

# NORTHERN RAILWAY



TENDER  
FOR

“Strengthening and improvement of Earthing  
and Bonding system of TRD Assets of  
Lucknow/NR Division.”

OFFICE  
OF  
SR. DIVISIONAL ELECTRICAL ENGINEER (TRD)  
DRM OFFICE  
NORTHERN RAILWAY  
Lucknow-226001

Tender no: TRD-08-SrDEE-LKO-26

**TOP SHEET****(A) Details to be filled in by Railway:**

Tender Notice No.	TRD-08-SrDEE-LKO-26
Name of work with its location:	“Strengthening and improvement of Earthing and Bonding system of TRD Assets of Lucknow/NR Division.”
Approximate cost of the work.	<b>Rs. 4,60,53,190.00</b>
Completion period	12 (Twelve) months
Earnest Money to be deposited	<b>Rs. 9,21,100/-</b>
Last Date/Time of uploading of Tenders	09.07.2026 upto 15.00 Hrs.
Date & time of opening of tender	Tender will be opened on 09.07.2026 after 15.00 Hrs.

**(B) Mandatory details to be filled in by tenderer while submitting their offer.**

1	Constitution of the firm/ Concern (Tick as applicable)	Sole Proprietorship/ Partnership Firm / Company/ JV/ Society/LLP/HUF
2	Full name of Sole Proprietorship/ Partnership firm/ Company/ JV/ Society (as the case may be)	
3	Year of formation/ incorporation	
4	PAN NO.	
5	Registered Office Address	
6	Address on which correspondence regarding this tender should be done	
7	Names of the Proprietor/ Partners/ JV members etc	
8	Contact No and e-mail id of authorized person under whose digital signature key tender document will be signed/uploaded on behalf of the tendering firm	

Note: (i) Special attention of tenderers is drawn to clause 1.1.4 of “Special tender condition & instruction to tenderers”, as per which the tender must submit along with tender, the documents mentioned therein pertaining to constitution of firm/ concern.

(ii) Special attention of tenderers is drawn to clause 1.1.12.2 of “Special tender condition & instruction to tenderers”, as per which they should submit the requisite documents along with tender pertaining to their technical & financial eligibility.

(iii) Special attention of tenderers is drawn to Annexure-B of Tender Notice.

Signature of the tenderer -----

Name of signatory: -----

**(C) Check List of Mandatory documents to be uploaded by the tenderer(s) while submitting their offer. (SINGLE PACKET)**

Tenderer must upload following documents without fail along with their offer.

1	Requisite earnest money, (ON LINE mode). (No Documentary Proof required). If exemption applied. (Documentary Proof required).
2	All requisite documents mentioned in clause 1.1.4 of "Special Tender Conditions and instruction to tenderers" pertaining to constitution of firm/concern. (As applicable).
3	All requisite documents/credentials mentioned in clause 1.1.12.2 of "Special Tender Conditions and Instructions to tenderers" pertaining to his/their technical and financial eligibility.
4	<b>Tenderers are compulsorily required to upload Certificate as per Annexure – 19 &amp; Annexure- 19(A) (if applicable) as stipulated in 1.1.3.10 &amp; 1.1.3.10.1 of "Special Tender Conditions and instruction to tenderers" without which the offer will be considered incomplete and will be rejected summarily.</b>
5	Tenderers are required to upload requisite details in prescribed proforma of Annexure-21, Annexure-18, Annexure- 6, Annexure-11, Annexure-12, Annexure-13, Annexure-14, Annexure-15, Annexure-16 & Annexure-9 without which the offer is liable to be rejected.
Not e	<p>i) Tenderer may please note that offers received without Annexure-19 as mentioned above, will be considered as incomplete &amp; invalid tender and for which contractor shall have no claim on Railway.</p> <p>ii) After opening of tender, any document/credential pertaining to technical, financial Eligibility and constitution of firm etc. shall neither be asked nor be entertained/considered under any circumstances and no claim or representation whatsoever from the tenderer in this regard shall be entertained. However, Railway reserves the right to ask for any clarification on the documents/credentials already submitted by the tenderer along with the offer.</p> <p>iii) <b>Tenderer may have to submit the original Documents in physical form at short notice whenever asked by Railway at any stage of tender evaluation process or even after finalization of tender.</b></p> <p>iv) <b>In E-tender, all submissions of documents are to be uploaded on web-site. There may be last minute hic-cups and delay in uploading the Documents and payment of Earnest Money etc. Tenderer's/Prospective bidders are advised to upload their offer well in time. Railway will not be responsible for any delay/non submission of offer due to any reason whatsoever.</b></p> <p>v) <b>Annexure 20 - Undertaking Regarding Employment/ Partnership of Retired Railway Employees.</b></p> <p>vi) <b>Annexure-21 Bid Security proforma</b></p>

**(D) PRECAUTIONS TO BE TAKEN FOR PREPARING LEGAL DOCUMENTS****(For guidance to Tenderer):****1. Non-Judicial stamp paper**

- (i) Should have been purchased in the name of the Company/firm/executants
- (ii) Should be purchased from the Place/State where the document is being executed.
- (iii) Values of the non-judicial stamp paper (NJSP) should be as mentioned in Tender conditions, where value of NJSP is not mentioned in the tender conditions, value of NJSP should as per the law of the state in which the document is being executed.
- (iv) Date of purchase of non-judicial stamp paper should be prior from the date of execution of document.

**2. Signature on the document**

- (i) The document should be signed on each page and also at the appropriate place meant for signature of executants/deponent.
- (ii) Signatory/executants should ensure that on the date of signing the document he/she has valid authority/attorney in his/her favour for signing.
- (iii) In affidavit declaration clause as well as verification clause both should be signed by deponent/executants.
- (iv) Where the document requires witnessing, it should be duly signed by witnesses along with their names and addresses.
- (v) On Power of Attorney, signatures of the Attorney holder should also be got done and attested by executants.

**3. Format of the document**

- (i) Where the format has been prescribed by the Railway, the document should be executed in that format.
- (ii) Date and place of execution should always be mentioned on the document.

**4. Notarization of document**

- (i) The document should be duly attested (signed and stamped) by notary public on each page.
- (ii) The seal of the notary public should contain his name, area of practice and Registration number.
- (iii) Notarial stamps of appropriate value wherever required should be affixed on the document

**NORTHERN RAILWAY  
TENDER NOTICE  
(NOTICE FOR UPLOADING ON WEBSITE)**

Office of the  
Sr. Divisional Electrical Engineer (TRD)  
Northern Railway,  
Lucknow.

Sr. Divisional Electrical Engineer (TRD), Northern Railway, Lucknow for and on behalf of the President of India invites open e-tender under **Single Packet System** for the following work:-

S.no	Name of work	Approx. Cost/ Earnest Money	Period of completion/ Similar nature of work.	Availability of documents /Cost of Tender document
1.	“Strengthening and improvement of Earthing and Bonding system of TRD Assets of Lucknow/NR Division.”	Rs. 4,60,53,190.00/  Rs. 9,21,100/-	<b>Completion Period – 12 months.</b>  /  Similar work means design, supply, erection testing & commissioning of 50 Hz, single phase 25 kV AC OHE.	Nil for e-Tender.

**TENDER/OFFER WITHOUT EARNEST MONEY WILL BE SUMMARILY REJECTED**

Code	Activity	Date
D0	Issue of Tender Notice on <a href="http://www.nr.indianrailways.gov.in">www.nr.indianrailways.gov.in</a> and availability of Tender Document on <a href="http://www.ireps.gov.in">www.ireps.gov.in</a>	16.06.2026
D1	Start of Submission of offers at <a href="http://www.ireps.gov.in">www.ireps.gov.in</a>	25.06.2026
D2	<ul style="list-style-type: none"> <li>• End of Availability of Tender Documents at <a href="http://www.ireps.gov.in">www.ireps.gov.in</a>.</li> <li>• Opening of tender/offer.</li> </ul> <b>Note:</b> 1.This is also the last date for uploading of completed offers by the bidders.	09.07.2026

*The reference time for all the above activities is 15:00 hours.*

**NOTE:-** In case the intended date for opening of tenders is declared a holiday, the tenders will be opened on the next working day at the same time.

**Electrical Contractor's License:** The tenderers must submit attested copy of valid Electrical contractor license along with their offer. Offer shall be summarily rejected if tenderer does not have Electrical contractor license issued by State/Central government.

