.1.4</td>
<td>System Particulars</td>
</tr>
<tr>
<td>2.1.5</td>
<td>Rolling Stock</td>
</tr>
<tr>
<td>2.1.6</td>
<td>Power Supply</td>
</tr>
</tbody>
</table>

### Section – 2: Overhead Equipment

<table>
<thead>
<tr>
<th>Para No.</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.10</td>
<td>Track</td>
</tr>
<tr>
<td>2.1.11</td>
<td>Sectioning</td>
</tr>
<tr>
<td>2.1.12</td>
<td>Pantographs</td>
</tr>
<tr>
<td>2.1.13</td>
<td>Description of overhead equipment</td>
</tr>
<tr>
<td>2.1.14</td>
<td>Type of equipments</td>
</tr>
<tr>
<td>2.1.15</td>
<td>Plan of Contact</td>
</tr>
<tr>
<td>2.1.16</td>
<td>Tensions</td>
</tr>
<tr>
<td>2.1.17</td>
<td>Clearances</td>
</tr>
<tr>
<td>2.1.18</td>
<td>Height of contact wire</td>
</tr>
<tr>
<td>2.1.19</td>
<td>Stagger</td>
</tr>
<tr>
<td>2.1.20</td>
<td>Termination</td>
</tr>
<tr>
<td>2.1.21</td>
<td>Type of Structures</td>
</tr>
<tr>
<td>2.1.22</td>
<td>Cantilever Assembly</td>
</tr>
<tr>
<td>2.1.23</td>
<td>Over laps</td>
</tr>
<tr>
<td>2.1.24</td>
<td>Points and crossings</td>
</tr>
<tr>
<td>2.1.25</td>
<td>Section insulators</td>
</tr>
<tr>
<td>2.1.26</td>
<td>Isolators</td>
</tr>
<tr>
<td>2.1.27</td>
<td>Return conductors</td>
</tr>
<tr>
<td>2.1.28</td>
<td>Bridges and tunnels</td>
</tr>
<tr>
<td>2.1.29</td>
<td>Bonding and earthing</td>
</tr>
<tr>
<td>2.1.30</td>
<td>LT Supply transformer stations</td>
</tr>
<tr>
<td>2.1.31</td>
<td>Lighting Arrestors</td>
</tr>
<tr>
<td>2.1.32</td>
<td>Ceramic beaded glass fiber type short neutral section assembly</td>
</tr>
</tbody>
</table>

### Section – 3: Switching stations Booster Transformers Stations And LT supply Transformer stations.

<table>
<thead>
<tr>
<th>Para No.</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.40</td>
<td>Description</td>
</tr>
<tr>
<td>2.1.41</td>
<td>Scope of Work</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>2.1.42</td>
<td>Clearances</td>
</tr>
<tr>
<td>2.1.43</td>
<td>Setting distance of gantries</td>
</tr>
<tr>
<td>2.1.44</td>
<td>Datum level</td>
</tr>
<tr>
<td>2.1.45</td>
<td>Mounting of equipment and bus-bar arrangements</td>
</tr>
<tr>
<td>2.1.46</td>
<td>Fencing and anti climbing devices</td>
</tr>
<tr>
<td>2.1.47</td>
<td>Numbering</td>
</tr>
<tr>
<td>2.1.48</td>
<td>Interlocking arrangements</td>
</tr>
<tr>
<td>2.1.49</td>
<td>Earthing arrangements</td>
</tr>
<tr>
<td>2.1.50</td>
<td>Cable connections.</td>
</tr>
</tbody>
</table>
SECTION – 1 GENERAL

2.1.1 INTRODUCTION:- This part of Tender Paper is divided into seven Chapters and contains general, technical and other specifications for design and erection of complete 25 KV AC 50 Hz single phase traction overhead equipment, switching stations, booster transformer stations, L.T. supply transformer stations complete with foundations, structures, return conductors and 25 KV feeders, if any. This part also gives reference to RDSO/ RITES technical specifications of materials and components, procedure for submission of designs and drawings of basic arrangements, components and fittings designs and other typical designs relating to overhead equipment, switching stations and booster transformer stations. A list of the standard drawings is included.

SCOPE OF WORK:- The details of the scope of work are furnished in the preamble to Tender Papers.

2.1.2 CLIMATIC DATA:- The data pertaining to section are given in Part - III

2.1.3 WIND PRESSURE:- For design of layout of overhead equipment maximum span etc wind pressure shall be taken as specified in Part - III. Structures and foundations of overhead equipment, switching stations, booster transformer stations and L.T. supply transformer stations shall be designed for the wind pressure indicated in part - III.

2.1.4 SYSTEM PARTICULARS:- The normal voltage of the overhead equipment will be 25 kV AC Hz single phase. The supply voltage may however rise upto 27.5 kV. 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 switch gear provided at the traction sub station and at the feeding station.

2.1.5 ROLLING STOCK:-
   a) LOCOMOTIVES:- The Electrical Locomotives will generally be quipped with DC motors fed through rectifiers installed on the locomotives.
   b) OVERSIZE CONSIGNMENTS:- The specific requirements in regard to movement of steam locomotives and over size consignments for each section are indicated in part – III.

2.1.6 POWER SUPPLY
   (a) SUB-STATIONS:- Electric power will be supplied at 25 KV AC 50 Hz single phase from traction sub stations to feeding stations spread 50 to 80 km apart along the track.
   (b) SWITCHING STATIONS:- Power supply will be controlled to the different sections of traction overhead equipment by switching stations. At these stations the switching will be effected by means of “interrupters” which are single pole, non-automatic interrupters capable of repeatedly interrupting normal full load current. There are three types of switching stations:
      i) TSS/ Feeding Post/ or Feeding Posts
      ii) Sectioning Posts and
      iii) Sub-sectioning Posts
   c) FEEDING STATIONS:- Supply will be effected to the overhead equipment through switchgear installed at feeding stations. All feeding stations will be located normally near the track.
   d) SECTIONING POSTS:- The sub stations cannot as a rule be paralleled and consequently neutral section of overhead equipment with insulated overlaps on either side will be provided approximately midway between two consecutive feeding stations. Neutral sections may also be provided at feeding stations. Facilities to bridge the neutral section between feeding stations will be provided at sectioning stations.
e) SUB SECTIONING STATIONS:- In order to facilitate maintenance of Overhead Equipment 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.

f) RETURN CONDUCTORS:- In order to reduce interference to telecommunication circuits arising from AC 50 Hz single phase traction current in the overhead equipment, a return conductor may be provided for each main running track. These return conductors shall be connected at intervals of booster transformers and to the rails. The sections in which return conductors shall be provided are indicated in Para-III.

g) BOOSTER STATIONS:- NIL –

h) Supply and erection of traction sub stations mentioned in para (a) above do not come within the purview of this specification.

SECTION – 2 OVERHEAD EQUIPMENT

2.1.10 TRACK

(A) GAUGE AND TRACK CENTERS SPEED

**M.G**: The track gauge is 1000 mm (3’ – 33”). In multiple track zones the normal distance between track centers varies between 4270 mm (14’ ft) and 4420 mm (14’-6’).

**B.G**: The track gauge is 1676 mm (5’ – 6”). In multiple track zones the normal distance between track centers varies between 4720 mm and 5300 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/hr (approx. 100 miles/hr) if regulated and for a maximum speed of 80 km/hr. (approx. 50 miles/hr.) if regulated unless otherwise specified in part III for any particular section.

c) CURVES:- The minimum radius permissible is 175 mts. (573 ft.) i.e. a 10 degree curve. Inside station limits the curvature at a 1 in 8 ½ turnout is 8 degree i.e. of radius 219 metres (716 ft.).

d) SUPER ELEVATION:- The maximum super elevation is 165 mm (6 ½”). On curves the minimum setting of structures shall be decided on the basic of maximum super elevation (See para 2.3.10). For purposes of design and erection of overhead equipment the actual super elevation as existing at site or as indicated to the contractor shall be adopted.

e) LOW JOINTS:- For low or loosely packed rail joints a difference of 25 mm (1”) in the level of opposite rails may be taken as the basis for estimating the displacements 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 tracks may be separate.

(g) DISPLACEMENT:- The general design of overhead equipment shall permit a displacement of 100 mm 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.

2.1.11 SECTIONING

(a) INSULATED OVERLAPS:- Insulated overlaps are provided for facility of isolation. Some of the overlaps may be provided with manually operated isolator switches. In addition for connecting the overhead equipment to booster transformer, insulated overlaps are indicated in the sectioning diagrams (See part – III).

(b) YARD SUPPLY:- The sectioning diagram/s also indicate the tracks in station yards and siding whose equipments 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 cross-over between main tracks and to isolate sections of overhead equipment in yards and siding. Section insulators may also be used to form neutral sections at special locations as indicated in approved drawings.

(d) FEEDERS AND RETURN FEEDERS:- Deleted

(e) 25 KV ALONG TRACK FEEDERS:- 25 KV along track feeders may connect section of overhead equipment or connect the overhead equipment to a switching stations or an isolator switch or gantry. Such feeders will be run usually on traction structures and sometimes on independent masts. A single stranded 150 sq. mm copper conductor shall be used for such feeders.

(f) RETURN CONDUCTOR:- Nil –

(g) SCHEMATIC ARRANGEMENTS:- The different arrangements of feeders, return feeders 25 KV along track feeders and return conductors are shown in the drawing listed in Annexure I, Part- IV.

(h) SECTIONING DIAGRAM:- The provisional sectioning diagram/s of the sections to be electrified is/are included in Part – III.

2.1.12 PANTO-GRAPHS

(a) The outline of the pantograph, its dimensions and its current collecting area are shown in a drawing listed in Annexure – I, Part – IV.

(b) NUMBER AND PRESSURE:- Each locomotive will be equipped with two pantographs but only one pantograph generally the trailing one will be in 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 metres. This distance may however, be reduced to 7.9 metres between two pantographs in very exceptional cases.

(d) INSULATION CLEARANCE:- The electrical clearances 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, 1939 printed in 1973 in metric units issued by Ministry of Railway (Railway Board), Government of India and any other order that may be issued by the Railway Board from time to time.

2.1.13 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 metres span and reduced suitably for other spans.

(b) CATENARY:- The catenary wire shall be of cadmium copper 19/2.10 mm-65 sq. mm. Under over line sections Aux. Contact wire to be provided over catenary wire of required length as directed by the purchase Engineer at site. In exceptional cases pure copper catenary wire of size 19/2.50 mm – 93.27 Sq.mm have to be used. This will be indicated in the Preamble.

(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 Electrolytic round copper wire approximately 5 mm dia. Droppers shall be spaced not more than 9 metre apart (See Annexure – I, Part – IV).

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

(f) JUMPERS:- 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 sq. mm nominal 19/1.8 mm size. Flexible jumpers of nominal section 105 sq. mm 19/7/1.06 mm size shall be
used at overlaps turnouts crossings etc. and down drop jumpers from FP/SSP/SP shall be of flexible 160 sq.mm copper jumper.

(g) BRIDDLIE WIRE:- Bridle wire for supporting contact wire for regulated tramway equipment shall be of Cadmium Copper 7/12.10 mm 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 anticrep wire as an anti theft measure. The jumper connecting the Al. Conductors to any other conductors terminal or clamp shall be made with the aid of suitable bi-metallic clamps. All aluminum jumpers of size 19/7/1.4 mm bare & hard shall be used to connect other Aluminum conductors such as return conductor. The tail ends of feeder wires from the strain clamps at the termination of a feeder, return feeder or return conductor may be connected directly to a terminal or clamp where feasible to avoid the use of a separate jumper wire.

2.1.14 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 desired 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-I. The arrangement shall generally consist of the galvanized steel wire copper wire anchored on the masts adjacent to the anticreep centered mast in accordance with the relevant drawing listed in Annexure-I Part IV. The Contractor shall indicate the type anti-creeps to be adopted in the pegging plans.

(b) UNREGULATED:- The unregulated type of overhead equipment has no provision for automatic regulation of tension of either the catenary or the contact wire.

(c) TRAMWAY TYPE EQUIPMENT REGULATED CONTACT WIRE ONLY:- In tramway type equipment regulated only a contact wire is provided without a continuous catenary or droppers. The tension in the contact wire is regulated. At support briddle wire is used for supporting the contact wire.

(d) The section in which different types of equipment should be provided are indicated in Part-III.

2.1.15 PLANE OF CONTACT

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

(b) UN REGULATED:- In the case of unregulated equipment the contact wire shall have no sag at an ambient 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 overhead equipment would be supplied by the 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. For catenary wire with 93.27 sq,mm area, special dropper have to be designed and approved by the Purchaser.

2.1.16 TENSIONS

(a) REGULATED

(i) In regulated equipment the tension in the catenary and in the contact wire shall be 1000 kgf in each conductor.

(ii) The regulated tension in the Aluminum alloy catenary shall be 1000 kgf and 1000 kgf in the copper contact wire.
(b) UNREGULATED:- In unregulated equipment the tension in the catenary and in the contact wire at 35 C without wind shall be 1000 kgf in each conductor.

(c) TRAMWAY TYPE:- In regulated type tramway equipment, the tension shall be 1,250 kgf.

2.1.17 CLEARANCES

(a) GENERAL:- The distance between live parts and parts at earth potential (or parts likely to be earthed) shall be as large as possible. In all cases the values given in Schedule of Dimensions, 1939, 1676 mm gauge 1939 printed in metric units, 1973 or its latest revision 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 & 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. Aux contact wire to be provided as required length as directed by purchase engineer.

(c) PLATFORM SHEDS & OTHER STRUCTURES:- In the course of preparing the OHE layout 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 these shown in the relevant drawings listed in Annexure-I, Part-IV. If these clearances are not available the Contractor shall advise the Purchaser in time to enable the later to take up necessary modifications.

2.1.18 HEIGHT OF CONTACT WIRE

(a) Normally, the minimum height of contact wire above rail level shall be 5.60 m at mid span under the worst temperature conditions. This height may be reduced under bridges and 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 crossings the minimum height shall be 5.50 m. Any infringement restricting minimum height at level crossings will be removed will be cleared by a special dispensation.

(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 lines 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.

2.1.19 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.

2.1.20 TERMINATION

(a) GENERAL:- Traction overhead lines shall be terminated using components specified in Chapter 2.4. The termination may be carried forward by one or two spans if anchoring facilities so require.

(b) Terminating wires shall be electrically connected to the conductors 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 terminations wire close to the live conductor shall be separated by means of insulators. The insulators swept shall be located in such a manner as to clear the sweep zone of the pantograph under the worst conditions and as far away as is possible from live conductors.

2.1.21 TYPES OF STRUCTURES
(a) The overhead equipment of main tracks in case of multiple track sections shall be electrically and mechanically independent of each other by provision of independent cantilever masts to the maximum extent possible (See Annexure-I for general arrangement drawings).

(b) HEAD SPANS

Head span construction may be adopted with unregulated overhead equipment. A single head span shall normally not cover more than six tracks (See Annexure-I for general arrangement drawings of head spans carrying complete overhead equipment).

(c) PORTALS

In case where the tracks in a multiple track 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 (see also 2.3.7). Portal structures shall also be employed at anticreep central locations and such portals will have necessary guy arrangement.

(d) 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 (See Part-II, Chapter-III).

2.1.22 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 fusing maintenance up to the extent of 100 mm on either side except as otherwise relaxed by the Purchaser (See para 2.1.10 (g)). In special locations, Pull-off arrangements may be used with the approval of the Purchaser (See Annexure-I for drawings of the bracket assembly and components). The cantilever assemblies provided in the drop arm normally should have an implantation of 2.25 metres.

2.1.23 OVERLAPS:- Overlaps shall be provided at suitable intervals such that neither the tension length exceeds 1500 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 plane parallel to the track and run separated from each other (See Annexure-I for general arrangement drawings).

(b) INSULATION:- In the case of insulated overlaps the separation between the two contact and the two catenary wires shall be 0.5m (See Annexure-I for general arrangement drawings).

2.1.24 POINTS & CROSSINGS:- Arrangements of overhead equipment of different types e.g. regulated, unregulated or tramway at points and crossings shall be in accordance with the standard drawings listed in Annexure-I.

2.1.25 SECTION INSULATORS:- (See also para 2.1.11 (c))

(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/hr. The outline of a section insulator is shown in a drawing listed in Annexure-I. The section insulators shall be of the single wire type.

(b) SIZE AND WEIGHT:- The section insulator assembly shall be such that it should be possible to install the insulator in the 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 kgs for single wire type excluding the weight of the catenary insulator and the catenary ending clamps.
2.1.26 **ISOLATORS:-** Manually operated isolators single or double pole type, with or without earth contact assembly may be required to bridge certain section insulators or insulated overlaps (See para 2.1.11). In certain large yards, isolators controlling different lines may be grouped together on a gantry (See Annexure-I).

2.1.27 **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 shall be connected to the rail through suitable terminal lugs which will provide a means of isolation when required. The drawings showing return conductor are listed in Annexure-I. The connection from the isolating arrangement; to the rail shall be by means of 2 M.S. flats each of minimum size 40 mm* 6 mm and at feeding stations 4 M.S flats each of minimum size 40 mm x 6 mm. The flats shall be given two coats of red oxide zinc chromate primer to IS : 2074 CNSL based & finished with two coats of Bitumen 85/25 blown grade. Return conductors may under overline structures with the approval of the Purchaser. The return conductor shall also be connected with buried rail in either side of 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 on all the sub sectioning posts and sectioning posts for the return conductor.

2.1.28 **BRIDGES & TUNNELS**

(a) **OVER BRIDGES:-** The complete overhead equipment i.e. both the catenary and the contact wires) shall normally pass under over line structures. Additional intermediate suspension points shall be provided if necessary to ensure the specified minimum height of contact wire being maintained. In special cases the catenary may be anchored on either side of the overline 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 in Part-II.

(c) **SAFETY SCREENS:-** On over bridges metallic protective screens shall be provided in order to prevent any person from coming into contact with all live overhead equipment. Such screens shall be as per RDSO’s approved design and properly earthed.

(d) **HEIGHT GAUGES AT LEVEL CROSSINGS:-** Height gauges will be provided at all level crossings in accordance with the general arrangement drawings listed in Annexure-I.

2.1.29 **BONDING & 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 circuited 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-I.

(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 4.09 mm dia. (RACCOON) (confirming to IS: 398 Pt. II 1976). The earth wire shall be run on traction masts or structures. they shall be divided into different electrical sections not exceeding 1000 m long. The earth wire in each such section shall be connected at two traction structures with independent Earthing stations of 2 to 10 ohms earth resistance situated at a distance not exceeding 250 m on either side of the mid point of the section. Sections on which earth wire is required to be provided are indicated in para-III.

2.1.30 **L.T. SUPPLY TRANSFORMER STATIONS:-** (See para 2.1.40 (c))
2.1.31 **LIGHTNING ARRESTORS:** No lightning arrestors will be provided on the traction overhead equipment.

2.1.32 **CERAMIC BEEDED GLASS FIBER TYPE SHORT NEUTRAL SECTION**

**ASSEMBLY:** Ceramic beaded glass fiber type insulator assembly shall consist of resin bonded fiber glass (or equivalent) insulators covered with either teflon (or equivalent) or ceramic beads with PTFE spacers (or similar) adequately dimensioned and rated for the application. The insulators shall have suitable end fittings for connections to the contact wire through end fitting. For smooth passage of pantograph without any shock from contact wire to insulator and vice versa suitable runners preferably of stainless steel shall be provided. The central position of the assembly along with arc trap shall be solidly earthed as the latter with earthing clamp is provided to trap any arc current caused by break of contact between pantograph and live contact wire when it passes from contact wire to insulator. The distance between arc trap and nearest line position shall be adjustable up to a maximum of 320 mm. Suitable means of suspension of the components of the assembly from the catenary conductor shall be provided. The complete assembly shall be as light as possible and so constructed that adjustments of components can easily be made during erection and maintenance and also for ensuring smooth passage of pantograph. In the catenary conductor resin bonded fiber glass insulators with suitable covering shall be provided the insulators shall have suitable end fittings for connections to catenary wire through end fittings. The neutral section assembly shall be suitable for erection symmetrically on either side of the cantilever bracket support with regulated or unregulated conventional/composite OHE where one point each for suspension or catenary conductor and contact wire is available as also shown in GA drawing under Annexure-I.

SECTION - 3

**SWITCHING STATIONS, BOOSTER TRANSFORMER STATIONS AND L.T. SUPPLY TRANSFORMER STATIONS**

2.1.40 **SWITCHING STATION**

(a) Switching station serving in the electrified tracks at 25 KV Interruptor AC single phase at 50 Hz shall be provided with Double Pole Isolators, Potential Transformer with Cable connection, L.A.s, A.Ts etc., with suitable the Bus bar connections. Switching station has a gantry with two or more main masts (Upright). Interrupter located behind the gantry. Isolators, Potential Transformers, Stations class lightning arrestors and pedestal insulators are to be mounted on a gantry. From the gantry connections, are made to various sections of overhead equipment by cross feeders and jumper connections, Switching stations are unattended and remote controlled from a remote control center (see Part III). A small masonry cubicle called the switching station to house control equipment, batteries battery charger, S&T terminal equipment, a terminal equipment, a telephone and telephone equipment and AC 240 V distribution board.

(b) **BOOSTER TRANSFORMERS:** Single Booster Transformer for the existing electrified line already exists. Some of the SBT with cross track feeders/ along track feeders may require shifting/ modifications depending upon the alterations needed. Booster stations are provided for each track at the insulated overlap spans. The primary terminals are connected directly on series with the traction overhead equipment and the secondary terminals directly in series with the return conductors by means of flexible jumpers. Normally each booster station will be provided with one booster transformer which will be mounted on a gantry structure with two masts as indicated in a drawing listed in Annexure-I. Single booster station will be located on either side of the track in a double track section. In multi-track sections where space does not permit location of a booster station may be provided with cross feeders for connections to the overhead equipment and return conductors as indicated in the relevant general arrangement drawing listed in Annexure-I. Two 7.5 KV lightning arrestors for each booster transformer are also erected on the gantry and connected to the L.T. terminals of the booster transformer. Where this item is deleted need not to be considered.

(c) **L.T. SUPPLY TRANSFORMERS:** The low tension supply required at switching stations will be obtained through L.T. supply transformers included as a part of switching stations, mounted on steel structures and connected to the 25 KV side through rigid bus bars of aluminum. In special cases where the length of connection is small, 50 sqmm copper wire may be used for connection, with
the approval of the purchaser. At locations other than at switching stations, wherever low tension supply is required L.T. supply transformer stations included as a part of OHE may be provided along side the track at isolated location. L.T. Supply transformer stations shall essentially comprise of a mast mounted transformer connected to the traction overhead equipment through dropout fuse switches. The 240 V side shall be connected to a distribution board located at the remote control cubicle available in SMR Room/ Power cabin/ LC’s by means of 2 core 25 sq. mm aluminum cable (See 2.4.23 (a)). The general arrangement drawing for L.T. Supply transformer stations for single, double and multi-track sections is included in Annexure-I.

2.1.41 SCOPE OF WORK

(a) SWITCHING STATIONS

The switching stations shall be complete in all respects in accordance with specifications. The work shall not include:

(i) Filling up and leveling of the ground to the extent necessary.

(ii) Provision of central cubicles for installation of remote control equipment for switching stations.