**Technical:** The tenderer must have successfully completed or substantially completed any one of the following categories of work(s) during last 07 (seven) years, ending last day of month previous to the one in which tender is invited:

Three similar works each costing not less than the amount equal to 30% of advertised value of the tender,

or

Two similar works each costing not less than the amount equal to 40% of advertised value of the tender,

or

One similar work costing not less than the amount equal to 60% of advertised value of the tender.

**Financial:** The tenderer must have minimum average annual contractual turnover of V/N or 'V' whichever is less; where

V= Advertised value of the tender in crores of Rupees

N= Number of years prescribed for completion of work for which bids have been invited.

The average annual contractual turnover shall be calculated as an average of "total contractual payments" in the previous three financial years, as per the audited balance sheet. However, in case balance sheet of the previous year is yet to be prepared/ audited, the audited balance sheet of the fourth previous year shall be considered for calculating average annual contractual turnover.

The tenderers shall submit requisite information as per **Annexure - 15**, along with copies of Audited Balance Sheets duly certified by the Chartered Accountant/ Certificate from Chartered Accountant duly supported by Audited Balance Sheet.

**Validity of Offer: 60 days** from the date of opening of Tender.

**Submission of Tender Documents & Opening-** The tenders may be uploaded up to date along with scanned copy of all the requisite documents (as per Annexure A and B).

- Tender will be opened on Date (09.07.2026) i.e. immediately after close of uploading of tenders.
- Tenderer may have to submit the original Documents in physical form at short notice whenever asked by Railway at any stage of tender evaluation process or even after finalization of tender.
- In E-tender, all submissions of documents are to be uploaded on web-site. There may be last minute hic-cups and delay in uploading the Documents and payment of Earnest Money etc. Tenderer's/Prospective bidders are advised to upload their offer well in time. Railway will not be responsible for any delay/non submission of offer due to any reason whatsoever.

The cost of the Tender Documents is non-refundable and Tender Document is not transferable.

"JVs/ Consortiums/ MOUs shall be considered in accordance with approved tender conditions."

The detailed e-tender notice is available on Northern Railway web site i.e. [www.ireps.gov.in](http://www.ireps.gov.in)

**NOTE:**

1. Works contracts shall be treated as supply of services as per schedule –II GST Act.
2. GST Act and Rules issued from time to time by the Government/ concerned authorities shall be applicable.
3. Contractor/ suppliers/ service providers/ parties shall register their firms State wise under GSTIN (GST Identification Number) and submit at the time of opening of tender or before the signing the agreement and shall mention place of business, registered office address and email id.
4. The bidders who desire to participate against e-tenders, are advised to electronically register themselves on website [www.ireps.gov.in](http://www.ireps.gov.in) for which they would require to obtain Class III digital certificate (if already not obtained) issued by CCA under IT Act-2000.
5. All other terms and conditions in respect of above tender are given in the tender document.

**Only e-tenders will be accepted and tenders submitted in any other form will be summarily rejected.**

Sr. Divisional Electrical Engineer (TRD),  
Northern Railway, Lucknow

**No. TRD-08-SrDEE-LKO-26**

Dated: 16.06.2026



## Annexure- A

**Scanned copy of the Documents to be uploaded along with offer**

<b>S. no.</b>	<b>Document</b>	<b>Required in the form</b>	<b>If not submitted along with the tender, then</b>
1	Cost of Tender Document (in terms of Clause 1.1.3.3 (a) of tender document)	<b>ONLINE MODE (no documentary proof required) (Nil for e-tender).</b>	
2.	Earnest Money Deposit (in terms of Clause 1.1.7 of tender document)	<b>ONLINE MODE (no documentary proof required)</b>  <b>If exempted. (documentary proof required)</b>	<b>Summarily Rejected</b>
3.	Constitution of Firm documents (as required in terms of Clause 1.1.4 of the tender document)		<b>Summarily Rejected</b>
a	In case of Sole Proprietorship Concern	All documents in terms of eligibility criteria.	<p>“After opening of the tender, any document pertaining to the constitution of the <b><i>firm/JV/sole proprietorship/partnership firm/company/Registered Society/Registered Trust/LLP</i></b> (as applicable), shall not be entertained/considered under any circumstances and no claim or representation whatsoever from the tenderer in this regard shall be entertained”.</p> <p><b>Note: If all the requisite documents pertaining to the constitution of the <i>firm/JV/sole proprietorship/partnership firm/company/Society etc., as specified in clause 1.1.4, are not submitted, offer will be considered as incomplete and shall be summarily rejected.</i></b></p>
b	In case of HUF.	(i) A copy of notarized affidavit on Stamp Paper declaring that he who is submitting the tender on behalf of HUF is in the position of 'Karta' of Hindu Undivided Family (HUF) and he has the authority, power and consent given by other members to act on behalf of HUF.  (ii) All other documents in terms of eligibility criteria.	
c	In case of a “Partnership Firm/Concern”	ALL documents as per Annexure-17B  <b>Complete details as per Annexure-17B</b>	
d	In case of a “JV Firm” (Applicable only for works costing more than Rs.10.00 crore)  <b>(Not applicable for this tender)</b>	ALL documents as per Annexure-17  <b>Complete details as per Annexure-17</b>	
e	In case of a “Company”	(i) The copies of <b>MOA (Memorandum of Association) / AOA (Articles of Association)</b> of the company (ii) A copy of Certificate of Incorporation (iii) A copy of Authorization/Power of Attorney issued by the Company (backed by the resolution of Board	

		<p>of Directors) in favour of the individual to sign the tender on behalf of the company and create liability against the company.</p> <p>(iv) All other documents in terms of eligibility criteria.</p>	
f	In case of a “LLP ((Limited Liability Partnership)”	<p>(i) A copy of LLP Agreement</p> <p>(ii) A copy of Certificate of Incorporation</p> <p>(iii) A copy of Power of Attorney/Authorization issued by the LLP in favour of the individual to sign the tender on behalf of the LLP and create liability against the LLP.</p> <p>(iv) An undertaking by all partners of the LLP that they are not blacklisted or debarred by Railways or any other Ministry / Department of the Govt. of India from participation in tenders / contracts as on the date of submission of bids, either in their individual capacity or in any firm/LLP or JV in which they were / are partners/members. Concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the Standard General Conditions of Contract.</p> <p>(v) All other documents in terms of eligibility criteria.</p>	
g	In case of Registered Society & Registered Trust	<p>(i) A copy of Certificate of Registration</p> <p>(ii) A copy of Memorandum of Association of Society/Trust Deed</p> <p>(iii) A copy of Power of Attorney in favour of the individual to sign the tender documents and create liability against the Society/Trust.</p> <p>(iv) A copy of Rules &amp; Regulations of the Society</p> <p>(v) All other documents in terms of eligibility criteria.</p>	

**Annexure-B****Scanned copy of Documents to be uploaded along with the tender**

<b>S. No</b>	<b>Document</b>	<b>Required in the form</b>	<b>If not submitted along with the tender, then</b>
1.	<u>Technical Eligibility Criteria:</u> - Completion/Performance Certificate in support of 30% or 40% or 60% similar nature of work as per clause 1.1.12.2 (i) of tender document.	Copy	<b>Summarily Rejected</b>
2.	<u>Financial Eligibility Criteria:</u> - Annual Turnover as per detail at <b>Annexure- 15</b> to judge the V/N or 'V' whichever is lower as per clause 1.1.12.2 (ii) of tender document.	Copy	<b>Summarily Rejected</b>
3.	Annexure-9 (Declaration form regarding site etc.)	Copy	Liable to be rejected
4.	Annexure-10 (Declaration regarding constitution of firm)	Copy	Liable to be rejected
5.	Annexure-11 (Plant and Machinery)	Copy	Liable to be rejected
6.	Annexure- -12(Engineers/Personnel)	Copy	Liable to be rejected
7.	Annexure- 13 (work executed in last seven years)	Copy	Liable to be rejected
8.	Annexure-14 (Work in Hand)	Copy	Liable to be rejected
9.	Annexure-15 (Contractual Turnover)	Copy	Liable to be rejected
10.	Annexure- 16 (Bank Detail/RTGS)	Copy	Liable to be rejected
11.	Annexure-18 (Performa of Completion Certificate)	Copy	Liable to be rejected
12.	Annexure 19 & Annexure- 19 (A) (if applicable) Certificate in the form of Annexure-M to be submitted by tenderer along with the tender documents	Copy	<b>Summarily Rejected</b>
13.	PAN No.	Copy	Liable to be rejected
14.	Electrical Contractor License as per clause 1.1.12 (iii) of tender document.	Copy	<b>Summarily Rejected</b>
15.	Annexure 20 - Undertaking Regarding Employment/ Partnership of Retired Railway Employees.	Copy	Liable to be rejected

**NORTHERN RAILWAY**  
**TENDER FORM (FIRST SHEET)**

**Tender No.** TRD-08-SrDEE-LKO-26

**Name of Work:** "Strengthening and improvement of Earthing and Bonding system of TRD Assets of Lucknow/NR Division."

The President of India, Acting through  
Sr. Divisional Electrical Engineer/TRD,  
Divisional Railway Manager Office, Northern Railway,  
Hazratganj, Lucknow

I/We \_\_\_\_\_ have read the various conditions to tender attached hereto and agree to abide by the said conditions. I/We also agree to keep this offer open for acceptance for a period of \_\_\_\_\_ days from the date fixed for closing of the tender and in default thereof, I/We will be liable for forfeiture of my/our "Bid Security". I/We offer to do the work for Northern Railway, at the rates quoted in the attached bill(s) of quantities and hereby bind myself/ourselves to complete the work in all respects within 12 months from the date of issue of letter of acceptance of the tender.