(iii) Provision of 240 V AC distribution board

(iv) Provision of lights, plug points inside the cubicles.

(v) S&T Terminal equipment, telephone and telephone equipment.

(vi) Trench work inside the cubicles and fencing panel work on outside.

(vii) Provision of 110 v battery and battery chargers and terminal boards in the feeding stations.

(b) BOOSTER TRANSFORMER STATIONS: - The booster transformer stations will be complete in all respects, in accordance with the specifications. The work however shall include:

(i) Filling up and leveling of the ground to the extent necessary including the supply of booster transformers and other equipments indicated in Annexure-4.

(c) L.T. supply transformer station shall be complete in all respects in accordance with the specifications. The work shall however include:

(i) cable and cable connections in L.T. side like at switching stations where this is excluded as a part of switching station work.

(ii) supply of L.T. supply transformer or cut fuse switch and other equipment as listed in Annexure-4.

2.1.42 CLEARANCES: - No part of the installations which is live at 25 KV shall be erected at a height less than 3 m from the datum level. Clearance between any part live at 25 kV and any part at earth potential (or part likely to be earthed) shall not normally be less than 500 mm. This clearance may be reduced under special circumstances but in no case static clearance shall be less than 320 mm and any dynamic vertical and horizontal clearance 270 mm and 220 mm respectively. The clearance between any part live at 3 KV and any part at earth potential (or part likely to be earthed) shall be not less than 150 mm under static condition and 70 mm under dynamic conditions.

2.1.43 SETTING OF GANTRIES: - The gantries are normally aligned parallel to the track. The minimum distance of the face of the gantry from the center line of the nearest track is referred to as the setting of the gantry. The setting shall normally be 3.5 m. Setting of the individual gantries of different stations will be furnished by the Purchaser.

2.1.44 DATUM LEVEL: - The datum level will be furnished level of the gantry mast foundation. All vertical dimensions shall be stated with respect to this datum level. Datum levels of individual stations will be indicated on the location and connection diagrams.

2.1.45 MOUNTING OF EQUIPMENT AND BUSBAR ARRANGEMENT
(a) The interrupters and isolators shall be mounted in such a way that these can be manually operated conveniently by a person standing in the ground. The indicators showing the 'OPEN' or 'CLOSED' position of the equipment shall be so arranged as to be visible from out-side the fencing enclosure on the side of the main gantry.

(b) The busbar arrangement for typical switching stations is schematically indicated in a drawing included in Annexure - I.

2.1.46 FENCING & ANTICLIMBING DEVICES:- Every switching station, together with its associated control cubicle shall be enclosed by fencing except at feeding station that are located within the traction sub station premises. The fencing shall have an anti-climbing device also at top. At booster transformer and L.T.supply transformer stations suitable anti-climbing devices consisting of galvanized steel clamp fixtures shall be mounted in each most. The device shall be fitted below the transformer supporting beam or steel work. The general arrangement drawings indicating the fencing and anti climbing devices are indicated in Annexure - I. Extension to the fencing panels at Switching stations and Anti climbing device would be required.

2.1.47 NUMBERING:- Each booster transformer interrupter, potential transformer L.T. supply transformer and isolator shall carry an enameled number plate of approved design (See Annexure - I). The purchaser will furnish the actual numbers to be allocated to the various equipments as per specification No. ETI/OHE/53 (10/84) with addendum and corrigendum slip No. 3 of 12/84.

2.1.48 INTERLOCKING ARRANGEMENTS:- An interlock shall be provided between each interrupter and its associated double pole isolator to prevent operation of the isolator from the open to the closed position or vice versa unless the interrupter is locked in the open position and to prevent operation of interrupter either manually or by remote control unless the isolator is locked in the open or closed position. The interlocking device shall consist of a lock combined with an electrical contact to make or break the remote control circuit on the operating mechanism of the interrupter and a lock for the isolator operating mechanism and interlock key for the two locks.

2.1.49 EARTHING ARRANGEMENTS:-

(a) Earthing of switching stations booster transformers stations and L.T. supply transformer stations shall generally comply with the code of practice for earthing IS : 3043-1966 except where otherwise specified below:

(b) SWITCHING STATIONS

(i) At each switching station two separate and independent earth circuits shall be provided one for earthing the HT equipment and the other for earthing the L.T.equipment the general arrangement of earthing connections at a typical switching stations is shown in the relevant drawing included in Annexure - I.

(ii) EARTH CIRCUITS:- Each earth circuit shall take the form of a closed ring and shall be provided with a minimum of two earth electrodes. Each earth electrode shall consist of galvanized iron pipe, 40 mm nominal bore at least 3.1 m long provided with a spike at one end and welded lug suitable for taking minimum size of 50 mm x 6 mm mild steel flat, directly at the other. The pipe shall be embedded into the ground. The earth electrodes of the HT and the LT earth circuits shall be located as far apart as it is possible. The drawing of typical earth electrode is included in Annexure - I.

(iii) HT EARTH CIRCUITS:- The resistance to earth of the HT earth circuit shall be less than 2 ohms. If this value cannot be achieved with a maximum of four separate but inter connected earth electrodes then the additional earth electrodes shall have the surrounding earth treated with charcoal and salt filling. All masts structures, fencing uprights and equipment pedestals shall be connected by the two separate and distinct connections to the closed loop of the earth bus. earth bus and connections to it shall be of M.S flats of aluminum size 50 mm x 6 mm. Potential transformers and lightning arrestors shall be bounded to masts/structures by 25 mm x 3 mm copper strips.
(iv) LT EARTH CIRCUITS:- The LT earth circuit shall also comprise of a minimum of two inter-connected earth electrodes as described in para (iii) above and the total resistance to earth of the earth circuit shall be less than 2 ohms. This circuit will not form a part of this contract at these feedings stations that are located within the traction sub-station premises. All low tension equipment control boards, one terminal of the secondary of the potential and LT supply transformers metal casing of battery charges, each connections of 8 SWG galvanized iron wire to the LT each bus. The section of the LT earth bus shall be same as that of the HT earth circuit.

(v) EARTH STRIPS:- The earth bus and connections of HT earth circuit shall be painted with two coats of red oxide zinc chromate primer to IS: 2074 with a minimum thickness of 1.5 mils (40 microns) and with two finishing coats of bitumen 85/25 (blown grade to Is: 702 with 20% mica to a thickness of about 15 mils (375 microns) either by not application or by brushing a solution of it with suitable viscosity to obtain the thickness in minimum number of coats and buried at a depth of 300 mm below the ground level.

(vi) The earth bus of the LT earth circuit shall run along the wall fixed on wooden gutties at a height of 300 mm from the floor. The connections to equipment will run from the bus along the wall and in recesses in the floor. All recesses will be covered with cement plaster after finishing the work. The connection of earth strips to each other shall be made by 10 mm dia. steel rivets or by welding. The connections to the various items of equipment and structures of fencing posts shall be made with G.I. bolts. The earth connection to the structural members shall be made at a height of about 150 mm above the foundation.

(vii) INTERCONNECTION:- The HT and LT earthing systems shall be interconnected. In addition, at all switching stations, the HT earth shall be connected by the two independent mild steel flats each of minimum size 50 mm x 6 mm painted with two coats of red oxide zinc chromate primer to IS: 2074 and finished with two coats of bitumen 85/25 blown grade as described above, to the non-track circuited rail in a single-rail - track - circuited section and to the neutral point of an impedance bond provided by the purchaser where double - rail - track circuiting is employed so as to limit high potential gradients developing in the vicinity of switching stations in the event of fault.

(viii) Suitable modifications/extension of Earthing Circuit and Earthing arrangements at Switching stations, Booster Transformer Stations modified would be required.

(c) EARTHING SYSTEM

(i) BOOSTER TRANSFORMER STATIONS:- The earthing system shall comprise of a minimum of two inter-connected earth electrodes. The general arrangement of earthing connections at a typical Booster Transformer stations is shown in the relevant drawing included in Annexure - 1. Each earth electrode shall consist of one galvanized iron pipe 40 mm nominal bore at least 3.1 m long provided with a spike at one end and welded bug suitable for taking a minimum size of 50 mm x 6 mm mild steel flat directly at the other end. The pipe shall be embedded into the ground. The earth bus inter-connecting the two earth electrodes shall consist of a minimum size of 50 mm x 6 mm mild steel strip. Each mast of the gantry shall be connected at the bottom to this earth bus by a minimum size 50 mm x 6 M.S. Flat. The resistance to earth of the earth circuit shall be less than 2 ohms as described in para (b) (iii) above. The transformers and the lightning arrestors shall strips of size 25 mm x 3 mm. In addition the earth circuit shall be connected to the non-track circuited rail in the case of single rail track circuit or to the mid point of impedance bond in case of double rail track circuit section.

(ii) EARTH STRIPS:- The earth strips shall be painted with two coats of red oxide zinc chromate primer to IS: 2074 with a minimum thickness of 1.5 mils (40 microns) and with two finishing coats of bitumen 85/25 (blown grade to IS: 702) with 20% mica to a thickness of about 15 mils (375 microns) either by hot application or by brushing a solution of it with suitable viscosity to obtain the thickness in minimum number of coats and buried at a depth of 300 mm below the ground level. The connection of earth strips to each other shall be made by 10
mm dia steel rivets or by welding. The earth connections to the structural members shall be made at a height of about 150 mm above the foundation.

(d) L.T. SUPPLY TRANSFORMER STATIONS:- The earthing arrangement of a pole mounted LT supply transformer station shall comprise inter-connected earth electrode/electrodes having a resistance not exceeding 10 ohms. If this value cannot be achieved with two electrodes addition 1 electrode shall have surrounding earth treated with charcoal and salt filling. The transformer and lightning arrester shall be connected to the supporting structure by means of 2 independent connections at the top by means of 50 mm x 6 mm copper strip. At the bottom the steel structures shall be connected to the inter-connected earth electrodes and to the nearest traction rail by means of two independent connections of mild steel flats having a minimum size of 50mm x 6mm. In addition the earth electrode should be connected to the traction rail by means of a minimum size of 50 mm x 6 mm mild steel flat. The mild steel flat shall be painted with two coats of red oxide zinc chromate primer to IS: 2074 with a minimum thickness of 1.5 mils (40 microns) and with two finishing coats of bitumen 85/25 (blown grade to IS: 702 with 20% mica to a thickness of about 15 mils (375 microns) either by hot application or by brushing a solution of it with suitable viscosity to obtain the thickness in minimum number of coats.

2.1.50 CABLE CONNECTIONS

(a) All PVC cables provided out-door shall be either laid in the trenches or neatly clamped to the structures as approved by the Purchaser. Extra PVC cable would be required for Interrupters Booster Transformers in the Switching Stations.

(b) TERMINATION OF CABLES:- The cable shall be terminated neatly and all the cores arranged and dressed properly. Suitable indexed terminal strips or ferrules shall be provided at all terminals to facilitate maintenance.

***********
## FOUNDATIONS

<table>
<thead>
<tr>
<th>Para No.</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2.1</td>
<td>Scope</td>
</tr>
<tr>
<td>2.2.2</td>
<td>Design of Foundations</td>
</tr>
<tr>
<td>2.2.3</td>
<td>Bearing Pressure</td>
</tr>
<tr>
<td>2.2.4</td>
<td>Concrete</td>
</tr>
<tr>
<td>2.2.5</td>
<td>Size and grading of aggregate</td>
</tr>
<tr>
<td>2.2.6</td>
<td>Sand cored foundations</td>
</tr>
<tr>
<td>2.2.7</td>
<td>Sinking of concrete shells</td>
</tr>
<tr>
<td>2.2.8</td>
<td>Types of foundation in black cotton soil</td>
</tr>
<tr>
<td>2.2.9</td>
<td>Cement</td>
</tr>
</tbody>
</table>
2.2.1 **SCOPE:** This chapter deals with the designs of foundations and anchor blocks for traction structures carrying overhead equipment (including those of bridges), structures at switching stations and booster stations and other concrete work. It also deals with the specification for concrete.

2.2.2 **DESIGN OF FOUNDATION**

(a) **SOLID PRESSURE**

For design of foundations for traction structures carrying overhead equipment the Contractor shall determine the type and allowable bearing pressure of soil at suitable intervals and adopt the type and mix of foundations, suitable for particular locations 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 the Purchaser. Soil bearing pressure, using SPT (Falling weight equipment) should be determined generally for every 5 Kilometer interval or less wherever change of soil is encountered. In general IS code of practice (IS: 6403) should be followed. In addition at every 250 mm the solid bearing pressure should be determined by dial gauge type penetrometers. Dial gauge type penetrometers shall also be made available by the Contractor at each foundations site so as to facilitate cross check at each individual location. For design of foundations 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:** Foundations for traction structures carrying overhead equipment shall be either of the side bearing, side gravity or medium gravity new pure gravity type according to their location, formation of the sub grade and bearing pressure of the soil. In new filled up soil or cinder. formation, pure gravity sand-filled core foundations or foundations with cost-in-situ reinforced concrete piles or cantilever types foundation with counter weights or guyed foundations may be adopted.

(c) **ON BRIDGE PIERS:** Complete design of foundations for traction structure on bridges to suit different locations and local conditions will be furnished by the Purchaser.

(d) **MASTS 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 on consolidated soil if the depth of unconsolidated soil is less than 1.5 ms 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 new pure gravity and side gravity type foundations are included in the drawings listed in Annexure - 1. Employment schedules for standard foundations for traction structures for various locations and types are also included in the drawings listed in Annexure - 1 Part - IV.

(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 pile foundations of under reamed type as per RDSO's standard designs (Reference RDSO's Drawing No. ETI/C/006 2 Mod. 'A') 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 L.T. 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 EARTH PRESSURE

(a) GUIDING INFORMATION:- Subject to Para 2.2.2 (a) above, the following allowable bearing pressures may generally be expected for various kinds of soil. The information is given for general guidance only.

i) Average good soil in banks and cuttings 11,000 kg/sqm

ii) Moorum soil in cuttings 22,000 kg/sqm

iii) New Banks and bad soils in banks and cuttings 5000 kg/sqm

iv) Black cotton soil pure gravity foundations 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/sqm the depth of the foundation block being not less than 2.8 m. In the case of wet black cotton soil the soil should be subjected to a bearing pressure as close as possible but not exceeding 8000 kg/sqm. 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:- For all OHE/Feeder/Switching stations, Concrete for foundations shall be nominal mix of grade M.15 obtained by mixing cement, coarse aggregate, fine aggregate and water in accordance with proportions given vide Table 3 of IS: 456.1978 reproduced below. For grouting, muffing, embedding of structures in foundations and for cable trenches at switching stations also nominal mix concrete M.20 obtained by mixing materials in proportions as indicated in Table 3 of IS: 456 -1978 shall be used. Volume batching may be adopted vide clause 9.2.2 of IS: 456 - 1978 reproduced below:

IS: 456-1978

TABLE - 3 : PROPORTIONS FOR NOMINAL MIX CONCRETE
(Clauses 8.3, 8.3.1. and 8.3.2)

<table>
<thead>
<tr>
<th>Grade of Concrete</th>
<th>Total quantity of aggregate by mass per 50 kg of Cement to be taken as the sum of the individual masses of the fine and coarse aggregates max</th>
<th>Proportion of fine aggregate coarse aggregate (by mass)</th>
<th>Quantity of water per 50 kg of cement mass</th>
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<tbody>
<tr>
<td>M5</td>
<td>800 KG Generally 1:2 but subject to an upper limit 60 Litres</td>
<td>1:2 but subject to an upper limit 60 Litres</td>
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<tr>
<td>M 7.5</td>
<td>625 1:1 1/2</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>M 10</td>
<td>480</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>M 15</td>
<td>350</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>M 20</td>
<td>250</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

NOTE:
1. The proportions of the fine to coarse aggregate should be adjusted from upper limit to lower limit progressively as the grading of the fine aggregate becomes finer and the maximum size of coarse aggregate becomes larger Graded coarse aggregate shall be used.

2. For every 50 m³ of concrete casted, sample three test cubes of size 15x15x15 cm shall be made and shall be tested for crushing strength after 28 days at Railway Engineering Workshops at Arakkonam (or )Govt. accredited Test Lab of any Govt./Govt aided engineering institute/colleges. The cost involved shall be borne by the contractor. Further, without the test results for each 50 m³ sample, payment for foundation for that batch will not be made.
Example: For an average grading of the fine aggregate (that it is zone II of Table 4 of IS: 383-1970*) the proportions shall be 1:2 1/2, and 1:2 for maximum size of aggregate 10 mm and 20 mm respectively.

* Specification for course and fine aggregates from nature sources for concrete (second revision)

"In case uniformity in the materials used for concrete making has been established over a period of time, the proportioning may be done by volume batching, provided periodic checks are made on mass/volume relationships of the materials where weight batching is not practicable the quantities of fine and coarse aggregate (not cement) may be determined by volume. If the fine aggregate is moist and volume batching is adopted allowance shall be made for bulking in accordance with IS: 2386 (Part-iii) - 1973".*

---------------------------------------------------------------------------------------------------------------

**Method of test for aggregate for concrete Part-III specific gravity, density, voids, absorption and building.**

---------------------------------------------------------------------------------------------------------------

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 of Plain and Reinforced Concrete, IS: 456 - 1978. The crushing strength of concrete shall not be less than the limits given below:

Crushing strength of 15 cm cubes by works test.

<table>
<thead>
<tr>
<th>Concrete</th>
<th>At 7 days age</th>
<th>At 28 days age</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) M.10</td>
<td>70 Kg/cm²</td>
<td>100 Kg/cm²</td>
</tr>
<tr>
<td>b) M.15</td>
<td>100 Kg/cm²</td>
<td>150 Kg/cm²</td>
</tr>
</tbody>
</table>

NOTE: (a) Test specimen of works tests shall be taken at the site of work from mixture of concrete ready for pouring into the foundation hole. All tests shall be carried out in accordance with IS: 516 1969 or its latest version. The sample of concrete from which test specimens are made shall be representative of the entire batch.

(b) Age is reckoned from the day of casting.

2.2.5 SIZE AND GRADING OF AGGREGATES:- The graded coarse aggregate 20 mm nominal size table 2 of IS: 383-1970) shall be used for foundation, grouting muff and embedding shall be of 20 mm graded nominal size as per table 2 of IS: 383-1970 (Specification for coarse and fine aggregate from natural sources for concrete). Fine aggregate shall be graded from 10 mm 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 hemisphere 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 section of reinforced concrete shells may have to be sunk before casting concrete. The size of each shell be 1200 mm outside dia * 50 mm thick * 600 high reinforced with 6 mm (1/4") dia rods spaced 150 mm apart, both longitudinally and circumferentially the concrete shall be of grade M. 15 as per provisions of para 2.2.4.

2.2.8 TYPE OF FOUNDATION BLACK COTTON SOIL:- Types of foundations 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 structure should of Ordinary Portland Cement to IS:269 of latest version or Portland Pozzolana cement (fly ash based) as per IS: 1489,Pt-I,1991 ,3rd rev or its latest version

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## PART - II
### CHAPTER - III
### STRUCTURES

<table>
<thead>
<tr>
<th>Para No.</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3.1</td>
<td>Scope</td>
</tr>
<tr>
<td>2.3.2</td>
<td>Types</td>
</tr>
<tr>
<td>2.3.3</td>
<td>Design</td>
</tr>
<tr>
<td>2.3.4</td>
<td>Cantilever masts</td>
</tr>
<tr>
<td>2.3.5</td>
<td>Anchor masts</td>
</tr>
<tr>
<td>2.3.6</td>
<td>Head spans</td>
</tr>
<tr>
<td>2.3.7</td>
<td>Portals</td>
</tr>
<tr>
<td>2.3.8</td>
<td>Structures on Bridges</td>
</tr>
<tr>
<td>2.3.9</td>
<td>Special structures</td>
</tr>
<tr>
<td>2.3.10</td>
<td>Setting of Structures</td>
</tr>
<tr>
<td>2.3.11</td>
<td>Numbering of Structures</td>
</tr>
<tr>
<td>2.3.12</td>
<td>Steel work for switching stations and gantries.</td>
</tr>
</tbody>
</table>
2.3.1 SCOPE :- This chapter deals with the design of steel structures and steel work for overhead equipment, switching stations, booster transformer stations and L.T. supply transformer stations and the specifications for steel and pre-stressed concrete trial mast.

2.3.2 TYPES:- Structures and gantries may consist of any or more of the following types:
   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 accrued by means of holding down bolts.

2.3.3 DESIGN
   (a) STEEL STRUCTURES:- Designs for steel structures shall, except where otherwise provided, comply with the Indian Standard Code of Practice for use of Structural Steel in General Building Construction - IS: 800-1984. The thickness of smallest steel section used shall be 5 mm for galvanized members.
   (b) All the steel structures and small part steel for carrying overhead equipment are to be fully galvanized after drilling and fabrication as per Specification ETI/OHE/13 (4/84) with A & C slip No. 3 of 4/90 and no painted structures are to be used.

2.3.4 CANTILEVER MASTS
   (a) LOAD:- For purposes of design the 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/metre)
      v) The effect of feeder, return conductor or other special equipments wherever they occur eccentricity of vertical and horizontal loads on the bracket due to variation in temperature.
      vi) Wind loads perpendicular and parallel to the track. The wind pressure adopted shall be taken as that indicated in Part-III.
      vii) Radial forces on the mast, due to stagger, curvature anchorage etc.
      viii) Weight of the mast itself.
      ix) Any other load or loads that may occur due to the special location of the structures.
   (b) DEFLECTION: Notwithstanding the provisions contained in IS: 800-1984 referred to in Para 2.3.3. above regarding permissible deflection, the following shall apply.
      i) The deflection at the top of the mast due to permanent loads shall not exceed 3 cm and the mast shall be so erected that it becomes reasonably vertical after application of permanent loads.
The additional deflection under maximum wind pressure shall not exceed 3 cm at the level of the contact wire.

(c) TORSION:- The torsional rotation of the mast due to permanent loads shall not exceed 0.1 radian.

(d) TYPICAL DESIGN:- The typical design of a traction mast is included in the set of standard drawings listed in Annexure - 1 Part IV. Employment schedules for standard masts for various locations and types and included in the standard drawings listed in Annexure-1, Part IV to enable selection of suitable type for different locations 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:- (See paras 2.1.21 and 2.4.19)

(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 span.

(c) MINIMUM TENSION IN CROSS SPAN AND STEADY SPAN WIRES:- 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 MASTS:- Deflection at the top of the mast of structure shall be limited to one-eightieth (1/80) of its height above foundation.

(e) TYPICAL DESIGN:- Typical design for head span mast carrying overhead equipment for 4 tracks will be furnished to the contractor.

2.3.7 PORTALS:- (See 2.1.21)

(a) GENERAL:- Portals shall be of fabricated steel of standard types to purchaser's designs. The most important designs are covered by Drawings listed in Annexure-1, Part IV.

(b) LOAD:- The loads shall be as detailed in Para 2.3.4 (a) as applicable.

2.3.8 STRUCTURE AT BRIDGES

(a) The structures may be either cantilever masts or portals (hinged or fixed at base) depending on the type and condition or bridge pier capping. As far as possible cantilever masts grouted in foundations 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.