**2.** I/We also hereby agree to abide by the Indian Railways Standard General Conditions of Contract, with all correction slips up-to-date and to carry out the work according to the Special Conditions of Contract and Specifications of materials and works as laid down by Railway in the annexed Special Conditions/Specifications, Standard Schedule of Rates (SSOR) with all correction slips up-to-date for the present contract.

**3.** A Bid Security of ₹ **9,21,100/-** has already been deposited online/ submitted as Bank Guarantee bond. Full value of the Bid Security shall stand forfeited without prejudice to any other right or remedies in case my/our Tender is accepted and if:

- (a) I/We do not submit the Performance Guarantee within the time specified in the Tender document;
- (b) I/We do not execute the contract documents within seven days after receipt of notice issued by the Railway that such documents are ready; and
- (c) I/We do not commence the work within fifteen days after receipt of orders to that effect.

**4.** (a) I/We am/are a Startup firm registered by ..... Department of Industrial Policy and Promotion (DIPP) and my registration number is ..... valid upto ..... (Copy enclosed) and hence exempted from submission of Bid Security.

**5.** We are a Labour Cooperative Society and our Registration No. is ..... with ..... and hence required to deposit only 50% of Bid Security.

**6.** Until a formal agreement is prepared and executed, acceptance of this tender shall constitute a binding contract between us subject to modifications, as may be mutually agreed to between us and indicated in the letter of acceptance of my/our offer for this work.

Signature of Witnesses:

- (1) \_\_\_\_\_
- (2) \_\_\_\_\_

\_\_\_\_\_  
Signature of Tenderer(s)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Address of the Tenderer(s)

## TENDER FORM (Second Sheet)

**1. Instructions to Tenderers and Conditions of Tender:** The following documents form part of Tender / Contract:

- (a) Tender Forms – First Sheet and Second Sheet
- (b) Special Conditions/Specifications (enclosed)
- (c) Bill(s) of quantities (enclosed)
- (d) Standard General Conditions of Contract and Standard Specifications (Works and Materials) of Indian Railways as amended/corrected upto latest correction slips, copies of which can be seen in the office of Sr. DEE/TRD/NR/LKO or obtained from the office of the Chief Engineer, Northern Railway on payment of prescribed charges.
- (e) Standard Schedule of Rates (SSOR) as amended / corrected upto latest correction slips, copies of which can be seen in the office of Sr. DEE/TRD/NR/LKO or obtained from the office of the Chief Engineer, Northern Railway on payment of prescribed charges.
- (f) All general and detailed drawings pertaining to this work which will be issued by the Engineer or his representatives (from time to time) with all changes and modifications.

**2. Drawings for the Work:** The Drawing for the work can be seen in the office of the Sr. DEE/TRD/NR/LKO and / or Chief Engineer, Northern Railway at any time during the office hours. The drawings are only for the guidance of Tenderer(s). Detailed working drawings (if required) based generally on the drawing mentioned above, will be given by the Engineer or his representative from time to time.

**3.** The Tenderer(s) shall quote his / their rates as a percentage above or below the Standard Schedule of Rates (SSOR) of Indian Railway as applicable to Lucknow Division except where he/they are required to quote item rates and must tender for all the items shown in the Bill(s) of Quantities attached. The quantities shown in the attached Bill(s) of Quantities are given as a guide and are approximate only and are subject to variation according to the needs of the Railway. The Railway does not guarantee work under each item of the Bill(s) of Quantities. The tenderer(s) shall quote rates / rebates only at specified place in Tender Form supplied by Railway. Any revision of rates / rebates submitted (quoted) through a separate letter whether enclosed with the bid (Tender Form) or submitted separately or mentioned elsewhere in the document other than specified place shall be summarily ignored and will not be considered.

**4.** Tenders containing erasures and / or alterations of tender documents are liable to be rejected. Any correction made by tender(s) in his/their entries must be attested by him / them.

**5.** The works are required to be completed within a period of **12 (Twelve) months** from the date of issue of acceptance letter.

## PART-I Chapter – I

### PREAMBLE & GENERAL INSTRUCTIONS to TENDERERS

#### 1.1.1 Introduction

- (i) On behalf of President of India, Sr. Divisional Electrical Engineer (TRD), Northern Railway, Lucknow, herein after referred to as '**Railway**' open e-tender under single packet system are invited from established, experienced and reliable manufacturers/ Contractors for execution of works as detailed below.
- (ii) The contract emerging out of this tender shall be referred to as **Works Contract** and contractor who is awarded Work contract shall be referred as Works Contractor.
- (iii) **Scope of work:-** “Strengthening and improvement of Earthing and Bonding system of TRD Assets of Lucknow/NR Division.”
- (iv)\* **Location:-** Works is to be executed in Electrified Section of Lucknow Division. However, Railway reserves right to change the site of work anywhere in area of the work in Para 1.1.1 (iii) above in the jurisdiction of Lucknow Division under **Sr. Divisional Electrical Engineer (TRD), Northern Railway, Lucknow** and the contractor shall be bound to execute the work without any extra cost.

#### 1.1.2 Tender Document

This tender document consists of following five parts:

<b>Part – I</b>	Chapter- I Preamble and General Instructions to tenderers.
	Chapter- II Conditions of Contract
	Chapter- III Prices & Payments
	Chapter- IV Explanatory Notes
<b>Part – II</b>	Technical specifications
<b>Part – III</b>	Particular specifications
<b>Part – IV</b>	Annexure and Appendices
<b>Part – V</b>	Tender Forms etc.

#### 1.1.3 Submission of Tenders

##### CARE IN SUBMISSION OF TENDERS

- (a) (i) Before submitting a tender, the tenderer will be deemed to have satisfied himself by actual inspection of the site and locality of the works, that all conditions liable to be encountered during the execution of the works are taken into account and that the rates he enters in the tender forms are adequate and all-inclusive to accord with the provisions in Clause-37 of the Standard General Conditions of Contract for the completion of works to the entire satisfaction of the Engineer.
- (a)(ii) Tenderers will examine the various provisions of the Central Goods and Services Tax Act, 2017(CGST)/ Integrated Goods and Services Tax Act, 2017(IGST)/ Union Territory Goods and Services Tax Act, 2017(UTGST)/ respective state's State Goods and Services Tax Act (SGST) also, as notified by Central/State Govt.& as amended from time to time and applicable taxes before bidding. Tenderers will ensure that full benefit of Input Tax Credit (ITC) likely to be availed by them is duly considered while quoting rates.
- (a)(iii) The successful tenderer who is liable to be registered under CGST/IGST/UTGST/SGST Act shall submit GSTIN along with other details

required under CGST/IGST/UTGST/SGST Act to railway immediately after the award of contract, without which no payment shall be released to the Contractor. The Contractor shall be responsible for deposition of applicable GST to the concerned authority.

- (a)(iv) In case the successful tenderer is not liable to be registered under CGST/IGST/UTGST/ SGST Act, the railway shall deduct the applicable GST from his/their bills under reverse charge mechanism (RCM) and deposit the same to the concerned authority.
- (b) When work is tendered for by a firm or company, the tender shall be signed by the individual legally authorized to enter into commitments on their behalf.
- (c) The Railway will not be bound by any power of attorney granted by the tenderer or by changes in the composition of the firm made subsequent to the execution of the contract. It may, however, recognize such power of attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the Contractor.