2.3.9 SPECIAL STRUCTURES:- In the case 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-I, Part IV. Minimum setting of structures shall be 2.5 m plus curve allowance as required. Whenever this distance can not be provided specific approval of purchaser shall be obtained before erection. Setting of portal upright overlap/turnout structures anchoring structures and other masts carrying more than one OHE will be 3.0 m wherever possible.

(c) EXTRA CLEARANCE ON 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-1, Part-IV.

(d) STRUCTURE WITH COUNTER WEIGHT:- In case of structures carrying counter-weight assemblies the term "setting" shall refer to the minimum distance of the counter weight from the track center under the worst conditions of wind.

(e) STRUCTURE OF PLATFORM:- The setting of structures at 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-1, Para-IV.

(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 a marked on the mast/structure by a horizontal red painted stroke.

2.3.11 NUMBERING OF STRUCTURE CARRYING OVERHEAD EQUIPMENT:- All structures shall be numbered in accordance with the numbering given in the approved overhead equipment layout plans. Enamelled number plates shall be provided on each mast or structure as per approved designs (See Annexure-1 Part-IV).

2.3.12 STEEL WORK FOR SWITCHING STATIONS &GANTRIES

(a) HORIZONTAL MEMBERS OF GANTRY:- Horizontal members of main as well as auxiliary gantry carrying isolator switches, insulators, potential transformers etc. shall be made from steel sections viz. channels, angles and small joists single or fabricated. They shall preferably be attached to by means of clamps to avoid drilling of mast 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, busbars 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 structures due to anchorage and radial tension (where applicable)

v) Wind load on the different structures conductors and equipment. The wind pressure shall be taken as that indicated in Part-III.

vi) Weight of men working on the structures.

vii) Weight of structure itself.

viii) Erection loads

ix) Any other load or loads which may occur due to special equipment wherever they occur.
(c) TENSION OF CONDUCTORS:- For purpose of design, the maximum tension of different conductors without wind load, shall normally be as under;

i) Deleted

ii) 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

iii) Maximum tension in longitudinal feeders running parallel to the track at the switching stations under worst conditions. 1,500 kgf

iv) Tension in anchored overhead equipment in case of sectioning and paralleling - 2,000 kgf

(d) DEFLECTION OF GANTRY MASTS:- Deflection under the permanent loads (at an average temperature of 35 degree C without wind) at the top of the fabricated structures of mast shall be limited to one eightieth (1/80) of its height above foundation.

(e) Masts of the gentry at which feeder or overhead equipment will be anchored at the switching stations shall normally be provided with suitable guys, but struts shall not be permitted.

(f) CHAIRS AND BRACKETS:- Chairs, brackets and supporting steel work carrying potential transformers, lightning arrestors, insulators etc. shall be made of fabricated steel and be mounted on the main auxiliary gentry preferably by means of clamps to avoid drilling of mast sections.

(g) UPRIGHTS AND FENCING POSTS:- Uprights carrying operating handles of isolators and fencing post shall be made from steel sections viz. channels, angles or small joists either single or fabricated.

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<table>
<thead>
<tr>
<th>Para No.</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4.1</td>
<td>General</td>
</tr>
<tr>
<td>2.4.2</td>
<td>Compliance with standard specification</td>
</tr>
<tr>
<td>2.4.3</td>
<td>Quality Assurance</td>
</tr>
<tr>
<td>2.4.4</td>
<td>Prototype tests</td>
</tr>
<tr>
<td>2.4.5</td>
<td>Inspection and tests</td>
</tr>
<tr>
<td>2.4.6</td>
<td>Test certificates</td>
</tr>
<tr>
<td>2.4.7</td>
<td>Bulk manufacture</td>
</tr>
<tr>
<td>2.4.8</td>
<td>Inter change ability</td>
</tr>
<tr>
<td>2.4.9</td>
<td>Technical specifications</td>
</tr>
<tr>
<td>2.4.10</td>
<td>Nomenclature and marking</td>
</tr>
<tr>
<td>2.4.11</td>
<td>Steel work and protection against rust</td>
</tr>
<tr>
<td>2.4.12</td>
<td>Bracket assembly components</td>
</tr>
<tr>
<td>2.4.13</td>
<td>Droppers</td>
</tr>
<tr>
<td>2.4.14</td>
<td>Insulators</td>
</tr>
<tr>
<td>2.4.15</td>
<td>Ending fitting and splices</td>
</tr>
<tr>
<td>2.4.16</td>
<td>Electrical connections for overhead equipments</td>
</tr>
<tr>
<td>2.4.17</td>
<td>Terminal connection for other equipments</td>
</tr>
<tr>
<td>2.4.18</td>
<td>Regulating equipment</td>
</tr>
<tr>
<td>2.4.19</td>
<td>Head span construction</td>
</tr>
<tr>
<td>2.4.20</td>
<td>Isolator</td>
</tr>
<tr>
<td>2.4.21</td>
<td>Insulation level</td>
</tr>
<tr>
<td>2.4.22</td>
<td>Busbars (at switching stations, booster stations and gantries)</td>
</tr>
<tr>
<td>2.4.23</td>
<td>Cabling</td>
</tr>
<tr>
<td>2.4.24</td>
<td>Literature of equipments</td>
</tr>
</tbody>
</table>
PART - II
CHAPTER - IV

EQUIPMENTS, COMPONENTS & MATERIALS

2.4.1 GENERAL:- This chapter deals with the details and specifications of the equipments, components and materials to be used for traction overhead equipment, switching stations, booster transformer stations and L.T. supply transformer stations. This chapter does not cover structures and foundations which are dealt with in Part II Chapter II and III. In general based on the specifications issued by various bodies, such as Indian Standard Institution, British Standards Institution etc. Specifications have been issued by the Purchaser. Such specifications may be bought separately from the Office of the Purchaser. All those specifications are included in the set of drawings and specifications referred to in para 1.1.10.

2.4.2 COMPLIANCE WITH STANDARD SPECIFICATION:- In the technical specifications of equipments components and materials, references are made to the following standard specifications:
   ii) British standards (abbreviated as BS)
   iii) Indian Standards (abbreviated as IS)
Tenderers may however offer equipment in accordance with the appropriate national standard specifications of the country of manufacture but such officers will be treated as deviations and should be quoted for in the manner specified in para 1.1.7 (d). English rendering of the text and illustrations to the national deviations from IEC, Britain or Indian Standards in question shall also be submitted in Form 3. In case of doubt the Purchaser shall decide the clause and specification applicable and the contents of the specification and standard mentioned above shall guide such decisions.

2.4.3 QUALITY ASSURANCE:- The provisions of Part I for quality assurance will apply including facilities to be provided by the manufacturer (para 1.2.25).

2.4.4 PROTOTYPE TESTS
   (a) FITTING, COMPONENTS AND MATERIALS:- All the fittings, components and materials to be supplied by the Contractor in terms of this contract the requisite number of prototype of components shall be supplied free of cost to the Purchaser for tests and approval. The tests will be conducted in a laboratory selected by the Purchaser.
   (b) EQUIPMENTS: 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 equipments as indicated in the individual specifications referred to in para 2.4.1 above, in the presence of the Purchaser's representative. The Contractor shall arrange to get these conducted at his own cost.
   (c) RESPONSIBILITY:- Any testing and approval by the Purchaser of proto types 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 PROTOTYPE TESTS:- If prototype samples of equipments, components or fittings or any manufacturer have already been approved in connection with the electrification of other sections of Indian Railway on the 25 KV 50 Hz single phase AC system prototype samples of such equipments, 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 prototype tests will be communicated to the Contractor as expeditiously as possible any delay in the respect will be ground for extension of time for completion under para 1.2.45.
2.4.5 INSPECTION TESTS:- These comprise inspection and tests conducted at the manufacturer’s factory for ensuring quality of manufactured items as part of the quality Assurance Programme. Acceptance test for all types of insulators shall be done by RDSO’s authorized inspection authority.

2.4.6 TESTS CERTIFICATES:- Three copies of the test certificates of successful prototype tests carried out at the manufacturer’s factory on all equipments shall be furnished to the Purchaser within a month after completion of the prototype tests. Three copies of the routine tests carried out on each equipment shall also be furnished after the equipment is passed by the Purchaser’s representative for inspection (See para 1.2.25).

2.4.7 BULK MANUFACTURE:- Bulk manufacture may be undertaken only after specific written approval of the Purchaser or his representative has been obtained indicating that tests on the prototypes are satisfactory. Where proto types have already been approved in connection with it manufacturer may proceed after exemption from proto type tests is received from the Purchaser in writing.

2.4.8 INTERCHANGEABILITY:- All equipments components and fittings shall be inter-changeable and supplies shall be in accordance with the Purchaser’s designs 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 3.

2.4.9 TECHNICAL SPECIFICATIONS:- The following specifications (latest revision) will govern the supply and testing of important materials components and equipments:

- Structural steel
  - IS: 2062 - 1992
  - IS: 800 - 1984
  - IS: 808 (Pt.II) 1978
  - IS: (Pt.III) 1979
  - (Pt. IV) 1976
  - (Pt. VI) 1976

- Tensile testing
  - IS: 1731 - 1971
  - IS: 2004 - 1978
  - IS: 1608 - 1972 for steel products etc

- Welding Disc.
  - IS: 816 - 1969

- Insulator
  - IS: 731 - 1971
  - IS: 318 - 1980

- Dropper wire
  - IS: 282 - 1982

- Annealed copper jumper wire
  - IS: 9968

- Al. Jumper wire
  - IS: 694 (Pt.II) - 1977

- All aluminum conductor
  - IS: 398 (Pt.I) - 1996

- Material for aluminum tubular busbar
  - IS: 5082 - 1998

- Dimensions for Aluminum Tubular Busbar
  - IS: 2673 - 1979

- Galvanized stay strand
  - IS: 2141 - 1992

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

- Tin bronze castings
  - IS: 306 - 1983

- Aluminum bronze castings
  - IS: 3091- 1965

- Malleable iron castings
  - IS: 2108 - 1977

- Grey iron castings
  - IS: 210 - 1993

- Aluminum castings
  - IS: 617 – 1994 (Grade 4600)

- Copper strip for formed fittings
  - IS: 1897 - 1983

- Components etc.,
  - IS 191 – 1980 (Pt 1 to Pt 10 )

- Cadmium copper conductor
  - ETI/OHE/50 (6/97) with

- for overhead Rly. Traction
  - A & C slip No. 1 of 6/97.

- Contact wire
  - ETI/OHE/76 (6/97) with A&C slip No. 1 of (4/2001)
Annealed copper stranded conductors | ETI/OHE/3 (2/94) with A & C slip No. 1 Jumper wires of (4/95)  
Copper bus bar | RE/30/OHE/5 (11/60); IS: 613 - 1984  
Structural steel tubes | ETI/OHE/11 (5/89)  
Hot dip galvanization of steel masts (Rolled and fabricated) tubes and fittings used on 25 KV AC OHE | ETI/OHE/13 (4/84) with A&C slip No. 1 of (5/86) 2 of (4/90) & 3 of (4/90) QAS – 5/86  
25 KV single and double pole isolator | ETI/OHE/16 (1/94) with A&C slip No. 1(6/2000)  
Aluminum Alloy section & tubes | ETI/OHE/21 (9/74)  
Standard drawings for traction overhead equipment | RE/OHE/25 (3/66)  
Enamed steel plates | ETI/OHE/33 (8/85)  
Galvanized steel wire | ETI/OHE/36 (12/73) with A&C slip No.1 of (5/98)  
Galvanized steel fittings for 25 kV 50 Hz Ac traction equipment | ETI/OHE/49 (9/95) with A&C slip No.1 to 4  
7.5 KV lightning Arrestor | ETI/PSI/3 (8/75) with cs.1  
25 kV, 150 kVA, 50 Hz Single phase oil filled Booster Transformer | ETI/PSI/98(6/87) with A&C slip no. 1 of 9/88  
25 kV (280 KVA) 50 Hz, single phase oil filled Booster Transformer | ETI/PSI/79 (1/87) with A&C slip No. 1 of 9/88  
25 KV Drop out fuse switch & operating pole for use with 10 KVA & 100 KVA 25 KV/ 240 V LT supply Transformer | ETI/PSI/14 (1/86) with A&C slip No. 1 of 4/87  
110 V lead Acid Battery 40 ah. | ETI/PSI/21 (6/81) with A&C slip No. 1 of 7/81  
110 V 40 AH battery charger | ETI/PSI/1 (6/81)  
Envelope type and Fittings for aluminum Alloy stranded conductors | Draft AL OHE/27 (4/78)  
Aluminum alloy stranded catenary wire 19/2.79 MM | ETI/OHE/54 (2/85) with A&C slip no. 2  
Bi-metallic (Al-Cu) strip Termination arrangement of OHE with | ETI/OHE/55 (4/90) ETI/OHE/G/04212  

### 2.4.10 NOMENCLATURE & MARKING

(a) 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.

### 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, 2 & 3.
(b) **PAINTING:** Some components or parts may, with the approval of the Purchaser, be protected only by paint and parts so 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 No. 1,2 & 3, 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.

(d) "Forged steel fittings have to be used in lieu of MCI (Malleable Cast Iron) fittings for the cantilever assembly, counter weights, regulating equipments and terminations etc as per the latest approved RDSO drawings and approved suppliers list. The forged steel items approved by RDSO/CORE only to be used."

### 2.4.12 BRACKET ASSEMBLY COMPONENTS

(a) **ARRANGEMENT 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 or 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 the tubes shall be such that there is a length of about 200 mm beyond the catenary suspension bracket to facilitate adjustment during track maintenance (See 2.6.10 (b).

(c) **TUBULAR STAY ARM**

Steel tubes with adjustable steel rod 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 end and eye arrangement shall be used at the bracket end to permit free movement in every directions.

(e) **STEADY ARM**

Steady arm shall normally be fitted in all cantilever 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 split galvanized steel redoing. The contact wire shall be fixed by a simple swivel clip with the steady arms. Steady arms shall normally be 1.0 m long; but for special locations such as turnouts, diamond crossings etc. steady arms shall be long as indicated in the relevant drawings listed in Annexure - 1 Part-IV. Bent steady arms of aluminum alloy tube conforming to Spec. ETI/OHE/21 (9/74) shall busied for neutral section overlap and in the central masts of a 4 span insulated overlap.

(f) **BRACKET FOR UNREGULATED TRAMWAY TYPE EQUIPMENT**

Brackets provided on cantilever masts for tramway type unregulated equipment shall normally span two tracks and the contact wires 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 (See para 2.1.13)

(a) **GENERAL DESIGN**

The droppers shall generally be designed as shown in standard drawings and made of copper wire about 5 mm diameter conforming to IS: 282, and shall be attached to the catenary wire by a copper dropper clip. The contact wire shall be held by clip of aluminum bronze as shown in the standard drawings. The distribution of dropper shall be in accordance with standard designs.

(b) **LOADING**

The droppers shall be able to withstand a vertical load of 200 kg at the point of attachment to the contact wire and the clip shall not slide under a horizontal load of 120 kgf.

(c) **Permissible tolerance in the overall length of a dropper will be ± 5 mm.**

### 2.4.14 INSULATORS
(a) All insulators except Disc type insulators those on return conductors 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 ETI/OHE/15 (9/91) A&C slip no. 1,2&3.

(b) INTERCHANGEABILITY:- For free interchangeability 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 dimension 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-Tonne insulators: These will be used for Anchoring of OHE conductors.

iv) Solid core post insulators: These will be used at all places for supporting isolator mechanisms, busbars, jumpers etc of 25 KV.

v) Disc insulators 255 mm: Clevis type 255 mm disc insulators will be used for return conductor suspension and for earth wire cut-in-insulator.

vi) 11 KV post insulators: These will be used at all places for supporting busbars, jumpers etc. in conjunction with return conductor/return feeders.

2.4.15 ENDING FITTINGS AND SPLICES

(a) GENERAL DESIGN:- 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 of wedge type. The arrangements shall be easy to install and also be such as would apply the clamping pressure gradually without shock (See ETI/CHE/49 (9/95) A&C slip no. 2. For Aluminum Alloy/Pure Aluminum Conductor and fittings shall be either cone type / strain type or any other type as approved by the Purchaser.

(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 wires.

(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 thefts or railway accidents.

(d) STRENGTH OF ASSEMBLED FITTINGS:- The strength of fittings assembled with appropriate conductors or wires shall be not less than that of the conductor or wire itself.

(e) ADDITIONAL TERMINATING WIRES:- Cadmium copper stranded wire of 65 sq mm nominal section or 130 sq mm 37/2.1 mm (as used in headspan 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-1

(b) JUMPERS:- 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&C slip no. 1 (4/95)

ii) Small jumper of annealed copper in accordance with the specification ETI/OHE/3 (2/94) A&C slip no. (4/95)

iii) Aluminum jumpers, wherever used, shall be of all aluminum stranded conductor 19/7/1.4 mm conforming to IS: 8130

(c) BUSBARS:- Busbars or rigid jumpers of copper where used shall be of 18 mm copper rod in accordance with RE/30/OHE/5 (11/60). IS 613: 1984 Aluminum busbars wherever used shall be of 36/28 mm tubing (See 2.4.22). Aluminum tubular busbars shall be made of Al. alloy grade 63401 (WF condition) to IS: 5082-1981. The tolerance on diameter and thickness shall be as per class I, IS: 2673-1079.

(d) FEEDERS:- Feeders shall be of all aluminum conductor 19/3.99 mm (SPIDER) or 37/2.25 mm of stranded copper feeder wire of 150 sq.mm

(e) RETURN CONDUCTORS:- The return conductors shall be of all aluminum conductor 19/3.99 mm (SPIDER). The arrangement of return conductors carried on traction structures is shown in a drawing listed in Annexure-1, Part-IV.

(f) The general characteristics of all wires and conductors is included in a drawings listed in Annexure-1, Part-IV.

(g) Earth wire shall be of steel reinforced aluminum conductor 7/4.09 mm (RACCOON) conforming to IS: 398 (Part-II) - 1976.

2.4.17 TERMINAL CONNECTORS FOR EQUIPMENTS:- Isolators, interrupter, potential Transformer line indication type, lightning Arrestor, Fuse Switch, Booster Transformer and LT supply Transformer shall be supplied by the Contractor along with the terminal connectors suitable for taking jumper / busbar as required. However, strips shall be provided by the Contractor for bimetallic connections wherever required.

2.4.18 REGULATING EQUIPMENT

(a) GENERAL:- A general arrangement is shown in the standard drawings listed in Annexure-1, Part-IV. The regulating equipment should have a minimum adjustment range of 950 mm. Stainless steel wire rope in accordance with ETI/OHE/14 (9/94) A&C slip no. 5 shall be used in these equipments and these shall be sufficiently flexible for the purpose.

(b) COUNTER WEIGHTS:- Counter weights and arrangements used shall be such that these could be accommodated within 330 mm (13 in) measured transverse to the track under worst condition of wind. The vertical upward movement shall be limited with a fixed top.

(c) REDUCTION RATIO:- Reduction ratio in the arrangement used shall be three for three pulley type.

Note: The 3 pulley type regulating equipment should be procured as per the latest RDSO specification No TI/SPC/OHE/ATD/0060 dated 08-09-2006.

2.4.19 HEADSPAN CONSTRUCTION:- (See also para 2.1.21 and 2.3.6)

(a) SIZE AND FACTOR OF SAFETY:- All span wires used in headspan construction shall be of stranded cadmium copper conductor 65 sq mm or 130 sq mm cross section. All the wired 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 headspan, cross span and steady span, wires to ensure electrical independence between the equipment in different elementary electrical sections.

2.4.20 ISOLATORS:- 25 KV Isolator switches shall comply with specification as indicated in para 2.4.9.
2.4.21 **INSULATION LEVEL:** Interrupters, Potential Transformers line indication type, 42 KV Lightning Arrestors and their equipment shall be suitable for insulation levels indicated in the relevant specifications.

2.4.22 **BUSBARS**

(a) No splicing will normally be allowed in the tubular busbars unless the length of the busbar exceeds 6 m.

(b) **GENERAL:** The busbar 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 busbars caused by temperature variation. The open ends of busbars shall be covered by suitable tube caps, wherever the tubular busbars are required to be bent the radius of the bend shall be not less than 200 mm.

(c) **JOINTS:** The joints in busbars shall be mechanically and electrically sound so that the temperature rise under normal working conditions does not exceed 40 degree C for an ambient temperature of 65 degree 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 busbars with bi-metallic connectors.

2.4.23 **CABLING**

(a) **CABLE FOR LT SUPPLY:** 240 VAC supply from LT supply transformer at Switching stations shall be brought and terminated on the L.T. AC distribution board in the remote control cubicles at the switching stations by XLPE insulated PVC sheathed aluminium conductor armoured power cable of aluminum cable of size 2 core x 70 sq. mm as per ISS: 7098 heavy duty, 1100 V with IS markings (for 10 kVA LT Transformer). All indoor wiring on walls shall be taken through PVC conduct pipes neatly fixed. The pipes shall be of ISI make and appropriate size.

(b) **CONTROL INDICATIONS CIRCUITS**

All other cables for control and indication at switching stations shall be 1100-V grade PVC insulated and sheathed unarmoured (heavy duty) complying with (IS: 1554 (Part I) 1976). RDSO/CORE specification The cables shall be provided as indicated in the Table below:

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Run</th>
<th>Circuit Voltage</th>
<th>Core size &amp; Materials</th>
<th>No. of Cores</th>
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<tbody>
<tr>
<td>Control and Indication of</td>
<td>From each interrupter to terminal board</td>
<td>110 V D.C.</td>
<td>2.5 sq mm copper</td>
<td>10</td>
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<tr>
<td>Interrupters</td>
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<tr>
<td>Catenary indication</td>
<td>From each PT line indication type to</td>
<td>100 V</td>
<td>-do-</td>
<td>2</td>
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<tr>
<td></td>
<td>terminal Board</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heater supply</td>
<td>i) From interrupter To Interrupter</td>
<td>240 V</td>
<td>4.0 sq mm aluminum</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>ii) From each Interrupter to fuse box</td>
<td></td>
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<td></td>
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<td></td>
<td>iii) From fuse box to distribution Board</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery supply 110 V</td>
<td>i) 110 V battery charger to battery</td>
<td>110 V DC</td>
<td>2.5 sq mm copper</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>ii) 110 V battery to 15A, DC fuse box.</td>
<td>110 V DC</td>
<td>2.5 sq mm copper</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>iii) 15A, DC fuse box to terminal board</td>
<td>110 V DC</td>
<td>2.5 sq mm copper</td>
<td>2</td>
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</table>
NOTE:  
i) In case of feeding stations which are located within the traction sub station premises, the cables shall be run from individual equipment and terminated inside the sub station control room.

ii) Notwithstanding the sizes of cables give above the Tenderer shall assure himself that the various cables would suit the ratings of equipment offered by him.

(c) SPECIFICATION:- The cables shall be resistant to decay, abrasion, acids alkalis and other corrosive materials. All indoor wiring on walls shall be clamped neatly on teak wood patens fixed to the wall by means of wall plugs/wooden pegs. The cable run layout at a typical switching station is shown in the relevant drawing already included in Annexure-1.

2.4.24 LITERATURE FOR EQUIPMENT:- The Contractor shall within six months of issue of Letter of Acceptance of Tender, supply 6 copies of detailed schedule, catalogues and drawings of all parts of the equipment.
### PART - II

### CHAPTER - V

**DESIGNS AND DRAWINGS**

<table>
<thead>
<tr>
<th>Para No.</th>
<th>...</th>
<th>Subject</th>
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<tr>
<td>2.5.1</td>
<td>...</td>
<td>General</td>
</tr>
<tr>
<td>2.5.2</td>
<td>...</td>
<td>Contractor's Drawings</td>
</tr>
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<td>2.5.3</td>
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<td>Special Designs</td>
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<td>Particular Designs and working drawings of OHE.</td>
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<td>2.5.7</td>
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<td>Particular Designs and working drawings for SS and BS.</td>
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<td>2.5.8</td>
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<td>Booster and L.T. supply Transformer Station's drawing.</td>
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<td>2.5.9</td>
<td>...</td>
<td>Schedule of Quantities.</td>
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<td>2.5.10</td>
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<td>Submission of Drawings and Schedules completion drawings and schedules.</td>
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<td>2.5.11</td>
<td>...</td>
<td>Completion drawings and schedule.</td>
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<td>2.5.12</td>
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<td>Addresses.</td>
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PART - II

DESIGNS AND 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 equipments, components and materials and to enable correct and complete erection of overhead equipment, switching stations, booster transformer stations and L.T. 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 in terms of the conditions of contract.

2.5.3 STANDARDS FOR DRAWINGS:
All designs, legends notes 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) and shall be prepared preferably in CAD only.

2.5.4 BASIC DESIGNS
(a) STANDARD DESIGNS
Where the contractor adopts designs and drawings conforming to the standard designs, drawings, and specifications of the Research Designs and Standards Organisation, Manak nagar, Lucknow - 226 011 (RDSO) for basic arrangements, equipment components and fittings of traction overhead equipment, switching stations, booster transformer stations and LT supply transformer stations and adopts employment schedules furnished by the Purchaser, he shall verify such designs, drawings and employment schedules and satisfy himself that these are correct 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 outlines in Para 1.2.23 shall be followed for approval of basic designs. The contractor, for his use and reference shall obtain reproducible transparent film (50 microns) each of such standard basic arrangement, component and fittings drawings and employment schedules from Chief Electrical Engineer, Railway Electrification, Allahabad 211001 on payment as per the prescribed rates.

(b) DEVIATIONS:- Normally deviations 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 development, he shall justify his proposals with supporting explanatory design details and notes.

(c) STANDARD DRAWINGS EMPLOYMENT SCHEDULES ETC.:- Deleted.

2.5.5 SPECIAL DESIGNS
(a) In cases where standard designs, drawings or employment schedules do not cover requirement of special locations 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 by 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 proposals.

2.5.6 PARTICULAR DESIGNS AND WORKING DRAWINGS FOR OHE
(a) PURCHASER'S TRACK PLANS
The Engineering plans for section will be furnished by the Purchaser the contractor shall verify and check these plans as required at site in consultation with purchaser.
(b) CONTRACTOR'S PEGGING PLANS
If the contractor is called upon to carry out survey and prepare overhead equipment pegging plans, he shall submit such plans for approval after checking their feasibility at site.

(c) PRINCIPLES LAYOUT
The contractor shall in all cases ensure that the final pegging plans are in conformity with the latest principles of preparation and checkiness of OHE layout plans and sectioning diagram issued by RDSO.

(d) PROVISIONAL LAYOUT PLANS
The Contractor shall prepare and submit overhead equipment layout plans incorporating the following informations:

(i) The run of wires in different thickness or colour in special cases and termination.
(ii) The run or 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.
(ix) Kilometer numbers and type of structure.
(x) Location and number of switches.
(xi) Consolidated requirement of each type of masts, portals, TTC and all other steel components clearly showing the name of the supplier Railways/Contractor Similar details for contractor also to be given.
(xii) Schematic sectioning diagram drawn to convenient scale showing section insulator, number of switches, elementary sections and connections to switches and switching stations.
(xiii) Table giving reference of approved profile drawings, feeder layout plans and other relevant drawings.

(e) THE 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 overline structure, the gradient and height of the contact wire on either side of the structure and the encumbrances at structures until normal height of contact wire and encumbrances are restored.

(f) CROSS SECTION DRAWINGS:- While the layout plans are being finalized, the contractor shall submit for approval, in-so-far as yards between outer most 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 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 rods and their correct location in references 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 proforma, 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 ______________________________
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<tr>
<th>Sl No.</th>
<th>Location No.</th>
<th>CHAINAGE</th>
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124
<p>| D | SETTING DISTANCE | E | IN <code>m' | |---------------------------------|-------------------------------------------------| | T | STEP DISTANCE     | A | IN </code>m' |
|---------------------------------|-------------------------------------------------|</p>
<table>
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<tr>
<th>I</th>
<th>F.B.M. CODE</th>
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<tr>
<td>L</td>
<td>SOIL TYPE &amp; PRESSURE in Kg/Sq.m</td>
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<td>S</td>
<td>FOUNDATION TYPE &amp; SIZE</td>
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<td>MAST SIZE &amp; LENGTH IN `m'</td>
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<td>MAST EMBEDDED LENGTH `m'</td>
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<td>REVERSE DEFLECTION cm</td>
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<td>SUPER MAST LENGTH (m)</td>
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<td>CROSS ARM LENGTH (m)</td>
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<td>-------------------------------------------------</td>
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<td>ANY OBSTRUCTION</td>
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(g) **FINAL LAYOUT PLANS:-** After all the cross section drawings in a section covered by the layout plan are finalized and foundations are cast, 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.

(h) **STRUCTURE ERECTION DRAWINGS:-** The contractors 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 or 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 connections shall also be incorporated. In open line sections the contractor shall submit structure erection particulars in the typical proforma as given below separately for each main line track in addition to particular details as indicated in the proforma for cross-section drawings. Modification to this proforma is found necessary will be finalized at time of structure erection drawings.

(i) **SUB-STATION FEEDER DRAWINGS** - Deleted -
2.5.7 PARTICULAR DESIGNS & WORKING DRAWINGS FOR SWITCHING STATIONS & BOOSTER STATIONS.

(a) PURCHASER'S LOCATION PLAN ETC.

The location plans and schematic diagrams of connections for all the switching stations, booster transformer stations and L.T. supply transformer stations will be furnished by the Purchaser to the Contractor. These will indicate the following as applicable.

i) Overhead equipment layout in the vicinity of switching or other stations.

ii) Location of main masts.

iii) Arrangements of cross feeders and longitudinal feeders to be anchored on the gantry if any, including jumper connections to the overhead equipment.

iv) Scheme of connections of interrupters.

v) Position of the remote control cubicle with respect to the switching stations.

vi) Fencing outline at the switching stations.

The contractor shall satisfy himself about the correctness and applicability of the location plans given by the Purchaser before adopting them for detailed designs.

(b) DETAILED DRAWINGS:- The contractor shall submit for approval of the Purchaser the following drawings:

i) Cross-section drawings for each switching stations indicating the cross section of the formation transverse to the track at each location of main mast and longitudinal section parallel to the track along the center line of the interrupters. These drawings shall be prepared after an accurate survey at site and shall indicate the nature of the soil, its bearing capacity, compactness and in case of loose soil, transverse section of the parent soil. In the preparation of the drawings, care shall be taken to show all obstructions to be removed, such as signal wires, rods and their correct location with reference to the track/s as well as underground constructions like pipes, cables etc. after collecting such information from the site.

ii) GENERAL ARRANGEMENT DRAWINGS:- General arrangement drawings for switching stations indicating the general arrangement of all equipments, run of bus bars, position of pedestal insulators, steel frame work and fencing. The drawings shall also give in schematic connection/diagram and an isometric view of busbars and connections. The drawing shall include and elevation view of the switching station from behind, a transverse cross section and plan sectional views at the level of feeder anchors insulator beams, potential transformer beams and ground. Each drawing shall have a schedule of all equipments required at the switching station along with drawing references of details of these equipments.

iii) STRUCTURAL DRAWINGS:- Structural assembly drawing for switching stations indicating the steel frame work assembly. The drawing shall include one elevation view of the steel frame work assembly from behind, a transverse cross-section and plan views at various levels such as at the level of feeder anchors, insulator beams, isolator beams, potentials transformer beams and ground. In the assembly each component member shall be marked with its reference number. The drawing shall also have a schedule of component members along with drawings reference various members. The weight of the component members shall be indicated in a separate weight schedule. The drawings shall be prepared for the various structural components. An individual drawing shall be made for each component and this shall include all fixing bolts, nuts and washers whose sizes will be mentioned on the drawings. Unit weight of the component shall also be given in the drawings.

iv) FOUNDATION LAYOUT AND CROSS-SECTION DRAWINGS:- Foundation layout and cross-section drawings for each switching station indicating layout of all foundations in plan, transverse cross-section of various foundations through center line of main masts, interrupters, fencing uprights and L.T. supply transformers, if any, and longitudinal sections parallel to tracks through the center line of the cable trench. All foundations shall be marked serially on the drawing and listed in a schedule on the drawing indicating the volume of concrete for each foundation block.

v) FENCING LAYOUT DRAWINGS:- Fencing layout drawings for each switching station indicating the layout of the entire fencing and anticlimbing device in plan. Each upright, fencing panel and fixture on the upright shall be indicated on the drawing by its reference number. Schedule of components viz. uprights, panels, fixtures, and barbed wire shall be included in the drawings indicating the drawing references of components. An individual drawing shall be made for each type of panel,
fencing post and future for mounting the anti-climbing device. The drawing of each fencing post shall indicate the unit weight of the fencing post.

vi) EARTHING LAYOUT 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, 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 may be made and references to these drawings marked on the layout. A schedule of components shall be made out in the giving drawing references of components.

vii) CABLE RUN LAYOUT:- Cable run layout of each switching station indicating inter-connection between existing 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 the drawings.

viii) EQUIPMENT DRAWINGS

Equipment drawings applicable to all switching stations except the ones for the equipments to be supplied by the purchaser. Drawings should be dimensioned and should indicate:

1. fixing or mounting hole dimension and arrangement.
2. net weight of the equipment.
3. Characteristic and rating of equipment.
4. Circuit diagrams
5. Overall dimensions and other important dimensions.
6. height and vertical and horizontal dimensions of all exposed live parts; and
7. notes explaining the operation of the equipment.

ix) MISCELLANEOUS DRAWINGS:- Miscellaneous drawings applicable to all switching stations. These drawings shall include drawings or sketches made for study of clearances, isolator alignment details scheme of interlocks, number plates of various equipments and 'U' bolts for cable mounting, caution or instruction boards, outriggers for busbar supports and non-standard busbar connectors.

x) EMPLOYMENT SCHEDULES AND CHARTS:- Employment schedules and charts applicable to all switching stations. These will include:

1. employment schedule of pure gravity type of foundations for main masts for various direct loads and bending moments:
2. employment schedule for all other foundations for various depths of parent soil from the datum level.
3. Sag tension charts for cross feeders for various spans and tensions.

The contractor shall submit for approval to the Purchaser drawings for booster transformer stations and L.T. supply transformer stations, similar to those detailed for switching stations in 2.5.7 (b). The following drawings may, however, be combines together:

i) Cross-section and foundation Layout drawings:

ii) General arrangement, structural and earthing layout drawings.

2.5.9 SCHEDULE OF QUANTITIES

(a) Within three months of 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.2) along with the corresponding quantity of various fittings and components included in Schedule 3 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 re-assessment is approved as Schedule 1, section 2 (Assess.2) (Assess.3) etc., shall also be submitted for approval of the purchaser.

(b) SWITCHING/BOOSTER STATIONS

Within a fortnight of receipt of approval of relevant drawings for each switching/booster station, the following schedules of quantities shall be submitted.

i) Schedule of number of foundation, types volume of different foundations and total volume. Overlapping foundations will be treated as one foundation;

ii) Schedule of number of masts, types weights of different masts, and the total weight of masts of each gantry;

iii) Schedule of steel work types, weight of each number and total weight; and

iv) Schedule of quantities of various items of work of schedule 1 not included in terms (i), (ii), and (iii) above.

2.5.10 SUBMISSION OF DRAWINGS AND SCHEDULES

(a) The submission of designs and drawings for approval shall be done in the manner indicated (See also para 1.2.23). In case contractor wish to deviate from standard 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, decisions 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-paras. The Purchaser will return one copy of the drawings 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 of opinion on the comments by discussions with the Purchaser's Engineers. No drawings shall be re-submitted 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 DESIGNS:- In case of deviations from standard designs and drawings, copies of correspondence and drawings shall be sent in duplicate to the Deputy Chief Electrical Engineer, Railway Electrification, Trivandrum or his successor/nominee (whose address will be intimated in due course). In the particular case of deviations 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 uses. In addition, four samples of the modified fitting shall also be submitted, after the drawings are approved (See para 1.2.23)

(c) SPECIAL DESIGNS:- Special designs to meet the requirement of particular locations of local conditions shall be submitted in due time in duplicate for approval.

(d) PURCHASER'S PEGGING PLANS:- Deleted

(e) CONTRACTOR'S FITTING PLANS:- When the Contractor is called upon to survey and prepare pegging plans, he shall send three copies of such plans, while submitting them for approval.

(f) CROSS-SECTION DRAWINGS:- Cross-section drawings shall be submitted for approval in two copies a convenient section at a time separately for sections within station limits and section outside station limits. Such drawings shall be submitted progressively and as far as possible without gaps (See para 2.5.6).
(g) OHE LAYOUT PLANS AND PROFILE DRAWINGS:- Overall equipments layout plans, provisional and final and profile drawings shall be submitted for approval in three copies (See para 2.5.6).

(h) STRUCTURE ERECTION DRAWINGS:- Structure erection drawings shall be submitted for approval in two copies for a section at a time separately for sections within station limits and sections outside station limits, progressively and without gaps.

(i) SCHEDULE OF QUANTITIES:- Schedule of quantities for each approved layout plan/switching station shall be submitted for approval in two copies.

(k) SUB-SECTION FEEDER DRAWINGS - Deleted -

(l) All drawings for switching stations, booster transformer stations and L.T. supply transformer stations shall be submitted for approval in three copies.

(m) DISTRIBUTION COPIES:- On receipt of Purchaser's unqualified 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 of 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 there after. On receipt of these tracings from the Purchaser, the Contractor shall submit copies for distribution to field officers and other departments and indicated below within 7 days of receipt of approved tracings:

i) Standard designs including fittings drawings as per para 2.5.10 (b) 8 copies
ii) Special designs 8 copies
iii) Final pegging plans 8 copies
iv) Structure cross section drawings 6 copies
v) OHE layout plans 14 copies
vi) OHE profile drawings 8 copies
vii) Structure erection drawings 8 copies
viii) Bonding plans prepared based on signalling plan 6 copies.
ix) Schedule of quantities 6 copies
x) Drawings for switching stations, booster transformer stations & L.T. supply transformer stations, 9 copies
xi) Manufacturer (Interrupters, PTS) Booklet and Test Certificates 6 copies
x) 'As Erected' OHE layout plans & SED's in CD's 2 copies

In all the above cases, the contractor has the option to supply only six copies of the approved drawings provided one of them in a transparent paper print or in reproducible tracing cloth.

2.5.11 COMPLETION DRAWINGS & SCHEDULES:- After completion of works, all drawings and designs submitted by the contractor and approved by the purchaser shall be made upto date incorporating actual supply and erection particulars including the name of make of insulators, galvanized steel tubes, stainless steel wire rope etc. The make 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 Seven sets plus one original and one of which shall be transparencies of linen or film reproduction or any other durable material approved by the Purchaser.

2.5.12 ADDRESSES:- Address to which designs and drawings should be submitted are indicated in part - III.
## SECTION - 1: PRINCIPLES

<table>
<thead>
<tr>
<th>Para No.</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.6.1</td>
<td>Scope</td>
</tr>
<tr>
<td>2.6.2</td>
<td>Method of erection</td>
</tr>
<tr>
<td>2.6.3</td>
<td>Sectioning</td>
</tr>
<tr>
<td>2.6.4</td>
<td>Inspection</td>
</tr>
<tr>
<td>2.6.5</td>
<td>Measurements</td>
</tr>
<tr>
<td>2.6.6</td>
<td>Bolts, nuts etc.</td>
</tr>
<tr>
<td>2.6.7</td>
<td>Damage to galvanizing painting</td>
</tr>
<tr>
<td>2.6.8</td>
<td>Foundations</td>
</tr>
<tr>
<td>2.6.9</td>
<td>Masts and Structures</td>
</tr>
<tr>
<td>2.6.10</td>
<td>Overhead equipments</td>
</tr>
<tr>
<td>2.6.11</td>
<td>Isolators</td>
</tr>
<tr>
<td>2.6.12</td>
<td>Busbars and connections</td>
</tr>
<tr>
<td>2.6.13</td>
<td>Earthing</td>
</tr>
<tr>
<td>2.6.14</td>
<td>Tolerances</td>
</tr>
<tr>
<td>2.6.15</td>
<td>Supplementary Instructions</td>
</tr>
</tbody>
</table>
Section - 2 : WIRING PROCEDURE

Para No. : Subject

2.6.20 : Wiring procedure
2.6.21 : General
2.6.22 : Erection of brackets
2.6.23 : Anti - creep
2.6.24 : Locking the regulating equipment
2.6.25 : Temporary arrangement
2.6.26 : Stringing catenary
2.6.27 : Tensioning of catenary
2.6.28 : Clamping the catenary
2.6.29 : Droppering
2.6.30 : Stringing contact wire
2.6.31 : Tensioning of contact wire
2.6.32 : Regulating equipment in action
2.6.33 : Final adjustment
2.6.34 : Concluding remarks

Notes.
PART - II  
CHAPTER - VI  
ERECTION & INSTALLATION OF EQUIPMENT  

Section - 1 : PRINCIPLES  

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, L.T. 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 tracks and on the inner rail of the first outer track from the center of the formation in the case of an even number of tracks, structures on curves shall be located in the radial offset 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 sections of equipment to the purchaser for inspection and testing.  

2.6.7 DAMAGE TO GALVANIZING PAINTING:-  In loading, transporting and erection 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 part of component shall be put up for inspection, to obtain permission from the Purchaser to carry out repairs as per para 2.4.11 (c).  

2.6.8 FOUNDATIONS:-  

(a)  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 adopted by the purchaser for the design of foundations.  

(b)  LOCATION:-  The location of each foundation or anchor block shall be setout correctly in accordance with approved structure cross-section drawings or foundation 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 installation 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 masts or structures in the same operation as casting of foundations are 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 blocks alongside the tracks may be done up to a length of 1 to 1.2 m and depth of 0.8 to 1 m without shoring, provided 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 more than 1 to 1.2 m and depth of excavation 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 the 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 waterlogged 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 waterlogged locations, shoring shall be done in accordance with drawings submitted by the contractor and approved by the Purchaser. Shoring/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) their edges cemented to the foundation blocks. 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 holes should be filled with sand before provision of core hole cover gets damaged or displaced. The track ballasts should be restored to its original form promptly after casting of the foundation block. The excavated earths should be removed well clear of the areas 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 falling back to the drain during the rains.

(e) CONCRETING:- All concreting of grouting shall be done in accordance with para 2.2.4 with ballasts 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. Testing shall be arranged by the purchaser at his own cost.

(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 maybe 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 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 framework of the equipment.

(g) Suitable grooves of niches shall be provided in the foundation blocks, wherever required, at the time of casting, to enable embodiment of earth strips etc. to avoid the necessity of chipping off concrete.

(h) Conduits/PVC pipes of heavy duty 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 MASTS & STRUCTURES

(a) 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: 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 MOVING 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 moving Dimensions 1676 gauge printed in metric units in 1973.

(d) ALIGNMENT OF MASTS AT GANTRIES:- The main masts of gantries shall be carefully aligned to enable easy and good assembly of fabricates steel work.

2.6.10 OVERHEAD EQUIPMENT

(a) As suggested, method for erection of traction overhead equipment 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 strength of the catenary and contact wires in the initial days after they are strung and put 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 are capable of adjustment 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 equipments for inspection and testing.

(e) STRINGING CATENARY:- Care shall be taken to avoid kinking or bird 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 and shall be of the swiveling type to permit 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 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 at the 'no load tension' (See Section 2 of this chapter) for a minimum duration of 48 hours before the pulley blocks are removed and the catenary is clamped to suspension clamps of brackets assemblies. Shorter periods may, however, be allowed by the Purchaser.

(f) STRINGING CONTACT WIRE:- Care shall be taken to avoid formation of kinks, tests 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 dropper 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 Degree 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 parts of these insulators
shall also be so located that they are at least 2m away from structures other than those supporting traction over head 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 over head 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 - 1)

(m) CONNECTIONS:- All jumper connections including anti-theft jumpers shall be 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 over head equipment or restrain 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 over head equipments 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 equipments shall be made on equipments at turnouts, cross overs, diamond crossing, overlaps and special locations, for position of bracket assemblies, stay arms and height of contact wire to ensure that pantographs electric rolling stock on the run will not foul with any parts of the bracket assemblies and change over of the contact wire is effected smoothly.

(q) For wiring in large yards, the contractor shall, prior to the execution of works, submit to the Purchaser's Engineer for the approval the sequence of stringing of catenary and contact wires to arrange for proper crossing of wires. 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 each operation.

2.6.12 BUS BARS AND CONNECTIONS:- Busbars and connections shall be neatly shaped and bent to give a good appearance.

2.6.13 EARTHING:- The copper earth strips, and MS flats are used for earthing and shall be bent and shaped neatly before connection to the structure or frame work of equipment. The connection of MS flats to steel work shall be made at a height not exceeding 25 cm from the datum level of a switching station. Before making earth connections, the ends shall be cleared thoroughly and tinned for copper strips. All junctions shall be properly secured to avoid 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 then +/- 50 mm as measured along the appropriate rail (See para 2.6.5). The cumulative error of measurement of all spans in a kilometer shall be not more than 1000 mm.

(b) SETTING STRUCTURE:- The setting of structure shall not be less than that included in the appropriate cross section drawings, specially those with the minimum setting of 2.36 m. A tolerance of +/- 20 mm will be permitted subject to minimum specified value, if the structure is not located in between tracks.
(c) HEIGHT OF CONTACT WIRE:- +/- 20 mm will be permitted on the height of contact wire at points of supports as shown in the relevant structures erection drawings, except under overline structures where no tolerance will be permitted.

(d) STAGGER:- Generally +/- 20 mm will be permitted for stagger.

(e) DROPPER LENGTHS:- +/- 5 mm will be permitted for dropper lengths

(f) Dripper locations:- +/- 100 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.

2.6.20 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 equipments immediately before energisation and commissioning, is virtually eliminated.

2.6.21 GENERAL:- In the case of regulated overhead equipment when the regulating equipments 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 is tensioned to 1,000 kgf, the stipulated tension at the means temperature of 35 Degree 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 brackets should be placed at angular position corresponding to temperature at the time of clamping, and proportionate to their distance from the anti-creep.

ii) The aluminum alloy catenary is tensioned at the calculated tension to correspond to 1000 kgf, the stipulated tension at the mean temperature of 35 Degree 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.

2.6.22 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 are 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 the 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.

2.6.23 ANTICREEP:- The anti-creep of the tension length is then installed in its final position.
2.6.24 **LOCKING THE REGULATING EQUIPMENT:** In the case of regulated overhead equipment, the regulating equipment is erected on the terminal masts or structures and their movement is locked by suitable means in the middle position, with the distance between the pulleys of the regulating equipment corresponding to 35 Degree C.