**1.1.3.1** The tenderers shall submit a copy of certificate stating that all their statements/documents submitted along with bid are true and factual. Standard format of certificate to be submitted by the bidder is enclosed as **Annexure- 19**. In addition to Annexure-19, in case of other than Company/Proprietary firm, **Annexure-19(A)** shall also be submitted by each member of a Partnership Firm / Joint Venture (JV) / Hindu Undivided Family (HUF) / Limited Liability Partnership (LLP) etc. as the case may be. Non submission of above certificate by the bidder shall result in **summarily** rejection of his/their bid. It shall be mandatorily incumbent upon the tenderer to identify, state and submit the supporting documents duly self-attested/digitally signed by which they/he is qualifying the Qualifying Criteria mentioned in the Tender Document.

**1.1.3.2** The tenders may be uploaded up to date 09.07.2026 along with scanned copy of all the requisite documents (as per Annexure A & B).

**1.1.3.3** Tender/offer will be opened on Date 09.07.2026, i.e. immediately after close of uploading of tenders. Tender/offer shall contain the scanned copies of all necessary documents regarding constitution of the firm and other requisite documents/credentials as per Annexures- A and B.

- **Tenderer may have to submit the original Documents in physical form at short notice whenever asked by Railway at any stage of tender evaluation process or even after finalization of tender.**
- **In E-tender, all submissions of documents are to be uploaded on web-site. There may be last minute hic-cups and delay in uploading the Documents and payment of Earnest Money etc. Tenderer's/Prospective bidders are advised to upload their offer well in time. Railway will not be responsible for any delay/non submission of offer due to any reason whatsoever**

**1.1.3.3 Cost of Tender documents**

- (a) Tender Documents will be available on IREPS web site i.e. [www.ireps.gov.in](http://www.ireps.gov.in) from 16.06.2026 to 09.07.2026 upto 15:00 hrs. The cost of tender document is **Nil for e-Tender.**

- 1.1.3.4** The Tender Documents shall be uploaded upto 15:00 hours on 09.07.2026 and will be opened immediately after closing of uploading of tender i.e 09.07.2026 **at 15:00 hrs.**

The offer shall be uploaded along with scanned copy of the entire requisite document (as per Annexure A and B of tender notice).

**In case the intended date for opening of tenders is declared a holiday, the tenders will be opened on the next working day at the same time.**

- 1.1.3.5 The rate/s should be quoted in figures as well as in words. If there is variation between rates quoted in figures and in words, rate quoted in words shall be taken as correct. In case, the tenderer(s) quote/s multiple rates\* the offer will be treated as incomplete and shall be summarily rejected.

Rebate if any, should be quoted/ given in the tender schedule against the respective SOR /overall single rebate over entire schedule of SOR / single rebate over entire schedule of Non-SOR items. One single rebate over entire Tender schedule shall be also be considered.

**Multiple rates\*** - In case tenderer/s quote selective rebate on any individual items of the SOR/ individual NS item of Non SOR. The same will be treated as multiple rates and **their offer will be summarily rejected.**

If a tenderer does not quote rate/ rates in the format as specified in this tender document i.e. both in words and figures, in the attached Schedule of items, Rates and Quantities, the offer will be treated incomplete and **summarily rejected.**

- 1.1.3.6 Each page of tender papers is to be signed/ and dated by the tenderers or such person/s on his/their behalf that is/are legally authorized to sign for him/them.

- 1.1.3.7 Tenders containing erasures and/or alteration of the tender documents are liable to be rejected. Any correction made by Tenderer(s) in his/their entries must be attested by him/them.

- 1.1.3.8 The rates, rebates and/or other financial terms, if any, quoted by tenderer in the relevant fields of the Financial Bid page will only be the ruling terms for deciding the inter-se ranking, and any such condition having financial repercussions, if quoted by them anywhere else including attached documents shall not be considered for deciding inter-se ranking.

- 1.1.3.9 Additional conditions or stipulations if any must be made by the tenderer/s in a covering letter with the tender. The Railway reserves the right not to consider conditional tenders and reject the same without assigning any reason. Only those additional conditions which are explicitly accepted by the Railway shall form part of the contract.

- 1.1.3.10 **A Certificate is required to be uploaded/submitted by all tenderers** (as given in **Annexure 19 & Annexure- 19(A)** (if required)) based on this certificate if contents in documents uploaded/submitted by tenderers are found to be incorrect/false, action will be taken against such tenderers as per provisions contained in certificate submitted by them as **Annexure 19 & Annexure- 19(A)**. In such eventuality, next lowest eligible tenderer/offer will be considered.

- 1.1.3.10.1** *The tenderers shall submit a copy of certificate stating that all their statements/documents submitted along with bid are true and factual. Standard format of certificate to be submitted by the bidder is enclosed as Annexure-19. In addition to Annexure-19, in case of other than Company/Proprietary firm, Annexure-19(A) shall also be submitted by each member of a Partnership Firm / Joint Venture (JV) / Hindu Undivided Family (HUF) / Limited Liability Partnership (LLP) etc. as the case may be.*



*Non submission of above certificate by the bidder shall result in summarily rejection of his/their bid. It shall be mandatorily incumbent upon the tenderer to identify, state and submit the supporting documents duly self-attested by which they/he is qualifying the Qualifying Criteria mentioned in the Tender Document.*

**1.1.3.11 If the Tenderer(s) fail to submit/Upload the Certificate as prescribed in clause 1.1.3.10 above along with his/their offer shall be considered incomplete and will be rejected summarily.**

1.1.3.12 Tenderer may have to submit the original Documents in physical form at short notice whenever asked by Railway at any stage of tender evaluation process or even after finalization of tender.

1.1.3.13 In E-tender, all submissions of documents are to be uploaded on web-site. There may be last minute hic-cups and delay in uploading the Documents and payment of Earnest Money etc. Tenderers/Prospective bidders are advised to upload their offer well in time. Railway will not be responsible for any delay/non submission of offer due to any reason whatsoever.

1.1.3.14 The value of contract and the quantities given in the attached schedule of items, rates and quantities are approximate and are given only as a guide. These are subject to variations/additions and omission. The quantum of work to be actually carried out shall not form the basis of any dispute regarding the rates to be paid and shall not give rise to claim for compensation on account of any increase or decrease either in the quantity of in the contract value. The value of contract and the quantities given in the attached schedule of items, rates.

#### **1.1.4 Constitution of the Firm**

1.1.4.1 The tenderer shall clearly specify whether the tender is submitted on his own (Proprietary Firm) or on behalf of a Partnership Firm / Company / Joint Venture (JV) / Registered Society / Registered Trust / HUF etc. The tenderer(s) shall enclose the attested copies of the constitution of their concern, and copy of PAN Card along with their tender. Tender Documents in such cases are to be signed by such persons as may be legally competent to sign them on behalf of the firm, company, association, trust or society, as the case may be.

1.1.4.2 If Tenderer(s) expires after submission of his/their tender or after acceptance of his/their tender, Railway shall deem such tender cancelled. If a partner of a firm expires after submission of their tender or after acceptance of their tender, Railways shall deem such tender as cancelled, unless firm retains its character.

1.1.4.3 If the contractor's firm is dissolved on account of death, retirement of any partners or for any reason what-so-ever before fully completing the whole work or any part of it, undertaken by the principal agreement the surviving partners shall remain jointly/severally and personally liable to complete the whole work to the satisfaction of the Railway due to such dissolution. The amount of such compensation shall be decided by HQ/Baroda House, New Delhi and his decision in the matter shall be final and binding on the contractor.

1.1.4.4 The cancellation of any documents such as power of attorney, partnership deed etc., shall Forth be communicated to the Railway in writing, failing which the Railway shall have no responsibility or liability for any action taken on the strength of the said documents.

#### **1.1.4.5 Uploading of documents related to constitution of firm**

The tenderer(s) must necessarily upload/submit the legal documents at the time of tendering & submit in original on or before closing of uploading of tender & before

opening of tender 09.07.2026, pertaining to the constitution of their Concern as applicable, along with the tender, as enumerated below.

The tenderer shall clearly specify whether the tender is submitted on his own (Proprietary Firm) or on behalf of a Partnership Firm / Company / Joint Venture (JV) / Registered Society / Registered Trust / Hindu Undivided Family (HUF) / Limited Liability Partnership (LLP) etc. The tenderer(s) shall enclose the attested copies of the constitution of their concern, and copy of PAN Card along with their tender. Tender Documents in such cases are to be signed by such persons as may be legally competent to sign them on behalf of the firm, company, association, trust or society, as the case may be.