2.6.25 **TEMPORARY ARRANGEMENT:** A pulley approximately 10 mm. dia. is attached to the overhead equipment one 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-clamps (See Fig.1). The length of this temporary arrangement from the regulating equipment to the extremities of the standard 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 fitting during the final termination of the wire (See Fig. 1).

2.6.26 **STRINGING CATENARY:** The catenary is initially terminated in the ending clamp of the temporary is then paved out from the reel 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 in reached.

2.6.27 **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, and 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 of platform, on one of the wagons of the wiring train. Subsequently, the tension in the wire is checked by measurement of sag with the help of leveling lathe attached to suspension points and to the catenary at midspan by a ladder working party. The sag shall be measured in two spans, each preferably greater than 34 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 +/- 5% of the theoretical value for the corresponding stringing tension, and the temperature at the time of this measurement. In case the discrepancy is more, the tension should be adjusted again and sag re-checked as above (see note I). After the sag is checked the catenary is terminated at the ending fitting of the temporary arrangement of 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.

2.6.28 **CLAMPING THE CATENARY:** The catenary is clamped on the brackets placed at right angles to the track (See Note 2 under Para 2.6.34)

2.6.29 **DROPPERING:** 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.

2.6.30 **STRINGING OF 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 paved out from the reel and supported on the pulleys hung from droppers or on hooks until the terminating point at the other end of the tension length is reached (See Note 3). 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 (See Fig. 2).

2.6.31 **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.

2.6.32 **REGULATING EQUIPMENT IN ACTION:** The regulating equipment is put into action with the counter weight at the correct height above rail level and with adequate distance between pulleys or the regulating equipment corresponding to a temperature of 35 Degree 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.

2.6.33 FINAL ADJUSTMENT:- The entire installation is left in the condition as long as it is possible, preferably for a period not less than 15 days (See Note 4) the temporary pulleys are removed and the conductors terminated in the permanent ending fittings, compensating plates, insulators and turn buckles (See Note. 5). The equalizer plate is kept 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 relating to, the temperature at the time. The contact wire is clipped on to dropper (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.

2.6.34 CONCLUDING REMARKS:- If the above method is followed with care, no further adjustment may be needed.

Note:
1. It would 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, turn buckle 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 a dynamometer.
   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 in para 2.6.27.

3. If it is difficult to obtain a separate traffic block for stringing contact wire, the wire may be paved 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 to the brackets, separately from the catenary pulleys, to avoid twisting together of the two conductors. Fig. 4 shows a special hook designed for this purpose.
   ii. The contact wire should not be suspended from the catenary until the latter is clamped on to 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 as indicated in Para 2.6.31.

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 equaliser 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 equaliser plates, all in the vertical position, and the necessity for any further adjustments before energisation and commissioning of the OHE may be reduced to a great extent. If this precaution is not taken, at the time of energisation of the OHE, the droppers may not be vertical and staff would have to the deputed for shifting the dropper clips which is attendant with risk of damage of the contact wire.
5. Before the temporary arrangements 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 - II

### CHAPTER - VII

<table>
<thead>
<tr>
<th>PARA NO</th>
<th>SUBJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.7.1</td>
<td>Scope</td>
</tr>
<tr>
<td>2.7.2</td>
<td>Overall performance</td>
</tr>
<tr>
<td>2.7.3</td>
<td>Responsibility</td>
</tr>
<tr>
<td>2.7.4</td>
<td>Tests on overhead equipment</td>
</tr>
<tr>
<td>2.7.5</td>
<td>Inspection and testing of switching stations etc.</td>
</tr>
<tr>
<td>2.7.6</td>
<td>Earthing</td>
</tr>
<tr>
<td>2.7.7</td>
<td>Detailed procedure for tests</td>
</tr>
</tbody>
</table>
PART - II  
CHAPTER - VII  
INSPECTION AND TESTING

2.7.1 SCOPE  
This chapter deals with the inspection and testing of completely erected overhead equipment, switching stations, booster transformer stations and L.T. supply transformer station, as provided in Part I.

2.7.2 OVER ALL 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 (see para 2.1.10) and without undue heating in the case of other equipments.

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 of guarantee which shall continue to be valid as provided for in Part I, Chapter II.

2.7.4 TEST OF OHE  
(a) GENERAL  
As soon as a section is ready for General inspection and testing, the contractor shall advise the Purchaser, inspection 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 equipments and their erection in strict compliance with the specifications.

(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) TESTS ON OHE 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 DEVICES  
All automatic tensioning devices installed shall be tested for sensitive functioning adjustment.
(g) STAGGER AND HEIGHT

The stagger and height of contact wire over the entire section of completed overhead equipment and the clearances available shall be measured and the measurement shall be checked against 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. Tolerance that will be permitted on the dimensions indicated in the approved drawings are shown in Part II, Chapter VI.

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 un-energised condition, is found to be satisfactory, it will be energized with the normal 25 KV A.C. supply.

(j) TEST ON OHE

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 so 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) GENERAL

As soon as a switching station, booster transformer station or LT supply transformer station is ready for inspection and testing, the contractor shall advise the Purchaser in writing. Testing will be carried out by the Purchaser at his cost jointly with the contractor. Those shall include the test which the Purchaser may like to conduct with a view to assure himself of the soundness of these equipments and their erection in compliance with these specifications. However, testing equipment such as those indicated below and staff required for the tests shall be provided by the contractor free of charge.

i) Oil testing equipment
ii) 2500 V and 500 V Meggers
iii) Earth megger and accessories
iv) Continuity test apparatus
v) Avometer.
The contractor shall take full responsibility for these tests inter-alia his other responsibilities.

(b) 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.

(c) OPERATION TESTS

This test will be conducted on every individual items of equipment such as interrupters, isolators, relays etc. to ensure that the equipment as a whole is functioning properly and is mechanically sound, i.e. 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-connected 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.

(d) INSULATION

The strength of insulation of the various items of equipment and of the entire installation as a whole shall be tested with a 2500 V/5000 V megger, as required.

(e) DI-ELECTRIC STRENGTH OF OIL

The di-electric strength of the oil of the Booster transformer and LT supply transformer, at each station shall be tested before commissioning in accordance with IS: 335 should this found not correct, the contractor shall arrange at his own expenses to have it rectified.

(f) ISOLATORS

All isolators will be tested for smooth and trouble free operation.

(g) INTERRUPTERS

Operation of trip and close coils for interrupters, shall be tested for satisfactory performance with the respective equipments de-energized.

2.7.6 EARTHING

(a) Earth wires will be checked for continuity and electrical isolation for every 1000 m approx.

(b) Clearance between earth wires and out-of-run wires of overhead equipments and signals shall be checked.

(c) Earth resistance shall be measured separately for each electrode. In the case of inter-connected earth electrodes the net resistance of the inter-connected electrodes shall also be measured.

2.7.7 DETAILED PROCEDURE FOR TESTS

The detailed procedure for inspection and testing will be organised by the contractor. The contractor shall submit the results of tests in the proforma which will be furnished by the Purchaser, in quadruplicate.
PART - IV

ANEXURES

<table>
<thead>
<tr>
<th>Annexure No.</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>List of standard drawings and specification.</td>
</tr>
<tr>
<td>2</td>
<td>Schedule of Quantities.</td>
</tr>
<tr>
<td>3</td>
<td>Requirement of spares.</td>
</tr>
<tr>
<td>4</td>
<td>List of materials to be supplied by the Purchaser to the Contractor.</td>
</tr>
<tr>
<td>5</td>
<td>List of tools and plant for maintenance.</td>
</tr>
<tr>
<td>6</td>
<td>Unit quantities of finished wires and conductors for various items of work.</td>
</tr>
<tr>
<td>7</td>
<td>List of bridges on which traction structures will be located.</td>
</tr>
</tbody>
</table>

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LIST OF STANDARD DRAWINGS AND SPECIFICATIONS

This Annexure contains reference to drawing number, charts, Schedules, Specification and other data referred to in various paragraphs of this Tender Paper. However, it is the responsibility of the Contractor to collect the latest specifications & drawings pertaining to each work.

The drawings, charts, schedules of specifications given in this Annexure shall be taken for reference or the latest versions of such drawings, charts and schedules of specifications as issued by the Purchaser/RDSO/CORE.

For drawings for fittings - see Form 7 : Part v.