The tenderer(s) shall give full details of the constitution of the Firm/JV/Company/Society etc in the "Top Sheet" as well as in **Annexure- "10"** to "Special Tender Conditions and Instructions to Tenderers" of Tender Document and must submit the following documents along with tender without fail:-

1.1.4.6 Following **documents shall be submitted by the tenderer:**

**(a) Sole Proprietorship Firm:**

- (i) All documents in terms of Para 1.1.12 of tender document.

**(b) HUF:**

- (i) A copy of notarized affidavit on Stamp Paper declaring that he who is submitting the tender on behalf of HUF is in the position of 'Karta' of Hindu Undivided Family (HUF) and he has the authority, power and consent given by other members to act on behalf of HUF.
- (ii) All other documents in terms of Para 1.1.12 of tender document.

**(c) Partnership Firm:**

- (i) All documents as mentioned in Annexure- 17B of tender document.

**(d) Joint Venture (JV):** All documents as mentioned in Annexure – 17 of Tender Document.

**(e) Company registered under Companies Act 2013:**

- (v) The copies of **MOA (Memorandum of Association) / AOA (Articles of Association)** of the company
- (vi) A copy of Certificate of Incorporation
- (vii) A copy of Authorization/Power of Attorney issued by the Company (backed by the resolution of Board of Directors) in favour of the individual to sign the tender on behalf of the company and create liability against the company.
- (viii) All other documents in terms of Para 1.1.12 of tender document.

**(f) LLP (Limited Liability Partnership):**

- (i) A copy of LLP Agreement
- (ii) A copy of Certificate of Incorporation
- (iii) A copy of Power of Attorney/Authorization issued by the LLP in favour of the individual to sign the tender on behalf of the LLP and create liability against the LLP.
- (iv) An undertaking by all partners of the LLP that they are not blacklisted or debarred by Railways or any other Ministry / Department of the Govt. of India from participation in tenders / contracts as on the date of submission of bids, either in

their individual capacity or in any firm/LLP or JV in which they were / are partners/members. Concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the Standard General Conditions of Contract.

(v) All other documents in terms of Para 1.1.12 Tender Document.

**(g) Registered Society & Registered Trust:**

- (i) A copy of Certificate of Registration
- (ii) A copy of Memorandum of Association of Society/Trust Deed
- (iii) A copy of Power of Attorney in favour of the individual to sign the tender documents and create liability against the Society/Trust.
- (iv) A copy of Rules & Regulations of the Society
- (v) All other documents in terms of Para 1.1.12 of the Tender document.

1.1.4.6.1 If it is NOT mentioned in the submitted tender that tender is being submitted on behalf of a Sole Proprietorship firm / Partnership firm / Joint Venture / Registered Company etc., then the tender shall be treated as having been submitted by the individual who has signed the tender.

1.1.4.6.2 After opening of the tender, any document pertaining to the constitution of Sole Proprietorship Firm / Partnership Firm / Registered Company/ Registered Trust / Registered Society / HUF/LLP etc. shall be neither asked nor considered, if submitted. Further, no suo moto cognizance of any document available in public domain (i.e., on internet etc.) or in Railway's record/office files etc. will be taken for consideration of the tender, if no such mention is available in tender offer submitted.

1.1.4.6.3 A tender from JV shall be considered only where permissible as per the tender conditions.

1.1.4.6.4 The Railway will not be bound by any change of power of attorney or in the composition of the firm made subsequent to the submission of tender. Railway may, however, recognize such power of attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the Contractor.

**1.1.4.7** The tenderer whether sole proprietor / a company or a partnership firm / registered society / registered trust / HUF / LLP etc if they want to act through agent or individual partner(s), should submit along with the tender, a copy of power of attorney duly stamped and authenticated by a Notary Public or by Magistrate in favour of the specific person whether he/they be partner(s) of the firm or any other person, specifically authorizing him/them to sign the tender, submit the tender and further to deal with the Tender/ Contract up to the stage of signing the agreement except in case where such specific person is authorized for above purposes through a provision made in the partnership deed / Memorandum of Understanding / Article of Association / Board resolution, failing which tender shall be summarily rejected.

A separate power of attorney duly stamped and authenticated by a Notary Public or by Magistrate in favour of the specific person whether he/they be partner(s) of the firm or any other person, shall be submitted after award of work, specifically authorizing him/them to deal with all other contractual activities subsequent to signing of agreement, if required.

*Note: A Power of Attorney executed and issued overseas, the document will also have to be legalized by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney*

*is being issued. However, the Power of Attorney provided by Bidders from countries that have signed the Hague Legislation Convention 1961 are not required to be legalized by the Indian Embassy if it carries a conforming Appostille certificate.*

**Note:1. In case of General Power of Attorney, photocopy of the same duly notarised shall also be considered.**

- 2. If all the requisite documents pertaining to the constitution of the firm/JV/sole/partnership firm/company/Society etc., as specified in clause 1.1.4 above, are not submitted, offer will be considered as incomplete and shall be summarily rejected.**
- 3. The tenderer must upload at the time of tendering & submit above documents on or before close of uploading of tender & before opening of tender 09.07.2026.**

#### **1.1.5 Employment/Partnership etc. of Retired Railway Employees:**

(a) Should a tenderer

i) 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 the Engineering or any other department of any of the railways owned and administered by the President of India for the time being, OR

ii) being partnership firm / joint venture (JV) / registered society / registered trust etc have as one of its partners/members a retired Engineer of the gazetted rank or any other gazetted officer working before his retirement, OR

iii) being an incorporated company have any such retired Engineer of the gazetted rank or any other gazetted officer working before his retirement as one of its directors

AND

in case where such Engineer or officer had not retired from government service at least 1 year prior to the date of submission of the tender

THEN

the tenderer will give full information as to the date of retirement of such Engineer or gazetted officer from the said service and as to whether permission for taking such contract, or if the Contractor be a partnership firm or an incorporated company, to become a partner or director as the case may be, has been obtained by the tenderer or the Engineer or officer, as the case may be from the President of India or any officer, duly authorized by him in this behalf, shall be clearly stated in writing at the time of submitting the tender.

- b) In case, upon successful award of contract, should a tenderer depute for execution of the works under or to deal matters related with this contract, any retired Engineer of gazette rank or retired gazetted officer working before his retirement in the Engineering or any other department of any of the railways owned and administered by the President of India for the time being, and now in his employment, then the tenderer will ensure that retired Engineer or retired gazetted officer had retired from government service at least 1 year prior to the date of his employment with tenderer and in case he had retired from service within a year then he possesses the requisite permission from the President of India or any officer, duly authorized by him in this behalf, to get associated with the tenderer.
- c) Should a tenderer or Contractor being an individual, have member(s) of his family or in the case of partnership firm/ company / joint venture (JV) / registered society / registered trust etc. one or more of his partner(s)/shareholder(s) or member(s) of the family of partner(s)/shareholder(s) having share of more than 1%in the tendering entity

employed in gazetted capacity in the Engineering or any other department of the railway, then the tenderer at the time of submission of tender, will inform the authority inviting tenders the details of such persons.

Note: -If information as required as per a), b), c) above has not been furnished, contract is liable to be dealt in accordance with provision of clause 62 of the Standard General Condition of contract.

**1.1.5.1 JVs/Consortiums/MOUs shall be considered. (The JV firms are allowed to participate only in the tenders of value more than Rs. 10 Crores).**

**1.1.5.2** If the tenderer is a partnership Firm, the conditions and the technical & financial Eligibility Criteria will be applicable as per guide lines given in "Part IV Annexure - 17B" of tender document.

**1.1.6 Validity Of Tender**

Tenderer shall keep his offer open for a minimum period of 60 days from date of opening of tender or as mentioned in tender notice.

**1.1.7 Bid Security:**

- (1) (a) The tenderer shall be required to submit the Bid Security with the tender for the due performance with the stipulation to keep the offer open till such date as specified in the tender, under the conditions of tender. The Bid Security shall be as under:

Value of the Work	Bid Security
For all works estimated to cost up to ₹ 1 crore	2% of the estimated cost of the work

**Note:**

- (i) The Bid Security shall be rounded off to the nearest ₹100. This Bid Security shall be applicable for all modes of tendering.
  - (ii) Any firm recognized by Department of Industrial Policy and Promotion (DIPP) as 'Startups' shall be exempted from payment of Bid Security detailed above.
  - (iii) Labour Cooperative Societies shall submit only 50% of above Bid Security detailed above.
- (b) It shall be understood that the tender documents have been issued to the tenderer and the tenderer is permitted to tender in consideration of stipulation on his part, that after submitting his tender he will not resile from his offer or modify the terms and conditions thereof in a manner not acceptable to the Engineer. Should the tenderer fail to observe or comply with the said stipulation, the aforesaid amount shall be liable to be forfeited to the Railway.
- (c) If his tender is accepted, this Bid Security mentioned in sub para (a) above will be retained as part security for the due and faithful fulfillment of the contract in terms of Clause 16 of the Standard General Conditions of Contract. The Bid Security of other Tenderers shall, save as herein before provided, be returned to them, but the Railway shall not be responsible for any loss or depreciation that may happen thereto while in their possession, nor be liable to pay interest thereon.