(A) LIST OF STANDARD DRAWINGS

<table>
<thead>
<tr>
<th>SI. No</th>
<th>Brief Description</th>
<th>Drawing Series</th>
<th>Number</th>
<th>Mod. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Extra allowance for setting of structures on curves (1676 mm Broad gauge)</td>
<td>ETI/OHE/G</td>
<td>00111</td>
<td>Sh-1 C</td>
</tr>
<tr>
<td>2.</td>
<td>Standard setting of structures in the vicinity of signals (broad gauge)</td>
<td>-do-</td>
<td>00112</td>
<td>D</td>
</tr>
<tr>
<td>3.</td>
<td>Typical design of side bearing foundation</td>
<td>-do-</td>
<td>00131</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>Typical design of cantilever mast.</td>
<td>RE/33/G</td>
<td>00141</td>
<td>Sh.3 -</td>
</tr>
<tr>
<td>5.</td>
<td>Standard drilling schedule of OHE masts 9.5 m long RSJ and BFB respectively</td>
<td>ETI/OHE/G</td>
<td>00144</td>
<td>Sh.3 C</td>
</tr>
<tr>
<td>6.</td>
<td>Span and stagger chart for (conventional OHE, Cad. Cu catenary &amp; Cu cont. wire)</td>
<td>ETI/OHE/G</td>
<td>00202</td>
<td>-</td>
</tr>
<tr>
<td>7.</td>
<td>Employment schedule for Cantilever mast Regulated OHE cat. 65/Cu and Cont 107/Cu, WP 112.5 kgf/sq.m.- OHE only.</td>
<td>ETI/OHE/G</td>
<td>00153</td>
<td>Sh.1 F</td>
</tr>
<tr>
<td>8.</td>
<td>Employment Schedule for Cantilever Mast Regulated OHE Cat. 65/Cu &amp; Cont. 107/Cu, WP 112.5 kgf/sq.m.- OHE + RC.</td>
<td>ETI/OHE/G</td>
<td>00153</td>
<td>Sh.2 F</td>
</tr>
<tr>
<td>9.</td>
<td>Employment Schedule for Cantilever Mast Regulated OHE Cat. 65/Cu &amp; Cont. 107/Cu, WP 112.5 kgf/sq.m.- OHE + RC.</td>
<td>-do-</td>
<td>00153</td>
<td>Sh.3 F</td>
</tr>
<tr>
<td>10.</td>
<td>Employment Schedule for Cantilever Mast Regulated OHE Cat. 65/Cu &amp; Cont. 107/Cu, WP 112.2 kgf/sq.m.- OHE + EW + RC.</td>
<td>-do-</td>
<td>00153</td>
<td>Sh.4 E</td>
</tr>
<tr>
<td>11.</td>
<td>Employment Schedule for Cantilever Mast Unregulated OHE Cat. 65/Cu &amp; Cont. 107/Cu, WP 112.5 kgf/sq.m. at 35 x C &amp; with 28 kgf/sq.m. at 4 x C without (EW &amp; RC).</td>
<td>-do-</td>
<td>00154</td>
<td>D</td>
</tr>
<tr>
<td>12.</td>
<td>Employment schedule of bracket tubes regulated Conventional OHE (Cd Cu Catenary &amp; Cu contact wire 1000 kgf tension each)</td>
<td>ETI/OHE/G</td>
<td>00158</td>
<td>Sh.1(for wind pressure 75kgf/sq.m)</td>
</tr>
<tr>
<td>13.</td>
<td>Dropper schedule for - uninsulated Overlap spans</td>
<td>-do</td>
<td>Sh.2 (for wind pressure 112.5Kgf/sq.m)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sh.3 (for wind pressure 150kgf/sq.m)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>00169</td>
<td>A</td>
</tr>
<tr>
<td>14.</td>
<td>Dropper schedule for insulated Overlap spans</td>
<td>-do-</td>
<td>00170</td>
<td>A</td>
</tr>
<tr>
<td>Sl. No</td>
<td>Brief Description</td>
<td>Drawing Series</td>
<td>Number</td>
<td>Mod. No.</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------</td>
<td>----------------</td>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>15.</td>
<td>Dropper schedule for conventional regulated OHE. With Zero presag (1400/1400)</td>
<td>-do-</td>
<td>00177</td>
<td>A</td>
</tr>
<tr>
<td>16.</td>
<td>Adjustment chart of Regulating equipment 3- Pulley Type 3:1 ratio</td>
<td>-do-</td>
<td>00195</td>
<td>A</td>
</tr>
<tr>
<td>17.</td>
<td>Schematic arrangement of regulated OHE</td>
<td>-do-</td>
<td>02101</td>
<td>A</td>
</tr>
<tr>
<td>18.</td>
<td>Schematic arrangement of uninsulated overlap (3 &amp; 4 span overlaps)</td>
<td>-do-</td>
<td>02121 Sh.4</td>
<td>A</td>
</tr>
<tr>
<td>19.</td>
<td>Schematic arrangement of insulated overlap</td>
<td>ETI/OHE/G</td>
<td>02131 Sh.3</td>
<td>A</td>
</tr>
<tr>
<td>20.</td>
<td>Standard termination of tramway type OHE (Regulated with pulley type regulating equipment (3:1 ratio).</td>
<td>ETI/OHE/G</td>
<td>04212</td>
<td>B</td>
</tr>
<tr>
<td>21.</td>
<td>General distribution of droppers –</td>
<td>ETI/OHE/G</td>
<td>00161</td>
<td>-</td>
</tr>
<tr>
<td>22.</td>
<td>Outline of Pantograph (Broad gauge and metre gauge).</td>
<td>RE/33/G</td>
<td>00181</td>
<td>A</td>
</tr>
<tr>
<td>23.</td>
<td>General formation of single track in Embankments and cutting (Broad gauge.)</td>
<td>RE/33/G Sh.1</td>
<td>01101</td>
<td>A</td>
</tr>
<tr>
<td>24.</td>
<td>General formation of double track in embankments and cutting (Broad gauge).</td>
<td>-do-</td>
<td>01102 Sh.1</td>
<td>A</td>
</tr>
<tr>
<td>25.</td>
<td>General formation of multiple tracks (1675 mm gauge).</td>
<td>-do-</td>
<td>01103 Sh.1</td>
<td>A</td>
</tr>
<tr>
<td>26.</td>
<td>Standard anchor arrangement</td>
<td>-do-</td>
<td>01401</td>
<td>E</td>
</tr>
<tr>
<td>27.</td>
<td>Anchor arrangement with dwarf mast.</td>
<td>ETI/OHE/G</td>
<td>01402</td>
<td>B</td>
</tr>
<tr>
<td>28.</td>
<td>Schedule of anchor block for B.G. track.</td>
<td>-do-</td>
<td>01403 Sh.1</td>
<td>D</td>
</tr>
<tr>
<td>29.</td>
<td>Double guy rod arrangement with anchor block for B.G. track.</td>
<td>-do-</td>
<td>01403 Sh.2</td>
<td>C</td>
</tr>
<tr>
<td>30.</td>
<td>Schedule of anchor block for B.G. track (Black cotton soil)</td>
<td>-do-</td>
<td>01403 Sh.3</td>
<td>B</td>
</tr>
<tr>
<td>31.</td>
<td>Standard guide tube arrangement on a mast and structures.</td>
<td>ETI/OHE/G</td>
<td>01505</td>
<td>-</td>
</tr>
<tr>
<td>32.</td>
<td>Trapezoidal counter weight arrangement on OHE structures.</td>
<td>ETI/OHE/G</td>
<td>01502</td>
<td>-</td>
</tr>
<tr>
<td>33.</td>
<td>Arrangement of 3kV &amp; 25 kV Pedestal insulator supports on OHE masts and portals.</td>
<td>-do-</td>
<td>01601</td>
<td>-</td>
</tr>
<tr>
<td>34.</td>
<td>Standard arrangements for mounting of number plate on OHE Structures.</td>
<td>ETI/OHE/G</td>
<td>01701</td>
<td>A</td>
</tr>
<tr>
<td>35.</td>
<td>Schematic arrangement of regulated overhead equipment.</td>
<td>-do-</td>
<td>02101</td>
<td>A</td>
</tr>
<tr>
<td>36.</td>
<td>Typical arrangements of OHE on cantilever masts for double track section.</td>
<td>-do-</td>
<td>2102</td>
<td>-</td>
</tr>
<tr>
<td>37.</td>
<td>Typical arrangement for fixing of bracket assembly on 9.5 m mast and Structure to suit raising of tracks (in future)</td>
<td>-do-</td>
<td>02102 Sh.3</td>
<td>-</td>
</tr>
<tr>
<td>38.</td>
<td>Mast on platforms MG</td>
<td>ETI/OHE/G</td>
<td>02104 Sh.2</td>
<td>A</td>
</tr>
<tr>
<td>39.</td>
<td>Details of bracket arrangement on tangent and curved tracks</td>
<td>-do-</td>
<td>02106 Sh.1</td>
<td>A</td>
</tr>
<tr>
<td>40.</td>
<td>Details of bracket arrangement for OHE (High Speed).</td>
<td>-do-</td>
<td>02106 Sh.3</td>
<td>C</td>
</tr>
<tr>
<td>41.</td>
<td>Single bracket assembly on Structures and dropped arms.</td>
<td>RE/33/G</td>
<td>02107</td>
<td>D</td>
</tr>
<tr>
<td>42.</td>
<td>Box type cantilever Arrangement.</td>
<td>ETI/OHE/G</td>
<td>02108</td>
<td>A</td>
</tr>
<tr>
<td>43.</td>
<td>Arrangement at anticreep.</td>
<td>-do-</td>
<td>02111</td>
<td>A</td>
</tr>
<tr>
<td>Sl. No</td>
<td>Brief Description</td>
<td>Drawing Series</td>
<td>Number</td>
<td>Mod. No.</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>----------------</td>
<td>--------</td>
<td>----------</td>
</tr>
<tr>
<td>44.</td>
<td>Standard cantilever arrangement for boom anchor anticreep location.</td>
<td>-do-</td>
<td>02113</td>
<td>-</td>
</tr>
<tr>
<td>45.</td>
<td>Schematic arrangement of uninsulated over Lap (type-I) 3 &amp; 4 Span overlaps.</td>
<td>ETI/OHE/G</td>
<td>02121 Sh.1</td>
<td>F</td>
</tr>
<tr>
<td>46.</td>
<td>Schematic arrangement of insulated overlap.</td>
<td>ETI/OHE/G</td>
<td>02131 Sh.1</td>
<td>C</td>
</tr>
<tr>
<td>47.</td>
<td>General arrangement of regulated OHE at turn-outs (overlap &amp; crossed type).</td>
<td>ETI/OHE/G</td>
<td>02141 Sh.1</td>
<td>C</td>
</tr>
<tr>
<td>48.</td>
<td>General arrangement of regulated OHE at cross over (overlap &amp; crossed type).</td>
<td>-do-</td>
<td>02151 Sh.1</td>
<td>-</td>
</tr>
<tr>
<td>49.</td>
<td>Arrangement of neutral section</td>
<td>-do-</td>
<td>02161 Sh.1</td>
<td>C</td>
</tr>
<tr>
<td>50.</td>
<td>Arrangement of neutral section assembly (PTFE Type) at SWS.</td>
<td>-do-</td>
<td>02162 Sh.1</td>
<td>-</td>
</tr>
<tr>
<td>51.</td>
<td>Arrangement of short neutral section</td>
<td>-do-</td>
<td>02161 Sh.2</td>
<td>-</td>
</tr>
<tr>
<td>52.</td>
<td>Schematic arrangement of unregulated overhead equipment.</td>
<td>-do-</td>
<td>03101 Sh.1</td>
<td>-</td>
</tr>
<tr>
<td>53.</td>
<td>Standard termination of OHE (Regulated &amp; un-regulated).</td>
<td>ETI/OHE/G</td>
<td>03121 Sh.1</td>
<td>E</td>
</tr>
<tr>
<td>(a)</td>
<td>Standard termination of regulated composite OHE</td>
<td>ETI/OHE/G</td>
<td>03121 Sh.2</td>
<td>B</td>
</tr>
<tr>
<td>(b)</td>
<td>Standard termination of regulated composite OHE with equal tension</td>
<td>ETI/OHE/G</td>
<td>03121 Sh.3</td>
<td>A</td>
</tr>
<tr>
<td>(c)</td>
<td>General arrangement of Unregulated OHE at turnouts (crossed &amp; overlap type).</td>
<td>ETI/OHE/G</td>
<td>03151 Sh.1</td>
<td>-</td>
</tr>
<tr>
<td>54.</td>
<td>General arrangement of unregulated OHE crossovers and diamond crossings (overlap and crossed type).</td>
<td>-do-</td>
<td>03152 Sh.1</td>
<td>-</td>
</tr>
<tr>
<td>55.</td>
<td>General arrangement of unregulated OHE at diamond crossing.</td>
<td>-do-</td>
<td>03152 Sh.2</td>
<td>-</td>
</tr>
<tr>
<td>56.</td>
<td>General arrangement of pull off</td>
<td>-do-</td>
<td>03301 Sh.1</td>
<td>A</td>
</tr>
<tr>
<td>57.</td>
<td>General arrangement of head span</td>
<td>-do-</td>
<td>03201 Sh.1</td>
<td>-</td>
</tr>
<tr>
<td>58.</td>
<td>In span jumper connection between catenary &amp; contact wire.</td>
<td>-do-</td>
<td>05101 Sh.1</td>
<td>-</td>
</tr>
<tr>
<td>59.</td>
<td>Continuity jumper connection at uninsulated overlap</td>
<td>-do-</td>
<td>05102 Sh.1</td>
<td>C</td>
</tr>
<tr>
<td>60.</td>
<td>Connection at turnouts</td>
<td>-do-</td>
<td>05107 Sh.1</td>
<td>A</td>
</tr>
<tr>
<td>61.</td>
<td>Potential equalizer connection at insulated overlap and neutral section</td>
<td>-do-</td>
<td>05103 Sh.1</td>
<td>B</td>
</tr>
<tr>
<td>62.</td>
<td>Connections at diamond crossing</td>
<td>-do-</td>
<td>05104 Sh.1</td>
<td>-</td>
</tr>
<tr>
<td>63.</td>
<td>General arrangement of connections to OHE by copper cross feeder (150).</td>
<td>-do-</td>
<td>05106 Sh.1</td>
<td>A</td>
</tr>
<tr>
<td>64.</td>
<td>General arrangement of connections at switching station on double track section by copper cross feeder (150).</td>
<td>ETI/OHE/G</td>
<td>05122 Sh.1</td>
<td>C</td>
</tr>
<tr>
<td>65.</td>
<td>General arrangement of connections at switching station on multiple track section by copper cross feeder (150).</td>
<td>-do-</td>
<td>05123 Sh.1</td>
<td>C</td>
</tr>
<tr>
<td>66.</td>
<td>Suspension of 25kV feeder(Spider) on OHE masts</td>
<td>ETI/OHE/G</td>
<td>05143 Sh.1</td>
<td>B</td>
</tr>
<tr>
<td>67.</td>
<td>Termination of feeder, return conductor &amp; return feeder (copper &amp; aluminum).</td>
<td>ETI/OHE/G</td>
<td>05145-1 Sh.1</td>
<td>A</td>
</tr>
<tr>
<td>Sl. No</td>
<td>Brief Description</td>
<td>Drawing Series</td>
<td>Number</td>
<td>Mod. No.</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------</td>
<td>----------------</td>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>70.</td>
<td>Arrangement of suspension of double spider 25 kV feeder and return feeder between sub-station and feeding station</td>
<td>RE/33/G</td>
<td>05152</td>
<td>C</td>
</tr>
<tr>
<td>71.</td>
<td>Assembly of section insulators</td>
<td>RE/33/G</td>
<td>05181</td>
<td>C</td>
</tr>
<tr>
<td>72.</td>
<td>General arrangement of earth wire on OHE mast</td>
<td>ETI/OHE/G</td>
<td>05201</td>
<td>A</td>
</tr>
<tr>
<td>73.</td>
<td>General arrangement of earth wire on OHE mast</td>
<td>ETI/OHE/G</td>
<td>05201-1</td>
<td>-</td>
</tr>
<tr>
<td>74.</td>
<td>Arrangement of transverse bonds</td>
<td>ETI/OHE/G</td>
<td>05251</td>
<td>A</td>
</tr>
<tr>
<td>75.</td>
<td>Connection of return conductor to track</td>
<td>-do-</td>
<td>05306</td>
<td>F</td>
</tr>
<tr>
<td>76.</td>
<td>Suspension arrangement of aluminum return conductor (spider) on traction Structures</td>
<td>-do-</td>
<td>05307</td>
<td>B</td>
</tr>
<tr>
<td>77.</td>
<td>Suspension of return conductor (spider) from boom of Structures (with clevis type disc insulators)</td>
<td>-do-</td>
<td>05312</td>
<td>A</td>
</tr>
<tr>
<td>78.</td>
<td>Connections between OHE and aluminum return conductor at booster stations</td>
<td>ETI/OHE/G</td>
<td>05413</td>
<td>B</td>
</tr>
<tr>
<td>79.</td>
<td>Mounting of 25kV Isolators on OHE Structures (General arrangement)</td>
<td>ETI/OHE/G</td>
<td>05513 Sh.1</td>
<td>A</td>
</tr>
<tr>
<td>80.</td>
<td>Details of small part steel work for supporting 25kV Isolator on new T.T.C. boom</td>
<td>-do-</td>
<td>05513 Sh.2</td>
<td>A</td>
</tr>
<tr>
<td>81.</td>
<td>Connection from isolator to OHE</td>
<td>-do-</td>
<td>05516</td>
<td>A</td>
</tr>
<tr>
<td>82.</td>
<td>Characteristics of conductors/ bus-bar for 25kV AC traction</td>
<td>-do-</td>
<td>05600</td>
<td>A</td>
</tr>
<tr>
<td>83.</td>
<td>Arrangement of mounting 25 kV/240, 10 kVA LT supply transformer</td>
<td>ETI/OHE/G</td>
<td>05522</td>
<td>-</td>
</tr>
<tr>
<td>84.</td>
<td>Employment Schedule for Cantilever Mast regulated OHE Caty 65 Cu, Cont.107/Cu (WP 75 kgf/sq.m.) OHE only</td>
<td>ETI/C</td>
<td>0702 (OHE only) (Sh.1)</td>
<td>B</td>
</tr>
<tr>
<td>85.</td>
<td>Employment Schedule for Tramway type regulated OHE (WP 75 kgf/sq.m.) without EW &amp; without RC.</td>
<td>-do- (OHE+EW) (Sh.2)</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-do- (OHE+RC) (Sh.3)</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-do- (OHE+EW+RC)(Sh.4)</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ETI/C</td>
<td>0704</td>
<td>A</td>
</tr>
<tr>
<td>86.</td>
<td>Employment Schedule for 8&quot;x 8&quot;x35 lbs BFB (9.5 M. long)(WP 112.5 kgf/sq.mm Cat. 65/Cu &amp; Cont. 107/Cu.</td>
<td>ETI/C</td>
<td>0708</td>
<td>A</td>
</tr>
<tr>
<td>87.</td>
<td>Employment Schedule for OHE mast overlap central location with 3.0 m implantation. Cat. 65/Cu &amp; Cont. 107/Cu,W P 75 kgf/sq.m.</td>
<td>-do-</td>
<td>0709</td>
<td>A</td>
</tr>
<tr>
<td>88.</td>
<td>Employment schedule for OHE mast (9.5M) overlap center location with 3.0 M implantation, Cat 65/cu and Cont.107/Cu, WP 112.5 kgf/sq.m.</td>
<td>ETI/C</td>
<td>0710</td>
<td>A</td>
</tr>
<tr>
<td>89.</td>
<td>Employment Schedule for OHE mast (9.5m) overlap inter location with 3.0 m implantation. Cat. 65/Cu &amp; Cont. 107/Cu,W P 75 kgf/sq.m.</td>
<td>-do-</td>
<td>0711</td>
<td>A</td>
</tr>
<tr>
<td>Sl. No</td>
<td>Brief Description</td>
<td>Drawing Series</td>
<td>Number</td>
<td>Mod. No.</td>
</tr>
<tr>
<td>--------</td>
<td>------------------</td>
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<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>90.</td>
<td>Employment schedule for OHE mast (9.5M) overlap inter location with 3.0 M implantations. Caty.65/Cu and cont.107/Cu WP 112.5kgf/sq.m.</td>
<td>-do-</td>
<td>0712</td>
<td>A</td>
</tr>
<tr>
<td>91.</td>
<td>Employment Schedule for 9.5 m long 200x200x49.9 kg mast Caty. 65/Cu &amp; Cont. 107/Cu WP 75 kgf/sq.m.</td>
<td>-do-</td>
<td>0713</td>
<td>B</td>
</tr>
<tr>
<td>92.</td>
<td>Employment schedule for 9.5 m long 200x200x49.9 kg mast Cat. 65/Cu and Cont.107/Cu WP 112.5 Kgf/sq.m.</td>
<td>-do-</td>
<td>0714</td>
<td>B</td>
</tr>
<tr>
<td>93.</td>
<td>Employment Schedule for OHE mast (9.5m) overlap Anchor location with 3.0 m implantation. Caty. 65/Cu &amp; Cont. 107/Cu,W P 75 kgf/sq.m.</td>
<td>-do-</td>
<td>0715</td>
<td>A</td>
</tr>
<tr>
<td>94.</td>
<td>Employment schedule for OHE mast (9.5M) overlap anchor location with 3.0 M implantations. Cat.65/Cu and cont. 107/cu WP 112.5 kgf/sq.m.</td>
<td>-do-</td>
<td>0716</td>
<td>A</td>
</tr>
<tr>
<td>95.</td>
<td>Employment Schedule for regulated OHE mast (9.5 m) wind pressure 75 kgf/sq.m for composite OHE (1000 x 1000) kgf tension. ETI/C</td>
<td>0721(OHE only)</td>
<td>-</td>
<td>SH.1</td>
</tr>
<tr>
<td>96.</td>
<td>Employment Schedule for regulated OHE mast (9.5 m) wind pressure 75 kgf/sq.m. for composite OHE with extra setting distance. Overlap Anchor location. ETI/C</td>
<td>(OHE+EW) (Sh.2)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(OHE+RC) (Sh.3)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(OHE+EW+ RC)(Sh.4)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-do-</td>
<td>0722</td>
<td>-</td>
</tr>
<tr>
<td>97.</td>
<td>Employment Schedule for regulated OHE mast (9.5 m) wind pressure 75 kgf/sq.m. for composite OHE with extra setting distance. Overlap center location. ETI/C</td>
<td>-do-</td>
<td>0723</td>
<td>-</td>
</tr>
<tr>
<td>98.</td>
<td>Employment Schedule for regulated OHE mast (9.5 m) wind pressure 75 kgf/sq.m. for composite OHE with extra setting distance. Overlap inter location.</td>
<td>-do-</td>
<td>0724</td>
<td>-</td>
</tr>
<tr>
<td>99.</td>
<td>Employment schedule for pre-stressed concrete mast (PC 42) 9.5 m long, for conventional OHE, Normal Location (WP 150, 112.5 and 75 kgf/sq.m.</td>
<td>-do-</td>
<td>0725</td>
<td>A</td>
</tr>
<tr>
<td>100.</td>
<td>Standard portal (N.O, P.R,G &amp; Double BFB type) ETI/C</td>
<td>0064</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>101.</td>
<td>Volume chart and equivalent chart of foundations (Side bearing, Side gravity and W.B.C.) TI/DRG/CIV/FND/RDSO/</td>
<td>00001/04/0 SH-1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>102.</td>
<td>Volume chart and equivalent chart of foundations (NG type) TI/DRG/CIV/FND/RDSO/</td>
<td>00001/04/0 SH-2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>103.</td>
<td>Volume chart and equivalent chart of foundations for Dry black cotton soil (NBC type) TI/DRG/CIV/FND/RDSO/</td>
<td>00001/04/0 SH-3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>104.</td>
<td>Volume chart and equivalent chart of New pure gravity foundations (500 M exposed) TI/DRG/CIV/FND/RDSO/</td>
<td>00001/04/0 SH-4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sl. No.</td>
<td>Brief Description</td>
<td>Drawing Series</td>
<td>Number</td>
<td>Mod. No.</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>----------------</td>
<td>--------</td>
<td>----------</td>
</tr>
<tr>
<td>105.</td>
<td>Volume chart and equivalent chart of New foundations for Dry black cotton soil (NBC type) 2.5 M depth</td>
<td>TI/DRG/CTV/ FND/RDSO/</td>
<td>00001/04/0 SH-5</td>
<td>-</td>
</tr>
<tr>
<td>106.</td>
<td>-do- (For a direct load of 4000 Kg)</td>
<td>ETI/C</td>
<td>0058 Sh.6</td>
<td>B</td>
</tr>
<tr>
<td>107.</td>
<td>Special BFB portal for 5 tracks (General C arrangement)</td>
<td>-do-</td>
<td>0026 Sh.1</td>
<td>C</td>
</tr>
<tr>
<td>108.</td>
<td>Protective screen at foot-over bridge and road over-bridge.</td>
<td>-do-</td>
<td>0068</td>
<td>G</td>
</tr>
<tr>
<td>109.</td>
<td>Chart for portal foundation</td>
<td>-do-</td>
<td>0005/68</td>
<td>E</td>
</tr>
<tr>
<td>110.</td>
<td>Muff for OHE structures</td>
<td>-do-</td>
<td>0007/68</td>
<td>E</td>
</tr>
<tr>
<td>111.</td>
<td>Structures muff for sand core foundations</td>
<td>-do-</td>
<td>0012/69</td>
<td>E</td>
</tr>
<tr>
<td>112.</td>
<td>9.5 m Standard traction mast (fabricated 'K' series)</td>
<td>-do-</td>
<td>0018-2</td>
<td>D</td>
</tr>
<tr>
<td>113.</td>
<td>Details of Remote Control Cubicle (Foundation, RCC slab, Building plant &amp; Steel door)</td>
<td>-do-</td>
<td>0067</td>
<td>B</td>
</tr>
<tr>
<td>114.</td>
<td>9.5 m standard traction mast (fabricated with bottom plates 'B' series)</td>
<td>ETI/C</td>
<td>0071</td>
<td>E</td>
</tr>
<tr>
<td>115.</td>
<td>Details of OHE foundation in soft rock (SBC 45,000 Kgf/sq.m)</td>
<td>-do-</td>
<td>0059</td>
<td>B</td>
</tr>
<tr>
<td>116.</td>
<td>Details of foundation for fencing upright</td>
<td>-do-</td>
<td>0032</td>
<td>B</td>
</tr>
<tr>
<td>117.</td>
<td>Employment schedule for switching and booster station main masts</td>
<td>ETI/C</td>
<td>0185</td>
<td>B</td>
</tr>
<tr>
<td>118.</td>
<td>Drilling schedule for S-1 mast</td>
<td>ETI/C</td>
<td>0030</td>
<td>F</td>
</tr>
<tr>
<td>119.</td>
<td>-do- S-2 mast</td>
<td>-do-</td>
<td>0031</td>
<td>D</td>
</tr>
<tr>
<td>120.</td>
<td>-do- S-3 mast (length 11.4 m)</td>
<td>-do-</td>
<td>0180</td>
<td>C</td>
</tr>
<tr>
<td>121.</td>
<td>Drilling schedule for 8” x 6” x 35 lbs. RSJ mast 8.0 m long for booster transformer station Type S-4</td>
<td>-do-</td>
<td>0036</td>
<td>E</td>
</tr>
<tr>
<td>122.</td>
<td>Drilling schedule for S-5 mast (11.4 m long)</td>
<td>-do-</td>
<td>0042</td>
<td>E</td>
</tr>
<tr>
<td>123.</td>
<td>-do- S-6 mast (length 12.4m)</td>
<td>-do-</td>
<td>0181</td>
<td>C</td>
</tr>
<tr>
<td>124.</td>
<td>-do- S-7 -do-</td>
<td>-do-</td>
<td>0182</td>
<td>C</td>
</tr>
<tr>
<td>125.</td>
<td>-do- S-8 –do-</td>
<td>-do-</td>
<td>0183</td>
<td>C</td>
</tr>
<tr>
<td>126.</td>
<td>-do- S-9 mast (length 9.4m)</td>
<td>-do-</td>
<td>0184</td>
<td>C</td>
</tr>
<tr>
<td>127.</td>
<td>General arrangement &amp; details of fencing panels &amp; gate for switching station</td>
<td>-do-</td>
<td>0186 Sh.1</td>
<td>E</td>
</tr>
<tr>
<td>128.</td>
<td>Details of fencing upright and anti-climbing device for switching station</td>
<td>-do-</td>
<td>0186 Sh.2</td>
<td>E</td>
</tr>
<tr>
<td>129.</td>
<td>S-100 fabricated mast for mounting LT supply transformer and drop out fuse switch at switching station</td>
<td>-do-</td>
<td>0043</td>
<td>B</td>
</tr>
<tr>
<td>130.</td>
<td>S-101 details of mast for supporting isolator inside switching station</td>
<td>ETI/C</td>
<td>0044</td>
<td>A</td>
</tr>
<tr>
<td>131.</td>
<td>Details of anchor beam or SP, SSP, &amp; FP</td>
<td>-do-</td>
<td>0033</td>
<td>D</td>
</tr>
<tr>
<td>132.</td>
<td>Details of small part steel for switching station</td>
<td>ETI/C</td>
<td>0034 Sh.1</td>
<td>K</td>
</tr>
<tr>
<td>133.</td>
<td>Details of bracing for switching &amp; B.T. masts</td>
<td>ETI/C</td>
<td>0034 Sh.2</td>
<td>B</td>
</tr>
<tr>
<td>134.</td>
<td>Details of small parts steel of out rigger for switching stations and booster transformer stations</td>
<td></td>
<td>0037</td>
<td>C</td>
</tr>
<tr>
<td>Sl. No</td>
<td>Brief Description</td>
<td>Drawing Series</td>
<td>Drawing Number</td>
<td>Mod. No.</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------------------------------------------------------------------</td>
<td>----------------</td>
<td>---------------</td>
<td>----------</td>
</tr>
<tr>
<td>135.</td>
<td>Details of small parts steel for booster transformer stations</td>
<td>ETI/C</td>
<td>0040</td>
<td>E</td>
</tr>
<tr>
<td>136.</td>
<td>Details of pre-cast cable trench for switching station</td>
<td>-do-</td>
<td>0038</td>
<td>E</td>
</tr>
<tr>
<td>137.</td>
<td>Standard 'R' type portal rod laced general arrangement</td>
<td>-do-</td>
<td>0011/69 Sh.1</td>
<td>C</td>
</tr>
<tr>
<td>138.</td>
<td>Standard 'G' type portal special upright and end piece</td>
<td>-do-</td>
<td>0056</td>
<td>C</td>
</tr>
<tr>
<td>139.</td>
<td>Short bored pile foundation for traction mast (permissible BM &amp; volume)</td>
<td>-do-</td>
<td>0062</td>
<td>B</td>
</tr>
<tr>
<td>140.</td>
<td>Chart for portal foundations in dry black cotton soil safe bearing capacity 16500 Kg/sq.m.</td>
<td>-do-</td>
<td>0063</td>
<td>B</td>
</tr>
<tr>
<td>141.</td>
<td>Dwarf mast foundation on wet &amp; dry black cotton soil</td>
<td>RE/ALD/OHE/SK/C</td>
<td>02</td>
<td>-</td>
</tr>
<tr>
<td>142.</td>
<td>Typical design of new pure gravity foundation</td>
<td>ETI/SK/C</td>
<td>131</td>
<td>A</td>
</tr>
<tr>
<td>143.</td>
<td>Typical design of side gravity foundation</td>
<td>-do-</td>
<td>142</td>
<td>A</td>
</tr>
<tr>
<td>144.</td>
<td>Rock Anchor for B.G.Track.</td>
<td>ETI/SK/C</td>
<td>208</td>
<td>-</td>
</tr>
<tr>
<td>145.</td>
<td>MS bracket fitting for PSC general arrangement and SPS details</td>
<td>ETI/SK/C</td>
<td>214 Sh.1</td>
<td>E</td>
</tr>
<tr>
<td>146.</td>
<td>SPS details for Earth wire clamp on PSC mast</td>
<td>ETI/SK/C</td>
<td>214 Sh.2 of 2</td>
<td>A</td>
</tr>
<tr>
<td>147.</td>
<td>Special arrangement of OHE under overline structure</td>
<td>ETI/OHE/SK</td>
<td>529</td>
<td>D</td>
</tr>
<tr>
<td>148.</td>
<td>Earthing and bonding of PSC mast.</td>
<td>ETI/OHE/SK</td>
<td>537 Sh.1 of 2</td>
<td>D</td>
</tr>
<tr>
<td>149.</td>
<td>Typical earthing arrangement in SPUN D PSC Mast with 18mm dia rod.</td>
<td>-do-</td>
<td>537 Sh.2</td>
<td>B</td>
</tr>
<tr>
<td>150.</td>
<td>Arrangement of anti-theft jumper at overlap</td>
<td>ETI/OHE/SK</td>
<td>566</td>
<td>-</td>
</tr>
<tr>
<td>151.</td>
<td>Catenary dropper assembly</td>
<td>ETI/OHE/P</td>
<td>1190</td>
<td>B</td>
</tr>
<tr>
<td>152.</td>
<td>Parallel clamp (20/20)</td>
<td>ETI/OHE/P</td>
<td>1550</td>
<td>E</td>
</tr>
<tr>
<td>153.</td>
<td>Standard guide tube assembly</td>
<td>ETI/OHE/P</td>
<td>5060-2</td>
<td>C</td>
</tr>
<tr>
<td>154.</td>
<td>Standard anti-wind clamp</td>
<td>-do-</td>
<td>2550-1/2</td>
<td>L</td>
</tr>
<tr>
<td>155.</td>
<td>Multiple cantilever cross arm assembly</td>
<td>RE/33/P</td>
<td>3120</td>
<td>H</td>
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<tr>
<td>156.</td>
<td>Anchor fitting assembly on rolled sections</td>
<td>ETI/OHE/P</td>
<td>3230</td>
<td>C</td>
</tr>
<tr>
<td>157.</td>
<td>Anchor fitting assembly on 'K' series, TCC masts and 'P' type portal upright.</td>
<td>-do-</td>
<td>3240</td>
<td>D</td>
</tr>
<tr>
<td>158.</td>
<td>Anchor assembly on 'N' and 'O' type portal upright</td>
<td>-do-</td>
<td>3250</td>
<td>D</td>
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<td>159.</td>
<td>Structure bonds</td>
<td>-do-</td>
<td>7000</td>
<td>E</td>
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<td>160.</td>
<td>Earthing station</td>
<td>-do-</td>
<td>7020</td>
<td>B</td>
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<td>161.</td>
<td>Longitudinal rail bond</td>
<td>-do-</td>
<td>7030</td>
<td>F</td>
</tr>
<tr>
<td>162.</td>
<td>Short super mast assembly</td>
<td>ETI/C/P</td>
<td>8010</td>
<td>G</td>
</tr>
<tr>
<td>163.</td>
<td>Long super mast assembly</td>
<td>-do-</td>
<td>8020</td>
<td>C</td>
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<td>164.</td>
<td>Bracket attachment assembly on portal upright (N,O,R,P,G &amp; BFB Type)</td>
<td>-do-</td>
<td>8030</td>
<td>B</td>
</tr>
<tr>
<td>165.</td>
<td>Super mast assembly on portals</td>
<td>-do-</td>
<td>8050</td>
<td>C</td>
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<tr>
<td>166.</td>
<td>Medium super mast assembly</td>
<td>ETI/OHE/P</td>
<td>8060</td>
<td>C</td>
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<tr>
<td>167.</td>
<td>Compensating plate</td>
<td>-do-</td>
<td>5191-1/2</td>
<td>D</td>
</tr>
<tr>
<td>168.</td>
<td>Suspension clamp</td>
<td>RE/33/P</td>
<td>1160</td>
<td>J</td>
</tr>
<tr>
<td>169.</td>
<td>Double suspension clamp</td>
<td>-do-</td>
<td>1170</td>
<td>K</td>
</tr>
<tr>
<td>170.</td>
<td>Double suspension lock plate</td>
<td>-do-</td>
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<td>Sl. No.</td>
<td>Brief Description</td>
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<tr>
<td>171.</td>
<td>Catenary splice (65)</td>
<td>ETI/OHE/P</td>
<td>1090</td>
<td></td>
</tr>
<tr>
<td>172.</td>
<td>Typical location &amp; schematic connection diagram for a three interruptor switching station</td>
<td>ETI/PSI</td>
<td>003</td>
<td>C</td>
</tr>
<tr>
<td>173.</td>
<td>Typical general arrangement of a three interruptor switching station</td>
<td>-do-</td>
<td>004</td>
<td>F</td>
</tr>
<tr>
<td>174.</td>
<td>Typical location plan &amp; general arrangement for sectioning &amp; paralleling station</td>
<td>-do-</td>
<td>005</td>
<td>F</td>
</tr>
<tr>
<td>175.</td>
<td>Typical location plan and general arrangement for a feeding station</td>
<td>-do-</td>
<td>006</td>
<td>E</td>
</tr>
<tr>
<td>176.</td>
<td>Typical general arrangement at a Booster transformer Stn. (with 4 cross feeder) type III</td>
<td>-do-</td>
<td>013</td>
<td>B</td>
</tr>
<tr>
<td>177.</td>
<td>Typical general arrangement of 280 kVA Booster Transformer Stn. (with 4 cross feeder) type III</td>
<td>-do-</td>
<td>018</td>
<td>A</td>
</tr>
<tr>
<td>178.</td>
<td>Typical general arrangement at a booster transformer station (without cross feeder) Type-I</td>
<td>ETI/PSI</td>
<td>011</td>
<td>C</td>
</tr>
<tr>
<td>179.</td>
<td>Typical number plate for auxiliary transformer</td>
<td>ETI/PSI/P</td>
<td>7525</td>
<td>-</td>
</tr>
<tr>
<td>180.</td>
<td>Typical fencing and anti-climbing arrangement at switching station</td>
<td>ETI/PSI</td>
<td>104</td>
<td>E</td>
</tr>
<tr>
<td>181.</td>
<td>Typical earthing layout of sub-sectioning and paralleling station</td>
<td>-do-</td>
<td>201</td>
<td>B</td>
</tr>
<tr>
<td>182.</td>
<td>Typical earthing layout of a sectioning and paralleling station</td>
<td>-do-</td>
<td>202</td>
<td>B</td>
</tr>
<tr>
<td>183.</td>
<td>Typical earthing layout of a feeding station</td>
<td>-do-</td>
<td>203</td>
<td>B</td>
</tr>
<tr>
<td>184.</td>
<td>Earthing details for interruptor L.T. supply transformer 25 kV lightning arrestors P.T. Type-I (S-100 masts, S-101 mast, fencing upright and main mast)</td>
<td>-do-</td>
<td>204</td>
<td>C</td>
</tr>
<tr>
<td>185.</td>
<td>Typical earthing layout at a booster transformer stations</td>
<td>-do-</td>
<td>211-1</td>
<td>A</td>
</tr>
<tr>
<td>186.</td>
<td>Typical cable run layout of a sub-sectioning &amp; paralleling station</td>
<td>-do-</td>
<td>301</td>
<td>C</td>
</tr>
<tr>
<td>187.</td>
<td>Typical cable run layout of a sectioning and paralleling station</td>
<td>-do-</td>
<td>302</td>
<td>C</td>
</tr>
<tr>
<td>188.</td>
<td>Typical cable run layout of a feeding station</td>
<td>-do-</td>
<td>303</td>
<td>B</td>
</tr>
<tr>
<td>189.</td>
<td>Typical earthing layout at a booster transformer station (with 4 cross feeder for Type III, IV and V)</td>
<td>ETI/PSI</td>
<td>212</td>
<td>B</td>
</tr>
<tr>
<td>190.</td>
<td>Typical drawing for a terminal board</td>
<td>-do-</td>
<td>501</td>
<td>C</td>
</tr>
<tr>
<td>191.</td>
<td>36 mm Aluminum Bus terminal</td>
<td>ETI/PSI/P</td>
<td>6480</td>
<td>C</td>
</tr>
<tr>
<td>192.</td>
<td>-do- splices</td>
<td>-do-</td>
<td>6490</td>
<td>B</td>
</tr>
<tr>
<td>193.</td>
<td>-do- Tee connector</td>
<td>-do-</td>
<td>6500</td>
<td>C</td>
</tr>
<tr>
<td>194.</td>
<td>36 mm aluminum tee terminal</td>
<td>-do-</td>
<td>6510</td>
<td>D</td>
</tr>
<tr>
<td>195.</td>
<td>36/15 Tap connector</td>
<td>-do-</td>
<td>6520</td>
<td>B</td>
</tr>
<tr>
<td>196.</td>
<td>36mm Aluminum flexible bus splice</td>
<td>-do-</td>
<td>6550</td>
<td>B</td>
</tr>
<tr>
<td>197.</td>
<td>36 mm Aluminum bus splice cum tee connector</td>
<td>-do-</td>
<td>6560</td>
<td>B</td>
</tr>
<tr>
<td>198.</td>
<td>Typical number plate for interruptor and double pole isolator</td>
<td>-do-</td>
<td>7520</td>
<td>B</td>
</tr>
</tbody>
</table>
### (B) LIST OF STANDARD DRAWINGS FOR TRAMWAY TYPE OHE (REGULATED)