- (2) The Bid Security shall be deposited either in cash through e-payment gateway or submitted as Bank Guarantee bond from a scheduled commercial bank of India or as mentioned in tender documents. The Bank Guarantee bond shall be as per **Annexure-21** and shall be valid for a period of 90 days beyond the bid validity period.
- (3) **In case, submission of Bid Security in the form of Bank Guarantee, following shall be ensured:**
- i. A scanned copy of the Bank Guarantee shall be uploaded on e-Procurement Portal (IREPS) while applying to the tender.
  - ii. The original Bank Guarantee should be delivered in person to the official nominated as indicated in the tender document within 5 working days before closing date for submission of bids.
  - iii. Non submission of scanned copy of Bank Guarantee with the bid on e-tendering portal (IREPS) and/or non submission of original Bank Guarantee within the specified period shall lead to summary rejection of bid.
  - iv. The Tender Security shall remain valid for a period of 90 days beyond the validity period for the Tender.
  - v. The details of the BG, physically submitted should match with the details available in the scanned copy and the data entered during bid submission time, failing which the bid will be rejected.
  - vi. The Bank Guarantee shall be placed in an envelope, which shall be sealed. The envelope shall clearly bear the identification “**Bid for the \*\*\*\*\* Project**” and shall clearly indicate the name and address of the Bidder. In addition, the Bid Due Date should be indicated on the righthand top corner of the envelope.
  - vii. The envelope shall be addressed to the officer and address as mentioned in the tender document.
  - viii. If the envelope is not sealed and marked as instructed above, the Authority assumes no responsibility for the misplacement or premature opening of the contents of the Bid submitted and consequent losses, if any, suffered by the Bidder.

**NOTE:** Any request for recovery from outstanding bills for bid security against any tender will not under any circumstances be entertained. Tenders submitted with earnest money in shape of cheques, Government Securities or in any form other than those specified above shall not be considered. Bond of any form is not acceptable.

**1.1.8 Execution of contract document** – The Tenderer whose tender is accepted shall be required to appear in person at the office of General Manager/General Manager (Construction), Chief Administrative Officer (Construction), Divisional Railway Manager or concerned Engineer, as the case may be, or if tenderer is a firm or corporation, a duly authorized representative shall appear (there would be no need for appear in person if agreement is signed digitally) and execute the contract agreement within seven days of notice from Railways that the Contract Agreement is ready. Failure to do so shall constitute a breach of the agreement affected by the acceptance of the tender. The Contract Agreement shall be entered into by Railway only after submission of valid Performance Guarantee by the Contractor. In such cases the Railway may determine that such tenderer has abandoned the contract

and there upon his tender and acceptance thereof shall be treated as cancelled and the Railway shall be entitled to forfeit the full amount of the Bid Security and other dues payable to the Contractor under this contract. The failed Contractor shall be debarred from participating in the re tender for that work.

**1.1.9 Security Deposit:(A)** The Security Deposit shall be 5% of the contract value. The Bid Security submitted by the Contractor with his tender will be retained/encashed by the Railways as part of security for the due and faithful fulfillment of the contract by the Contractor. Provided further that, if Contractor submits the Cash or Term Deposit Receipt issued from a Scheduled commercial bank of India or irrevocable Bank Guarantee Bond from a Scheduled commercial bank of India, either towards the Full Security Depositor the Part Security Deposit equal to or more than Bid Security, the Railway shall return the Bid Security, to the Contractor.

Balance of Security Deposit may be deposited by the Contractor in cash or Term Deposit Receipt issued from Scheduled commercial bank of India or irrevocable Bank Guarantee bond issued from Scheduled commercial bank of India, or may be recovered at the rate of 6% of the bill amount till the full Security Deposit is recovered. 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 (including amount guaranteed through Performance Guarantee) may not exceed 10% of the total value of the contract.

The Irrevocable Bank Guarantee submitted towards Security deposit shall be initially valid up to the stipulated date of Maintenance period plus 60 days and shall be extended from time to time, depending upon extension of contract granted in terms of Clause 17A and 17B of the Standard General Conditions of Contract.

**Note:** Security Deposit deposited in cash by the Contractor or recovered from the running bills of a Contractor or submitted by contractor as Term Deposit Receipt(s) can be refunded/returned to the contractor, in lieu of irrevocable Bank Guarantee bond issued from scheduled commercial bank of India, to be submitted by him, for an amount equal to or more than the already available Security Deposit, provided however that, in a contract of value less than Rs. 50 Crore, such refund/ return of the already available Security Deposit is permitted up to two times and in a contract of value equal to or more than Rs. 50 Crore, such refund / return of the already available Security Deposit is permitted up to three times.

**1.1.9.1 (i) Refund of Security Deposit:** Security Deposit mentioned in sub clause (1) above shall be returned to the Contractor along with or after, the following:

- (a) Final Payment of the Contract as per clause 51.(1) of GCC 2022 **and**
- (b) Execution of Final Supplementary Agreement or Certification by Engineer that Railway has No Claim on Contractor and
- (c) Maintenance Certificate issued, on expiry of the maintenance period as per clause 50.(1) of GCC 2022, in case applicable.

**(ii) Forfeiture of Security Deposit:** Whenever the contract is rescinded as a whole under clause 62 (1) of GCC of these conditions, the Security Deposit already with railways under the contract shall be forfeited. However, in case the contract is rescinded in part or parts under clause 62 (1) of GCC of these conditions, the Security Deposit shall not be forfeited.

**1.1.9.2** No interest shall be payable upon the Bid Security and Security Deposit or amounts payable to the Contractor under the Contract, but Government Securities deposited in terms of Sub-Clause 16.(4)(b) of GCC of this clause will be payable with interest accrued thereon.

#### **1.1.10 Tenderer's Address**

Tenderer should state in tender his postal address and E-mail id legibly and clearly. Any communication sent in time, to tenderer by post at his said address or e- mail shall be deemed to have reached tenderer duly and in time. Important documents should be sent by Registered post. Email provided by the contractor on IREPS website can also be used for send important letters. Contractor should regularly check their email for any correspondence from Railway Side.

**1.1.11 Right of Railway to Deal with Tenders:** The Railway reserves the right of not to invite tenders for any of Railway work or works or to invite open or limited tenders and when tenders are called to accept a tender in whole or in part or reject any tender or all tenders without assigning reasons for any such action. In case if tender is accepted in part by Railway administration, Letter of Acceptance shall be issued as counter offer to the Tenderer, which shall be subject to acceptance by the Tenderer.

**A. Two Packets System of Tendering:** With a view to assess the tenders technically without being influenced by the financial bids, 'Two Packets System of tendering' shall be adopted wherein tender documents provide for the same.

**B. Pre-Bid Conference:** Intenders having advertised value more than Rs 50 Crore or as mentioned in the tender document, Railway shall conduct Pre-Bid Conference(s) with the prospective bidders.

**C. Make in India Policy:** Provisions of Make in India Policy 2017 issued by Govt. of India, as amended from time to time, shall be followed for consideration of tenders.

**D. Permission to Bid for a bidder from a country which shares Land boundary with India:** Any bidder from the countries sharing a land border with India will be eligible to bid in any procurement of works (including turnkey projects) only if the bidder is registered with the Competent Authority. The Competent Authority for registration will be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT), Government of India. For interpretation of this para, Department of Expenditure, Ministry of Finance, Government of India letter F.No.6/18/2019-PPD dated 23/07/2020 shall be referred.

**E. Clarification of Bids:** To assist in the examination, evaluation & comparison and pre-qualification of the Tender, the Railway may, at its discretion, ask any Bidder for a clarification of its Bid. Any clarification submitted by a Bidder that is not in response to a request by the Railway shall not be entertained or considered. The Railway request for clarification and the response of the bidder in this regard shall be in writing.

However, if a Bidder does not provide clarification of its bid by the date and time communicated in the Railway request for clarification, the bid shall be evaluated as per the documents submitted along with the bid.