<table>
<thead>
<tr>
<th>SL. No</th>
<th>Brief Description</th>
<th>Drawing</th>
<th>Mod. No.</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Series</td>
<td>Number</td>
</tr>
<tr>
<td>1.</td>
<td>Span and stagger chart for Tramway type OHE (Regulated)</td>
<td>ETI/OHE/G</td>
<td>04201</td>
</tr>
<tr>
<td>2.</td>
<td>Drilling schedule of OHE mast 8.5m &amp; 9m ling RSJ and BFB for Tramway OHE (Regulated) respectively.</td>
<td>ETI/OHE/G</td>
<td>04202 Sh.1 Sh.2</td>
</tr>
<tr>
<td>3.</td>
<td>Schematic arrangement of (regulated) tramway type OHE.</td>
<td>-do-</td>
<td>04203</td>
</tr>
<tr>
<td>4.</td>
<td>Arrangement of bracket assembly for Tramway Type OHE (regulated)</td>
<td>-do-</td>
<td>04204</td>
</tr>
<tr>
<td>5.</td>
<td>Arrangement of anti-creep for Tramway Type OHE (regulated)</td>
<td>ETI/OHE/G</td>
<td>04205</td>
</tr>
<tr>
<td>6.</td>
<td>Arrangement of anticreep for Tramway OHE (Regulated alternative arrangement)</td>
<td>-do-</td>
<td>04206</td>
</tr>
<tr>
<td>7.</td>
<td>Arrangement of section Insulator for Tramway Type OHE (Regulated)</td>
<td>-do-</td>
<td>04207 Sh.1</td>
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<tr>
<td>8.</td>
<td>Small parts steel for supporting section insulator assembly for regulated Tramway Type OHE.</td>
<td>-do-</td>
<td>04207 Sh.2</td>
</tr>
<tr>
<td>9.</td>
<td>General arrangement of turnouts for Tramway type OHE (Regulated)</td>
<td>ETI/OHE/G</td>
<td>04208</td>
</tr>
<tr>
<td>10.</td>
<td>Adjustment chart for Tramway type OHE (Regulated)</td>
<td>ETI/OHE/G</td>
<td>04209</td>
</tr>
<tr>
<td>11.</td>
<td>Bridle wire clamp (6 mm) with two bolts</td>
<td>ETI/OHE/P</td>
<td>1070-1</td>
</tr>
<tr>
<td>12.</td>
<td>Large suspension clamp 20mm (with armour rod)</td>
<td>ETI/OHE/P</td>
<td>1580 Sh-2</td>
</tr>
<tr>
<td>13.</td>
<td>Hook Bracket</td>
<td>ETI/OHE/P</td>
<td>2380</td>
</tr>
<tr>
<td>14.</td>
<td>Counter weight assembly (light)</td>
<td>ETI/OHE/P</td>
<td>5090-3</td>
</tr>
<tr>
<td>15.</td>
<td>Counter weight assembly (For Tramway Type OHE) (1250 Kgf)</td>
<td>-do-</td>
<td>5090-6</td>
</tr>
<tr>
<td>16.</td>
<td>Employment schedule for tramway type regulated OHE without R.C. and E.W. (W.P.112.5 kgf/sq.m)</td>
<td>ETI/C</td>
<td>0705</td>
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<tr>
<td>Sl. No</td>
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<td>--------</td>
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<td>17.</td>
<td>Protective screen at FOB/ROBs</td>
<td>ETI/C 0068</td>
<td>G</td>
</tr>
<tr>
<td>18.</td>
<td>Proposed height gauges at level crossings upto 7.30m spans</td>
<td>TI/DRG/C-IV/HGAUGE/RDSO/00001/05/0</td>
<td>TI/DRG/C-IV/ HGAUGE/RDSO/00002/05/0</td>
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### LIST OF STANDARD SPECIFICATIONS

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>TITLE OF SPECIFICATION</th>
<th>SPECIFICATION NO</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Annealed stranded copper conductor for jumper wire.</td>
<td>ETI/OHE/3(2/94) with A&amp;C slip No.1</td>
</tr>
<tr>
<td>2.</td>
<td>Copper busbar</td>
<td>RE/30/OHE/5(11/60)</td>
</tr>
<tr>
<td>3.</td>
<td>Structural steel tubes.</td>
<td>ETI/OHE/11 (5/89)</td>
</tr>
<tr>
<td>4.</td>
<td>Hot dip galvanisation of steel mast (Rolled and Fabricated) tube and fittings used on 25 kV AC OHE.</td>
<td>ETI/OHE/13(4/84) with A&amp;C slip No. 1 to 3</td>
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<tr>
<td>5.</td>
<td>Stainless steel wire ropes</td>
<td>TI/SPC/OHE/WR/1060 with A&amp;C slip No 1</td>
</tr>
<tr>
<td>6.</td>
<td>Solid core porcelain insulators for 25 kV 50 Hz over head lines</td>
<td>TI/SPC/OHE/INS/0070</td>
</tr>
<tr>
<td>7.</td>
<td>25 kV single and double pole isolators.</td>
<td>ETI/OHE/16(1/94) with A&amp;C Alip No.1 &amp; 2</td>
</tr>
<tr>
<td>8.</td>
<td>Bolts nuts and washers</td>
<td>ETI/OHE/18(4/84) with A&amp;C slip No.1 &amp; 4</td>
</tr>
<tr>
<td>9.</td>
<td>Aluminum alloy section and tubes</td>
<td>ETI/OHE/21(9/74)</td>
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<td>11.</td>
<td>Section Insulators assembly.</td>
<td>TI/SPC/OHE/LWTSI/0060 (Light weight) OR ETI/OHE/27(8/84) with A&amp;C slip No.1 (Conventional)</td>
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<tr>
<td>12.</td>
<td>Enamelled steel plates</td>
<td>ETI/OHE/33(8/85)</td>
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<tr>
<td>13.</td>
<td>Galvanised steel wire</td>
<td>ETI/OHE/36(12/73) with A&amp;C Slip No.1</td>
</tr>
<tr>
<td>14.</td>
<td>Regulating Equipment 3 pulley Type (3:1 Ratio)</td>
<td>TI/SPC/OHE/ATD/0060 with A&amp;C Slip No.1</td>
</tr>
<tr>
<td>15.</td>
<td>Fitting for 25 kV 50 HZ AC Overhead Traction equipment.</td>
<td>ETI/OHE/49(9/95) with A&amp;C Slip No.1 to 4</td>
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<tr>
<td>16.</td>
<td>Cadmium copper conductor for overhead Rly. Traction</td>
<td>ETI/OHE/50(6/97) with A&amp;C slip No.1</td>
</tr>
<tr>
<td>17.</td>
<td>Principle of OHE layout plan and sectioning diagrams for 25 kV AC traction.</td>
<td>ETI/OHE/53(6/88) with A&amp;C slip no.1 to 5</td>
</tr>
<tr>
<td>18.</td>
<td>All Aluminum alloy stranded catenary wire 19/2.79mm.</td>
<td>ETI/OHE/54(2/85) with A&amp;C slip No.1 &amp; 2</td>
</tr>
<tr>
<td>20.</td>
<td>Short Neutral Section Assembly (Phase Break)</td>
<td>TI/SPC/OHE/SNS/0000 of (1/2000)</td>
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<tr>
<td>21.</td>
<td>Code for bonding and earthing for 25kV single phase, 50 Hz AC traction system.</td>
<td>ETI/OHE/71(11/90) with A&amp;C slip no. 1&amp;2</td>
</tr>
<tr>
<td>22.</td>
<td>Insulated Cadmium copper catenary 19/2.10mm dia for provision under overline structures in the 25kV AC Electric Traction.</td>
<td>TI/SPC/OHE/INSCAT/0000 of (4/2000)</td>
</tr>
<tr>
<td>23.</td>
<td>Battery charger for 110 V battery, 40 AH</td>
<td>ETI/PSI/1(6/81)</td>
</tr>
<tr>
<td>24.</td>
<td>7.5 kV Lightning arrester</td>
<td>ETI/PSI/3(8/75) with A&amp;C slip No.1</td>
</tr>
<tr>
<td>25.</td>
<td>25kV Potential transformers</td>
<td>TI/SPC/PSI/PTS/0990 with A&amp;C slip No.1 to 3</td>
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</tbody>
</table>
26. 25 kV Dropout fuse switch & operating pole for use with 10 kVA and 100 kVA. 25 kV 230 V L.T. Supply transformer. ETI/PSI/14(1/86) with A&C slip no 1
27. 25 kV/240V, 5,10, 25 & 50 kVA L.T. Supply Transformer. ETI/PSI/15(8/03)
28. 110V, 40AH Lead Acid batteries. RDSO/PE/SPEC/TL/0040-2003(Rev-0) with A&C slip no 1
29. 150 kVA Booster Transformers -Dry type ETI/PSI/97(6/87) with A&C slip No.1
- Oil filled ETI/PSI/98/892 with A&C slip No.1 to 3
30. 25 kV single pole out door Vacuum Interrupter ETI/PSI/167(9/97) with A&C slip no 1 or TI/SPC/PSI/VACINT/ 0040
31. Contact wire ETI/OHE/76(6/97) with A&C slip No.1 to 4
32. Metal Oxide Gapless type Lightning Arrester use on 25kV side ETI/PSI/71 Rev.1(1/87) with A&C Slip No.1 to 6

(D) LIST OF IS SPECIFICATION

| IS:2062-1999 | Steel for general structural purpose |
| IS:808-1989 | Dimensions for hot rolled steel beam, column, channel & angle sections |
| IS:1731-1971 | Dimensions for steel flats for structural & general engineering purpose |
| IS:2004-1991 | Carbon steel forgings for general engineering purpose |
| IS:1608-1995 | Mechanical testing of metal- tensile testing |
| IS:816-1969 | Welding |
| IS:731-1971 | Porcelain Insulator for overhead power lines with a nominal voltage greater than 1000V |
| IS:3188-1980 | Characteristics of string insulator units |
| IS:282-1982 | Dropper Wire |
| IS:9968(Pt.2)-2002 | Annealed Copper Jumper Wire |
| IS:694:1990 | Al. Jumper wire |
| IS:398(P.T.I)-1996 | All Aluminum conductor |
| IS:2673-2002 | Dimensions for Aluminum Tubular Busbar. |
| IS:2141-2000 | Galvanised stay strand |
| IS:1554(Part-I)1988 | PVC insulated cables |
| IS:306-1983 | Tin bronze castings |
| IS:3091-1999 | Aluminum bronze castings |
| IS:2108-1977 | Malleable iron castings |
| IS:210-1993 | Grey iron castings |
| IS:617-1994 | Aluminum castings |
| IS:1897-1983 | Copper strip for formed fittings |
| IS:2074-1992 | Ready mix Paint, air drying, Redoxide, Zinc crome |
| IS:398 Pt.II-1996 | Al.conductor for overhead transmission purposes |
| IS:383-1970 | Specification for coarse & fine aggregates from natural sources for concrete |
| IS: 2386 Pt.III·1963 | Method of tests for aggregates for concrete Pt.III Specific gravity, density voids, absorption & buckling |
| IS: 516·1959    | Method of tests for strength of concrete                  |
| IS: 8130·1984   | Conductor for Insulated electric cables & flexible cords (1st Rev) |
| IS:335·1993     | New Insulating oil (4th Rev) Reaffirmed 2000            |
| IS:3837·1976    | Accessories for Rigid steel conduit for electrical wiring |
| IS:4826·1979    | Specification for hot dipped for galvaised coatings on round steel wires (1st Rev) |
| IS:13947 Pt.III·1993 | Specification for low voltage switchgear & control gear Pt.:3, disconnectors & fuse combination unit |
| IS:3854·1997    | Switches for domestic & similar purposes(2nd Rev)       |
| IS:1293·2005    | Plugs & socket outlets of rated voltage upto and including 250V and rated current upto 16 Amp(3rd Rev) |
| IS:371·1999     | Ceiling rose spec. (3rd Rev)                            |
| IS:1777·1978    | Industrial Luminaries with metal reflectors (1st Rev)   |
| IS:2312·1967    | Propeller type AC ventilating fans (1st Rev)            |
| IS:732·1989     | Code of practice for electrical wiring installation (3rd Rev) |
| IS:2675·1983    | Enclosed distribution fuse boards ad cut-outs for voltage not exceeding 1000V AC & 1200V DC (2nd Rev) |
| IS:800·1984     | Code of practice for general construction in steel (2nd Rev) |
| IS:9537 Pt.I·1980 | Conduits for electrical installations                   |
| IS: 432 Pt.1·1982 | Specification for mild steel & medium tensile steel bars and hard drawn steel wires for concrete reinforcement |
| IS:1786·1985    | Specification for high strength deformed steel bars and wires for concrete reinforcement |
ANNEXURE - 3

REQUIREMENT OF SPARES

As per Schedule – 4

SCHEDULE-4
SUPPLY OF SPARES

Deleted

ANNEXURE - 4

LIST OF ITEMS TO BE SUPPLIED BY PURCHASER TO THE CONTRACTOR
EQUIPMENTS, FITTINGS AND FINISHED MATERIAL

(Furnished in Vol. I)

ANNEXURE - 5

LIST OF TOOLS AND PLANTS FOR MAINTENANCE

(See Schedule - 5: Form - 9)

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ANNEXURE - 6

UNIT QUANTITIES OF FINISHED WIRES AND
CONDUCTORS FOR VARIOUS ITEMS OF WORK

<table>
<thead>
<tr>
<th>Wire/Conductor</th>
<th>Applicable linear density Kg/m</th>
<th>Bare unit Item No. requirement per unit or work Sch.1</th>
<th>Allowance for erection per unit of work</th>
<th>Total requirement per unit of work returnable as scrap (Col.4 &amp; 5)</th>
<th>Remarks</th>
</tr>
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<tbody>
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ANNEXURE - 7

List of bridges on which traction structures will be located

Between Samayanallur and Koodal Nagar (Km.486/877.10-962.38) Bridge No.1460
No of Bridge Mast proposed is 2 nos.
PART - V
FORMS OF TENDERS ETC.

FORM NO:

1. : Offer letter
2. : Memorandum of the Tenders.
3. : Deviations from the Tender Paper.
4. : Alternative proposals of the Tenderer.
5. Schedule-1 Section - 1 : Schedule of Prices (Unit Prices)
   Schedule-1 Section - 3 : Deleted
6. Schedule-2 : Deleted
7. Schedule-3 Section - 1 : Schedule of 'On account' rates.
   Schedule-3 Section - 2 : Deleted
8. Schedule - 4 : Schedule of Spares
9. Schedule - 5 : Deleted
10. : Tenderer's scheme of work and time schedule.
11. : Names of manufacturers, places of manufacture and inspection of supplies.
12. : Tenderer's credentials.
13. : Deleted
14. : Agreement.
16. : Standing Indemnity Bond.
17. : Extension of period of completion work on contractor's account.
18. : Extension of period of completion on work on purchaser's account.
19 : proforma for Guarantee Bond
20 : Joint Venture forms
Form-1

From _____________________

_______________________

To

The President of India,
Acting through the Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008 or
his successor

Dear Sir,

Sub : Tender for “___________________________________________________
_________________________________________________ ____________
_________________________________________________ ____________
_______________________”. Regarding.

******

1. I/We, the undersigned hereby offer to execute the works relating to “____________
---------------------------------------------------------------------
---------------------------------------------------------------------
---------------------------------------------------------------------
---------------------------------------------------------------------
---------------------------------------------------------------------
---------------------------------------------------------------------
---------------------------------------------------------------------
within a period of ____months from the date of issue of Letter of Intent/Letter of
Acceptance of Tender and in strict compliance with the provisions detailed in the Tender Papers appended
hereto including Instructions to contract and specifications as included therein and as modified by this Tender
at such rates as are specified in Schedule and of this tender enclosed within a sealed cover. Summary of
prices given in Part 'B'.

2. I/We agree that this/these tender/s shall not be restricted or withdrawn and shall remain open for
acceptance for and during the period of four months from the date fixed for opening the same subject to the
stipulation mentioned in Clause 1.1.5 and will continue to be open even beyond the period of four months till
withdrawn or rejected or accepted as the case may be.

3. I/We fully understand the terms, conditions and other provisions as contained in the Tender papers and
I/We agree that same shall apply to my/our Tender/s as modified by my/our Tenders and I/We shall be bound by
them.

4. I/We have deposited with the Senior Assistant Financial Adviser, Railway Electrification, Chennai Egmore -
600 008, the required EMD for this Tender/s for which Receipt No. __________ has been granted.

The full value of Earnest Money shall stand forfeited without prejudice to other rights and remedies if

(a) I/We do not execute the contract documents within 21 days of receipt
of notice by the Railways that such documents are ready or

(b) I/We do not commence work within 10 days of receipt of the instructions to that effect.

3. I/We enclose the Income-tax clearance Certificate in the prescribed form or a declaration to that effect
as required under Para 1.1.6 of the Tender Papers pertaining to me/us for the year.

4. I/We have no retired engineer or retired gazetted officer of the Electrical/Engineering Department of any
of the Railways owned and administered by the President of India.

OR
The list of retired engineers or retired gazetted officers who are associated with me/us, is included as an enclosure to this offer Letter.

Yours faithfully

Seal of the Tenderer

Signature/s of the Tenderer/s

Place :

Date :

Witnessed by

1.

Signature
Name in Block Letters
Address

2.

Signature
Name in Block Letters
Address

* Tenderer's full name and address

** Here enter particulars and form of deposit as detailed in para 1.1.5 @ See para 1.1.19 C
MEMORANDUM OF THE TENDERER

DEVIATIONS FROM THE TENDER PAPERS
- Deleted -

ALTERNATIVE PROPOSALS OF THE TENDERER

<table>
<thead>
<tr>
<th>Paper No. of The tender</th>
<th>Alternative Proposals</th>
<th>Technical advantages and/or financial implication of the proposal</th>
</tr>
</thead>
</table>

SCHEDULE – 1 : SCHEDULE OF PRICES

SCHEDULE – 3 : SUPPLEMENT TO SCHEDULE OF UNIT PRICES
- Deleted –

LIST OF THE IMPORTED SPECIAL TOOLS, PLANT EQUIPMENT AND MATERIALS FOR CONSTRUCTION
-Deleted-

SCHEDULE - 3
SECTION - 2
- Deleted -

SCHEDULE - 5
- DELETED -
TENDER'S SCHEME OF WORK AND TIME SCHEDULE.

I. OVERHEAD EQUIPMENT

Issue of preliminary layouts and site allocations:
Submission of layout plant for walk-outs and approvals:
Approval of layout plans:
Preparation and submission of Drawings and approval:
Approval of Drawings:
Ordering of steel work on the Purchaser:
Bulk order for materials:
Detailed ordering of materials:
Foundation installation:
Delivery of steel work:
Steel work erection:
Delivery of materials:
Wiring and testing:
Guarantee period:

MONTHS.
FORM - 10
SHEET - 2

BOOSTER TRANSFORMERS STATIONS.
Deleted

FORM - 11

NAMES OF MANUFACTURERS, PLACES OF MANUFACTURE AND
INSPECTION OF SUPPLIES

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description of item</th>
<th>Name and address of manufacturers</th>
<th>Place of manufacturers</th>
<th>Place of Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
</tbody>
</table>

FORM - 12

TENDERERS CREDENTIALS

Please fill in the questioner below

1. (a) Give details of your previous experience on installation of similar equipments.
   
   (b) Give details of similar works presently under execution their completion period.

2. Have entered into technical collaboration with any consultants to assist you in this work? If so, give full particulars.

3. (a) (i) Give details of technical personnel employed alongwith date of joining the service with the tenderer.
   (ii) Details of the personnel proposed to be engaged for this subject work

   (b) List of plants, tools and equipments owned by the firm and proposed to be used on this work.