**1.1.11.2** The authority for the acceptance of the tender will rest with the Railway. It shall not be obligatory on the said authority to accept the lowest tender or any other tender, and tenderer(s) shall neither demand any explanation for the cause of rejection of his/ their tender nor the Railway to assign reasons for declining to consider or reject any particular tender or tenders.

**1.1.11.3** If the tenderer(s) deliberately gives / give wrong information in his / their tender or creates / create circumstances for the acceptance of his / their tender, the Railway reserves the right to reject such tender at any stage.

**1.1.11.4** If any partner(s) of a partnership firm expires after the submission of its tender or after the acceptance of its tender, the Railway shall deem such tender as cancelled/contract as terminated under clause 61 of the Standard General Conditions of Contract, unless the firm retains its character as per partnership agreement. If a sole proprietor expires after the



submission of tender or after the acceptance of tender, the Railway shall deem such tender as cancelled / contract as terminated under clause 61 of the Standard General Conditions of Contract.

### **1.1.12 Credentials of Tenderer-**

**1.1.12.1** Documents testifying tenderer previous experience and financial status should be produced along with the tender.

Tenderer(s) who is / are not borne on the approved list of the Contractors of \_Railway shall submit along with his / their tender:

- (a) Certificates and testimonials regarding contracting experience for the type of job for which tender is invited with list of works carried out in the past.
- (b) Audited Balance Sheet duly certified by the Chartered Accountant regarding contractual payments received in the past.
- (c) The list of personnel / organization on hand and proposed to be engaged for the tendered work. Similarly list of Plant & Machinery available on hand and proposed to be inducted and hired for the tendered work.
- (d) **A copy of certificate stating that they are not liable to be disqualified and all their statements/documents submitted along with bid are true and factual. Standard format of the certificate to be submitted by the bidder is enclosed as Annexure-19. In addition to Annexure-19, in case of other than Company/Proprietary firm, Annexure-19(A) shall also be submitted by each member of a Partnership Firm / Joint Venture (JV) / Hindu Undivided Family (HUF) / Limited Liability Partnership (LLP) etc. as the case may be. Non submission of a copy of certificate by the bidder shall result in summarily rejection of his/their bid. It shall be mandatorily incumbent upon the tenderer to identify, state and submit the supporting documents duly self-attested / digitally signed by which they/he are/is qualifying the Qualifying Criteria mentioned in the Tender Document.**
- (e) The Railway reserves the right to verify all statements, information and documents submitted by the bidder in his tender offer, and the bidder shall, when so required by the Railway, make available all such information, evidence and documents as may be necessary for such verification. Any such verification or lack of such verification, by the Railway shall not relieve the bidder of its obligations or liabilities hereunder nor will it affect any rights of the Railway there under.
- (f) (a) In case of any information submitted by tenderer is found to be false, forged or incorrect at any time during process for evaluation of tenders, it shall lead to forfeiture of the tender Bid Security besides banning of business for a period of upto two years.  
(b) In case of any information submitted by tenderer is found to be false, forged or incorrect after the award of contract, the contract shall be terminated. Bid Security, Performance Guarantee and Security Deposit available with the railway shall be forfeited. In addition, other dues of the contractor, if any, under this contract shall be forfeited and agency shall be banned for doing business for a period of upto two years.
- (g) Tenderer shall upload details of similar works done in past as per the proforma enclosed in Part-IV, **(Annexure-13)**.
- h) Tenderer should also give details of advisory or technical collaboration with original equipment manufacturers in consultation with whom equipment has been designed and/or whose specifications are utilized in manufacturing of equipment being supplied.

### **1.1.12.2 Eligibility Criteria**

**(i) Technical Eligibility Criteria: -**

(a) The tenderer must have successfully completed or substantially completed any one of the following categories of work(s) during last 07 (seven) years, ending last day of month previous to the one in which tender is invited:

(i) *Three similar works each costing not less than the amount equal to 30% of advertised value of the tender,*

**or**

(ii) *Two similar works each costing not less than the amount equal to 40% of advertised value of the tender,*

**or**

(iii) *One similar work costing not less than the amount equal to 60% of advertised value of the tender.*

**The similar work is defined as under:**

**Similar Work: Similar work means design, supply, erection testing & commissioning of 50 Hz, single phase 25 kV AC OHE.**

(b) (1) In case of tenders for composite works (e.g. works involving more than one distinct component, such as Civil Engineering works, S&T works, Electrical works, OHE works etc. and in the case of major bridges – substructure, superstructure etc.), tenderer must have successfully completed or substantially completed any one of the following categories of work(s) during last 07 (seven) years, ending last day of month previous to the one in which tender is invited:

- (i) Three similar works each costing not less than the amount equal to 30% of advertised value of each component of tender, or
- (ii) Two similar works each costing not less than the amount equal to 40% of advertised value of each component of tender, or
- (iii) One similar work each costing not less than the amount equal to 60% of advertised value of each component of tender.

Note for b(1): Separate completed works of minimum required values shall also be considered for fulfillment of technical eligibility criteria for different components.

(b)(2) In such cases, what constitutes a component in a composite work shall be clearly pre-defined with estimated tender cost of it, as part of the tender documents without any ambiguity.

(b) (3) To evaluate the technical eligibility of tenderer, only components of work as stipulated in tender documents for evaluation of technical eligibility, shall be considered. The scope of work covered in other remaining components shall be either executed by tenderer himself if he has work experience as mentioned in clause 7 of the Standard General Conditions of Contractor through subcontractor fulfilling the requirements as per clause 7 of the Standard General Conditions of Contract or jointly i.e., partly himself and remaining through subcontractor, with prior approval of Chief Engineer in writing.

However, if required in tender documents by way of Special Conditions, a formal agreement duly notarised, legally enforceable in the court of law, shall be executed by the main contractor with the subcontractor for the component(s) of work proposed to be executed by the subcontractor(s), and shall be submitted along with the offer for considering subletting of that scope of work towards fulfilment of technical eligibility. Such subcontractor must fulfill technical eligibility criteria as follows:

The subcontractor shall have successfully completed at least one work similar to work proposed for subcontract, costing not less than 35% value of work to be subletted, in last 5 years, ending last day of month previous to the one in which tender is invited through a works contract.

In case after award of contract or during execution of work it becomes necessary for contractor to change subcontractor, the same shall be done with subcontractor(s) fulfilling the requirements as per clause 7 of the Standard General Conditions of Contract, with prior approval of Chief Engineer in writing.

**Note for Item 1.1.12.2 (i):**

Work experience certificate from private individual shall not be considered. However, in addition to work experience certificates issued by any Govt. Organisation, work experience certificate issued by Public listed company having average annual turnover of Rs 500 crore and above in last 3 financial years excluding the current financial year, listed on National Stock Exchange or Bombay Stock Exchange, incorporated/registered at least 5 years prior to the date of closing of tender, shall also be considered provided the work experience certificate has been issued by a person authorized by the Public listed company to issue such certificates.

In case tenderer submits work experience certificate issued by public listed company, the tenderer shall also submit along with work experience certificate, the relevant copy of work order, bill of quantities, bill wise details of payment received duly certified by Chartered Accountant, TDS certificates for all payments received and copy of final/last bill paid by company in support of above work experience certificate.

**(ii) Financial Eligibility Criteria:**

The tenderer must have minimum average annual contractual turnover of V/N or 'V' whichever is less; where

V= Advertised value of the tender in crores of Rupees

N= Number of years prescribed for completion of work for which bids have been invited.

The average annual contractual turnover shall be calculated as an average of "total contractual payments" in the previous three financial years, as per the audited balance sheet. However, in case balance sheet of the previous year is yet to be prepared/ audited, the audited balance sheet of the fourth previous year shall be considered for calculating average annual contractual turnover.

The tenderers shall submit requisite information as per Annexure-15, along with copies of Audited Balance Sheets duly certified by the Chartered Accountant/ Certificate from Chartered Accountant duly supported by Audited Balance Sheet.

**(iii) Electrical Contractor's License: The tenderers must submit attested copy of valid Electrical contractor license along with his offer. Offer shall be summarily rejected if tenderer does not have Electrical contractor license issued by State/Central government.**

**1.1.12.3 Non-compliance with any of the conditions set forth therein above is liable to result in the tender being rejected.**

**1.1.12.4 Bid Capacity:** The tender/technical bid will be evaluated based on bid capacity formula detailed as Annexure-6.