4. Give the names of principal manufacturers from whom supply is assured.

5. Give constitution of your firm. Attach certified copies of legal documents in support thereof.

NOTE: This form shall be filled precisely and with full details.
**Form – 12A**

**SOLVENCY CERTIFICATE**

(Issued by Scheduled/Nationalised Banks)

This is to Certify _______________________________ (Name of the tenderer) – is a customer in our bank maintaining ……………………………….. account (nature of account)

The party is financially sound and is considered respectable and solvent to the extent of a sum of Rs. ……..(amount both in figures and word) as disclosed by the information and records which are available with us.

Date :
(Signature of the Manager)
Name of the Bank

---

**Form – 12B**

**PROFORMA FOR FURNISHING EXPERIENCE CERTIFICATE**

(Last 3 years preceding the date of opening of tender.)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Nature of Work</th>
<th>Value as per Agreement</th>
<th>Revised value</th>
<th>Payment received as per actual execution</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Total TKM of OHE as per Agreement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a)</td>
<td>OHE Energized at 2.2 kV</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>OHE Energized at 25 kV</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>OHE Commissioned for traffic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Details of Power Supply Installations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a)</td>
<td>Number of Switching stations covered under the agreement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>Number of Traction substation covered under the agreement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>Percentage/Number of completion of Power supply Installations under the agreement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Whether any penalty is imposed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Signature and Seal of the Authority issuing Certificate.
GUARANTEE BOND FOR EARNEST MONEY

- Deleted -
AGREEMENT

AN AGREEMENT MADE this_______ day of_____________ Two thousand and ____(year)
between the President of India, acting through the Dy. Chief Electrical Engineer, Railway Electrification, Egmore,
Chennai-600 008 or his successor of the Ministry of Railways, Railway Board (herein after referred to as 'The
Purchaser') on one part and Messers _____________ (hereinafter referred to as the 'Contractor' of the other part.

WHEREAS in response to a call for Tenders for ‘____ _________ ‘section (Name of the work) of the
_________________ Railway as per Tender Paper No.__ __________ at Annexure 'A' hereto, the Contractor
has submitted a Tender as per Annexure 'B' hereto and whereas the said Tender of the Contractor has been
accepted for ________________ as per copy of the Letter of Acceptance of Tender No.__________ dated____________ complete with enclosures at the accepted rates and agreed deviations from Tender
Paper No.__________ as per Annexure 'C' hereto and at an estimated contract value of Rs.___________ __
(Rupees _____________________ only) Now this agreement with witnesseth to that in consideration of
the premises and the payment to be made by the Purchaser to the Contractor provided for herein below the
Contractor shall supply and equipments and materials and execute and perform all works for which the said
Tender of the Contractor has been accepted, strictly according to the various provisions and Annexures 'A' and
'C' hereto and upon such supply, execution and performance to the satisfaction of the Purchaser, the
Purchaser shall pay to the Contractor at the rates accepted as per the said Annexure 'C' and in terms of the
provisions therein.

IN WITNESS where of the parties have hereto set and subscribed their respective hands and/or
seals the day, month and year respectively mentioned against their respective signatures.
Signed and delivered at ________ by Shri_________ _______ for and on behalf of
Messrs________________________ the Contractor within names in the presence of :

1. Signature 1. Signature
Date Date
Name in Block Capitals Name in Block Capitals
Address Address

Signed and delivered at _________________ for and on behalf of the President of India by Shri
Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008 or his
successor, Ministry of Railway (Railway Board) in the presence of :

1. Signature
Date
Name in Block Capitals
Address

2. Signature
Date
Name in Block Capitals
Address

Annexure 'A' Tender Paper No.
Annexure 'B' Firm's Tender No.
Annexure 'C' Letter of Acceptance of Tender No.__________ dated ____________
complete with enclosures.
Form - 15
(On Stamp Paper of requisite value)
GUARANTEE BOND (A)
(To be used by approved Scheduled Banks)

1. In consideration of the President of India, acting through the Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008 or his successor of the Ministry of Railways, Railway Board (hereinafter called 'The Government') having agreed to exempt ______________ called the said Contractor(s) from the demand, under the terms and conditions of Agreement dated ___________ made between __________ and ______________ for ______________ (hereinafter called 'the said Agreement'), of security deposit for the due fulfilment by the said Contractor(s) of the terms and conditions contained in the said Agreement on production of a Bank Guarantee for Rs. ______________ (Rupees _______________ only) We ______________ (indicate the name of Bank) (hereinafter referred to as 'the Bank') at the request of ________________ (Contractor(s) do hereby undertake to pay to the Government an amount not exceeding Rs. ______________ against any loss or damage caused to or suffered or would be caused to or suffered by the Government by reason of any breach by the said Contractor(s) of any of the terms of any breach by the said Contractor(s) of any of the terms or conditions contained in the said Agreement.

2. We, ________________ (indicate the name of the bank) do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from the Government stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Government by reason of breach by the said Contractor(s) of any of the terms of conditions contained in the said Agreement or by reason of the Contractor(s) failure to perform the said Agreement. Any such demand made on the bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. ______________

3. We undertake to pay to the Government any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s)/Supplier(s) in any suit or proceeding pending before any court or tribunal relating there to our liability under this present being absolute and unequivocal. The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder and the Contractor(s)/Suppliers shall have no claim against us for making such payment.

4. We, ______________ further agree that the guarantee (indicate the name of the bank) in contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till ________ Office / Department / Ministry of ________________ certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee. Unless a demand or claim under this guarantee is made on us in writing on or before the_________ (B) we shall be discharged from all liability under this guarantee thereafter.

5. We, ______________ further agreed with the Government that (indicate the name of the Bank) the Government shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said Contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Government against the said Contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said contractor(s) or by any such matters or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s)/Supplier(s).

7. We, ________________ lastly undertake not to revoke this (indicate the name of the bank) guarantee during its currency except with the previous consent of the Government in writing.

Dated, the __________ day of __________________ for ____________________

(indicate the name of the Bank)
(A) See Para 1.2.17 and 1.2.56

(B) The guarantee shall be valid for a period of two months after the expiry of the guarantee period of the equipment under Para 1.2.49.

----------
We, M/s ______________________ hereby undertake that we hold at our stores Depot/s at___________ for and on behalf of the President of India, acting through the Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008 or his successor of the Ministry of Railways, Railway Board (hereinafter referred to as 'the Purchaser') all materials for which 'On Account' Payment have been made to us against the Contract for supply and erection of OHE/PSI installations and materials issued to us as per Annexure – 4, Part – B and associated equipment of 25 kV A.C. ______________ on the section/s ______________ Letter of Acceptance of Tender No._____________ dated______________ and materials handed over to us by the Purchaser for the purpose of execution of the said Contract, until such time the materials are duly erected or otherwise handed over to him.

We shall be entirely responsible for the safe custody and protection of the said materials against all risk till they are duly delivered as erected equipment to the Purchaser, or as he may direct otherwise and shall indemnify the Purchaser against any loss, damage or deterioration whatsoever in respect of the said materials while in our possession and against disposal of surplus materials. The said materials shall at all times be open to inspection by any officer authorised by the Dy.Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008 or his successor (whose address will be intimated in due course).

Should any loss, damage or deterioration of materials occur or surplus materials disposed off and a refund becomes due, the Purchaser shall be entitled to recover from us the full cost as per prices included in Schedule-3 to the contract (As applicable), and in respect of other materials as indicated in Part-I, Chapter-IV, Section-1 and also compensation for such loss or damage, if any, along with the amount to be refunded without prejudice to any other remedies available to him by deduction from any sum due or any sum which at any time hereafter become due to us under the said or any other Contract.

Dated this_______ day of____________200____
For and on behalf of Messrs______________________(Contractor)

Signature of Witness:

Name of Witness IN BLOCK LETTERS

Address:
Dear Sir,

The stipulated date for completion of the work mentioned above is ___________. From the progress made so far and the present rate of progress, it is unlikely that the work will be completed by the above date (or however, the work was not completed on this date).

Expecting that you may be able to complete the work if some time is given, the _______ (insert here the contracting party on behalf of the President of India) although not bound to do so, hereby extends the time for completion from ___________ to ___________.

Please note that an amount equal to Rs. 4000/- per day subject to a maximum of 10% of the estimated value of the OHE/PSI installations as a recovery for delay in the completion of the work after the expiry of ___________ (give here the stipulated date for completion without any penalty fixed earlier) will be recovered from you as mentioned in Para 1.2.44 of the conditions of contract for the extended period not withstanding the grant of this extension. You may proceed with the work accordingly.

The above extension of the completion date will also be subject to the further condition that no increase in rates on any account will be payable to you.

Please intimate within a week of the receipt of this letter your acceptance of the extension on the conditions stated above.

Please note that in the event of your declining to accept the extension on the above said conditions or in the event of your failure after accepting or acting up to this extension to complete the work by ___________ (here mention the extended date), further action will be taken in terms of Para 1.2.29 and 1.2.30 of the conditions of contract.

Yours faithfully,

(__________)

for & on behalf of The President of India
Form - 18

EXTENSION OF PERIOD OF COMPLETION OF WORK

(Registered with Ack. Due)

No. ______________                             Date ___________

To

------------------------------------------------------------

Dear Sirs,

Sub:  

i) ----------------------------------------------------  (Name of work)

ii) Acceptance Letter No. -------------- -----date -----------------------

iii) Understanding/Agreement No. -------------------------------

Ref:  --------------------------------------------- (Quote specific application of the Contractor for extension to the date if received).

------------

The stipulated date for completion of the work in .......... Group under the above contract was ............ .In consideration of the Contractor’s Letter No. ............ of ............ The General Manager or his successor on behalf of the President of India, is pleased to grant extension of the time for completion of works in accordance with Note 1 and / or Notes 2 under para 1.2.45 of the Contract, as mentioned below : -

................................................................................................................

................................................................................................................

................................................................................................................

It may be noted that unless repugnant to the context all the terms and conditions of the Contract will remain unaltered during the extended period from ............ to ............ also, and further, no increased/ additional rates and claims or recoveries which have not been already envisaged in terms of the conditions of the Contract will be leviable either by you or by the Purchaser in respect of this extended period.

Yours faithfully,

For & on behalf of the President of India.
FORM-19
PROFORMA FOR GUARANTEE BOND

GUARANTEE BOND TOWARDS PERFORMANCE OF CONTRACT.

BG No________________
Date _________________
Value ________________
Valid upto ____________

In consideration of the President of India (herein after called “the Government”) having agreed to exempt Shri ______________________________________ (herein after “the said contractor”) from the demand under the terms and conditions of the Agreement under execution between the President of India acting through the Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600008 and ______________________________________________________ (“the said contractor) in terms of Agreement No. ______________________________ (name of work) by the said contractor of the terms and conditions contained in the said agreement on production of Bank Guarantee for Rs. ______________________ (in words) as a security towards satisfactory performance of the work from the said contractor for compliance of his obligations in accordance with the terms and conditions in the said Agreement, We, ___________________________________________ (name of Bank and address) (“hereinafter called the Bank”) do hereby undertake to pay to the Government an amount not exceeding Rs. ______________________ (in words) against any loss or damage caused to or suffered by or would be caused or suffered by the Government by reasons of any breach by the said contractor of any terms and conditions in the said Agreement towards performance of the Contract assigned.

2) We, ___________________________________________ (name of Bank) do hereby undertake to pay the amounts due and payable under this Guarantee without any demur, merely on a demand from the Government stating that the amount claimed is required to meet the recoveries due or likely to be due from the said Contractor. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this Guarantee. However, our liability under this Guarantee shall be restricted to an amount not exceeding Rs. ______________________ (in words).

3) We further undertake to pay to the Government any money so demanded not withstanding any disputes or dispute raised by the said Contractor in any suit or proceeding pending before any Court or Tribunal relating thereto, our liability under this present being absolute and unequivocal. The payment so made us under this Bond shall be a valid discharge of our liabilities for payment thereunder and the said Contractor shall have not claim against us for making such payment.

4) We, ___________________________________________ (name of Bank) agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement including the maintenance period and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till the Dy. Chief Electrical Engineer, Railway Electrification, Egmore, Chennai-600 008, certified that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor and accordingly discharges this Guarantee. Unless a demand or claim under this Guarantee is made on us in writing on or before the expiry of ______________________ (date) we shall be discharged from all liability under this Guarantee thereafter.

5) In the event of the period of contract being extended and the Contractor fails to extend the validity of this Guarantee for a further period to cover the extended period of contract before the validity date of this Guarantee, a mere demand or claim made on the Bank by the Government on or before the date of discharge of this Bond to the effect that the Contractor has failed to extend the validity of this Bond can be conclusive as...
regards the amount due and payable by the Bank under this Guarantee unless the Contractor extends the validity and the Bank shall pay the amount forthwith to the Government.

6) We, ___________________________________________ (name of Bank) further agree with the Government that the Government shall have the fullest liberty without our consent and without effecting in any manner out obligations here under to vary any of the terms and conditions from time to time or to postpone from time to time any of the powers exercisable by the Government against the said Contractor and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extensions being granted to the said Contractor or for any forbearance act of omissions on the part of the Government or any indulgence by the Government to the said Contractor or by any such matter of thing whatsoever under the law relating to sureties would but for this provision have effect of so relieving us.

7) The Guarantee will not be discharged due to any change in the Constitution of the Bank or of the said Contractor.

8) We ___________________________________________ (name of Bank) lastly undertake not to revoke this Guarantee except with the previous consent of the Government in writing.

9) This Guarantee shall be valid upto ___________________(date) being the tentative completion period of the contract including the maintenance period unless extended or demanded by the Government.

Notwithstanding anything contained herein.

1) Our liability under this Bank Guarantee shall not exceed Rs. ______________________ (in words).
2) This Bank Guarantee shall be valid upto _______________(date)
3) We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only if you serve upon us and we receive a written claim or demand on or before ___________________(date) being the expiry of the validity period of Performance Guarantee Bond. Our liability under this Bank Guarantee shall be fully discharged beyond the validity period and you shall not have any claim against this Bank Guarantee.

In witness whereof We, ____________________________________ (name of Bank with address) hereby affix our hand and seal on this the ____________________________ day of _______________2006.

Authorised Signatory of the Bank  With seal

Annexure JV - 1

FORMAT FOR POWER OF ATTORNEY FOR AUTHORISED SIGNATORY OF JOINT VENTURE (JV) PARTNERS

POWER OF ATTORNEY*

(To be executed on non-judicial stamp paper of the appropriate value in accordance with relevant stamp Act. The stamp paper to be in the name of the company who is issuing the Power of Attorney.)

Know all men by these present, we . . . . . . do hereby constitute, appoint and authorise Mr/Ms. . . . . . . who is presently employed with us and holding the position of . . . . as our attorney, to do in our name and on our behalf, all such acts, deeds and things necessary in connection with or incidental to our bid for the work of including signing and submission of all documents and providing information/ responses to, Railway
Electrification, Chennai Project representing us in all matters, dealing with Railway Electrification, Chennai Project in all matters in connection with our Tender for the said project.

We hereby agree to ratify all acts, deeds and things lawfully done by our said attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid attorney shall and shall always be deemed to have been done by us.

Dated this the . . . . . . . . . day of . . . . . . . 200…

(Signature of authorised signatory)

........................................
(Signature and Name in Block letters of Signatory)
Seal of Company

Witness:

Witness 1:  
Name :  
Address :  
Occupation :

Witness 2:  
Name :  
Address :  
Occupation :

Notes:

i) To be executed by all the partners individually, in case of a Joint Venture.

ii) The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure.
Annexure JV - 2
FORMAT FOR POWER OF ATTORNEY TO LEAD PARTNER OF JOINT VENTURE (JV)

(To be executed on non-judicial stamp paper of the appropriate value in accordance with relevant stamp Act. The stamp paper to be in the name of the company who is issuing the Power of Attorney.

POWER OF ATTORNEY
Whereas Southern Railway Construction Organisation has invited Tender for the work of

Whereas, the members of the Joint Venture comprising of M/s. . . . . . . . M/s. . . . . . . . . and M/s. . . . . . . . , are interested in submission of bid for the work . . . (insert name of work). . . in accordance with the terms and conditions contained in the bidding documents.

Whereas, it is necessary for the members of the Joint Venture to designate one of them as the Lead Partner, with all necessary power and authority to do, for and on behalf of the Joint Venture, all acts, deeds and things as may be necessary in connection with the Joint Venture’s bid for the project, as may be necessary in connection the Joint Venture’s bid for the project.

NOW THIS POWER OF ATTORNEY WITNESSETH THAT:

We, M/s. . . . . . . . . . . . . . . , hereby designate M/s. . . . . . . . . . . . . . . , being one of the partners of the Joint Venture, as the lead partner of the Joint Venture, to do on behalf of the Joint Venture, all acts, deeds or things necessary or incidental to the Joint Venture’s Tender for the contract, including submission of Tender, participating in conferences, responding to queries, submission of information/documents and generally to represent the Joint Venture in all its dealings with the Railway or any other Government Agency or any person, in connection with the contract for the said work until culmination of the process of Tendering till the contract agreement is entered into with the Railway Electrification, Chennai Project and thereafter till the expiry of the maintenance period.

We hereby agree to ratify all acts, deeds and things lawfully done by lead member, our said attorney pursuant to this power of attorney and that all acts deeds and things done by our aforesaid attorney shall and shall always be deemed to have been done by us/Joint Venture.

Dated this the . . . . . . . . day of . . . . . . 200. . . . . . . . . . . .

(Signature)

Notes:

i) To be executed by all the partners individually, in case of a Joint Venture.
ii) The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure.

(Name in Block letters of Executant)
Seal of Company
Witness 1: Witness 2:
Name : Name :
Address : Address :
Occupation : Occupation :
Annexure JV - 3

DRAFT MEMORANDUM OF UNDERSTANDING (MOU) FOR

JOINT VENTURE PARTICIPATION

BETWEEN

M/s…………….having its registered office at ……………. (hereafter referred to as …………………………………………………………………………..) acting as the Lead Partner of the first part.

And M/s………………………………..having its registered office at ………………… (hereafter referred to as ‘……………………..’) in the capacity of a Joint Partner of the other part.

The expressions of ……………… and …………… shall whatever 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; Railway Electrification, Chennai Project (hereinafter referred to as “Client”) has invited bids for ……….(insert name of work) …………………………………………………..

NOW, THEREFORE, THE PARTIES AGREE AS FOLLOWS:

1. The following documents shall be deemed to form and be read and construed as an integral part of this MOU.
   i) Notice for bid, and
   ii) Tender document
   iii) Any Addendum/Corrigendum issued by (Railway Electrification, Chennai Project )
   iv) The Tender submitted on our behalf jointly by the Lead Partner.

2. The ‘Parties’ have studied the documents and have agreed to participate in submitting a ‘Tender’ jointly.

3. M/s………….shall be the lead member of the JV for all indents and purpose and shall represent the Joint Venture in its dealing with the Client. For the purpose of submission of Tender proposals, the parties agree to nominate ………..as the leader duly authorized to sign and submit all documents and subsequent clarifications, if any, to the Client. However, M/s…………. shall not submit any such proposals, clarifications or commitments before securing the written clearance of the other partner which shall be expeditiously given by M/s………….. to M/s………….

4. The ‘Parties’ have resolved that the distribution of share and responsibilities is as under:

   a) Lead Partner share ……….%;
      Responsibilities. i) ………
      ii) ………
      iii) ………

   b) Joint Venture Partner’s share --------%
      Name ………………………………………
      Responsibilities. i) ………
      ii) ………
      iii) ………

   c) Joint Venture Partner’s share --------%
      Name ………………………………………
Responsibilities. i) .......... 
   ii) .......... 
   iii) .......... 

5. JOINT AND SEVERAL RESPONSIBILITY

The Parties undertake that they shall be jointly and severally liable to the client in the discharge of all the obligations and liabilities as per the contract with the client and for the performance of contract awarded to their JV.

6. ASSIGNMENT AND THIRD PARTIES

The parties shall co-operate throughout the entire period of this MOU on the basis of exclusively and neither of the parties shall make arrangement or enter into agreement either directly or indirectly with any other party or group of parties on matters relating to the Project except with prior written consent of the other party.

7. EXECUTIVE AUTHORITY

The said Joint Venture through its authorized representative shall receive instructions, payments from the client. The management structure for the project shall be prepared by mutual consultations to enable completion of project to quality requirements within permitted cost and time.

8. GUARANTEES AND BONDS

Till the award of the work, the lead partner shall furnish Earnest Money and all other bonds/guarantees to the Client on behalf of the Joint Venture, which shall be legally binding on all the partners of the Joint Venture.

10 INDEMNITY

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

11. For the execution of the respective portions of works, the parties shall make their own arrangements to bring the required finance, plants and equipment, materials, manpower and other resources.

12 DOCUMENTS & CONFIDENTIALITY.

Each Party shall maintain in confidence and not use for any purpose related to the Project all commercial and technical information received or generated in the course of preparation and submission of the bid.

13 ARBITRATION

Any dispute, controversy or claim arising out of or relating to this agreement shall be settled in the first instance amicably between the parties. If an amicable settlement cannot be reached as above, it will be settled by arbitration in accordance with the Indian Arbitration and Conciliation Act 1996 or any amendments thereof. The Venue of the arbitration shall be Chennai. This will be further subject to the provision/stipulation in Para 55 of Special Conditions of the Contract.

14 VALIDITY
This MoU/JV Agreement shall remain in force till the 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 Tender submitted by the joint venture is declared unsuccessful, or
b. Cancellation/shelving of the project by the client for any reasons prior to award of work

15 This MOU is drawn in ......number of copies with equal legal strength and status. One copy is held by M/s........ and the other by M/s. & .....M/s........ and a copy submitted with the proposal.

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

17 NOTICES

Notices shall be given in writing by Fax confirmed by registered mail or commercial courier to the following Fax numbers and addresses.

Lead Partner

----------------
(Name and Address)

Other Partner.

----------------
(Name and Address)

IN WITNESS WHEREOF THE PARTIES, have executed this MOU the day, month and year first before written.

M/s.……………… M/s.………………

................…................
(Seal) (Seal)

Witness:

1. …………………. (Name & Address)
2. …………………. (Name & Address)
Annexure JV - 4

DRAFT FORMAT OF JOINT VENTURE AGREEMENT

To be executed on no-judicial stamp paper of appropriate value in accordance with relevant Stamp Act and to be registered with appropriate authority under Registration Act.

The JV agreement shall be structured generally as per contents list given below:-

A. CONDITIONS AND TERMS OF JV AGREEMENT

1. Definitions and interpretation
2. Joint Venture – include Equity of members, transferability of shareholding of equity of a partner leaving during the subsistence of the contract.
3. Proposal submission.
4. Performance – To indicate scope of responsibility of each member
5. Language and law
6. Exclusively
7. Executive Authority
8. Documents
9. Personnel
10. Assignment and Third Parties.
11. Severability
12. Member in Default
13. Duration of the Agreement
14. Liability and sharing of risks
15. Insurance
16. Sharing of Promotion and project costs, Profits, Losses and Remuneration
17. Financial Administration and Accounting
18. Guarantees and Bonds
19. Arbitration
20. Notices
21. Sole Agreement and Variation

B. SCHEDULES

1. Project and Agreement particulars
2. Financial Administration Services
3. Allocation of the obligations
4. Financial Policy and Remuneration

SIGNATURE OF TENDERER/CONTRACTOR

END OF VOLUME 2

BOTH VOLUME 1 AND 2 SHALL BE SIGNED IN EVERY PAGES AND BE SUBMITTED AS TENDER DOCUMENT