1.1.12.5 Credentials if submitted in foreign currency shall be converted into Indian currency i.e., Indian Rupee as under:

The conversion rate of US Dollars into Rupees shall be the daily representative exchange rates published by the Reserve Bank of India or entity authorized by RBI to do so for the relevant date or immediately previous date for which rates have been published. Where, relevant date shall be as on the last day of month previous to the one in which tender is invited. In case of any other currency, the same shall first be converted to US Dollars as on the last day of month previous to the one in which tender is invited, and the amount so derived in US Dollars shall be converted into Rupees at the aforesaid rate. The conversion rate of such currencies shall be the daily representative exchange rates published by the International Monetary Fund for the relevant date or immediately previous date for which rates have been published.

**[Explanation for clause 1.1.12 including clause 1.1.12.2 to 1.1.12.5 - Eligibility Criteria:**

1. *Substantially Completed Work means an ongoing work in which payment equal to or more than 90% of the present contract value (excluding the payment made for adjustment of Price variation (PVC), if any) has been made to the contractor in that ongoing contract and no proceedings of termination of contract on Contractor's default has been initiated. The credential certificate in this regard should have been issued not prior to 60 days of date of invitation of present tender.*
2. *In case a work is started prior to 07 (seven) years, ending last day of month previous to the one in which tender is invited, but completed in last 07 (seven) years, ending last day of month previous to the one in which tender is invited, the completed work shall be considered for fulfillment of credentials.*
3. *If a work is physically completed and completion certificate to this extent is issued by the concerned organization but final bill is pending, such work shall be considered for fulfillment of credentials*
4. *In case of completed work, the value of final bill (gross amount) including the PVC amount (if paid) shall be considered as the completion cost of work. In case final bill is pending, only the total gross amount already paid including the PVC amount (if paid) shall be considered as the completion cost of work.*

*In case of substantially completed work, the total gross amount already paid including the PVC amount (if paid), as mentioned in the certificate, shall be considered as the cost of substantially completed work.*

5. *If a bidder has successfully completed a work as subcontractor and the work experience certificate has been issued for such work to the subcontractor by a Govt. Organization or public listed company as defined in Note for Item 10.1 Para 10 of the Tender Form (Second Sheet), the same shall be considered for the purpose of fulfillment of credentials.*
6. *In case a work is considered similar in nature for fulfillment of technical credentials, the overall cost including the PVC amount (if paid) of that completed work or substantially completed work, shall be considered and no separate evaluation for each component of that work shall be made to decide eligibility.*
7. *In case of newly formed partnership firm, the credentials of individual partners from previous propriety firm(s) or dissolved previous partnership firm(s) or split previous partnership firm(s), shall be considered only to the extent of their share in previous entity on the date of dissolution / split and their share in newly formed partnership firm. For*

example, a partner A had 30% share in previous entity and his share in present partnership firm is 20%. In the present tender under consideration, the credentials of partner A will be considered to the extent of  $0.3 \times 0.2 \times \text{value}$  of the work done in the previous entity. For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deed(s), dissolution deed(s) and proof of surrender of PAN No.(s) in case of dissolution of partnership firm(s) etc.

8. In case of existing partnership firm, if any one or more partners quit the partnership firm, the credentials of remaining partnership firm shall be re-worked out i.e., the quitting partner(s) shall take away his credentials to the extent of his share on the date of quitting the partnership firm(e.g. in a partnership firm of partners A, B & C having share 30%, 30% & 40% respectively and credentials of Rs 10 crore; in case partner C quits the firm, the credentials of this partnership firm shall remain as Rs 6 crore). For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deed(s), dissolution deed(s) and proof of surrender of PAN No.(s) in case of dissolution of partnership firm(s) etc.
9. In case of existing partnership firm if any new partner(s) joins the firm without any modification in the name and PAN/TAN no. of the firm, the credentials of partnership firm shall get enhanced to the extent of credentials of newly added partner(s) on the same principles as mentioned in item 6 above. For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deeds, dissolution/splitting deeds and proof of surrender of PAN No.(s) in case of dissolution of partnership firm etc.
10. Any partner in a partnership firm cannot use or claim his credentials in any other firm without leaving the partnership firm i.e., In a partnership firm of A&B partners, A or B partner cannot use credentials of partnership firm of A&B partners in any other partnership firm or propriety firm without leaving partnership firm of A&B partners.
11. In case a partner in a partnership firm is replaced due to succession as per succession law, the proportion of credentials of the previous partner will be passed on to the successor.
12. If the percentage share among partners of a partnership firm is changed, but the partners remain the same, the credentials of the firm before such modification in the share will continue to be considered for the firm as it is without any change in their value. Further, in case a partner of partnership firm retires without taking away any credentials from the firm, the credentials of partnership firm shall remain the same as it is without any change in their value.
13. In a partnership firm "AB" of A&B partners, in case A also works as propriety firm "P" or partner in some other partnership firm "AX", credentials of A in propriety firm "P" or in other partnership firm "AX" earned after the date of becoming a partner of the firm AB shall not be added in partnership firm AB.
14. In case a tenderer is LLP, the credentials of tenderer shall be worked out on above lines similar to a partnership firm.
15. In case company A is merged with company B, then company B would get the credentials of company A also.]

#### 1.1.13 Period of Completion

Entire work is required to be completed in all respects within **12 (Twelve) months** from date of issue of the acceptance letter/telegram. Time is the essence of contract. Contractor will be required to maintain speedy and required progress to the satisfaction of Engineer to ensure that work will be completed in all respects within the stipulated period failing which action may be taken by the Railway Administration

in terms of Clause 17 and/or Clause 62 of the General Conditions of Contract 2020 with latest amendments.

1.1.14 DELETED

1.1.15 DELETED

1.1.16 (A) Tenderer shall furnish list of material and suppliers to purchaser within one month of receipt of Letter of Acceptance to arrange inspection of material through RDSO, RITES, CEE's representative,

(B) The contractor shall supply the material after getting approval for supply of material as per schedule decided by the concerned Sr. DEE/TRD after award of tender and planning of the work with contractor.

#### 1.1.17 Variation in quantity

**1.1.17 (1) Powers of Modification to Contract:** The Engineer on behalf of the Railway shall be entitled by order in writing to enlarge or extend, diminish or reduce the works or make any alterations in their design, character position, site, quantities, dimensions or in the method of their execution or in the combination and use of materials for the execution thereof or to order any additional work to be done or any works not to be done and the Contractor will not be entitled, to any compensation for any increase/reduction in the quantities of work but will be paid only for the actual amount of work done and for approved materials supplied against a specific order.

1.1.17 (2) (i) Unless otherwise specified in the special conditions of the contract, the accepted variation in quantity of each individual item of the contract would be upto 25% of the quantity originally contracted, except in case of foundation work (in which no variation limit shall apply). However, the rates for the increased quantities shall be as per sub- para (iii) below.

(ii) The Contractor shall be bound to carry out the work at the agreed rates and shall not be entitled to any claim or any compensation whatsoever upto the limit of 25% variation in quantity of individual item of works.

(iii) In case an increase in quantity of an individual item by more than 25% of the agreement quantity is considered unavoidable, then same shall be executed at following rates

a. Quantities operated in excess of 125% but upto 140% of the agreement quantity of the concerned item, shall be paid at 98% of the rate awarded for that item in that particular tender;

b. Quantities operated in excess of 140% but upto 150% of the agreement quantity of the concerned item shall be paid at 96% of the rate awarded for that item in that particular tender;

c. Variation in quantities of individual items beyond 150% will be avoided and would be permitted only in exceptional unavoidable circumstances and shall be paid at 96% of the rate awarded for that item in that particular tender.

d. Variation to quantities of Minor Value Item:

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 contract value.

- d.(i) Quantities operated upto and including 100% of the agreement quantity of the concerned minor value item, shall be paid at the rate awarded for that item in that particular tender;
- d.(ii) Quantities operated in excess of 100% but upto 200% of the agreement quantity of the concerned minor value item, shall be paid at 98% of the rate awarded for that item in that particular tender;
- d.(iii) Variation in quantities of individual minor value item beyond 200% will be avoided and would be permitted only in exceptional unavoidable circumstances and shall be paid at 96% of the rate awarded for that item in that particular tender.

(iv) In case of earthwork items, the variation limit of 25% shall apply to the gross quantity of earthwork items and variation in the quantities of individual classifications of soil shall not be subject to this limit.

(v) As far as Standard Schedule of Rates (SSOR) items are concerned, the variation limit of 25% would apply to the value of SSOR schedule(s) as a whole and not on individual SSOR items. However, in case of Non-Standard Schedule of Rates (SSOR) 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).

#### **1.1.18 Purchaser not bound to accept any tender**

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. Purchaser reserves right to accept any tender in respect of whole or any portion of work specified in tender papers or to reduce work or to accept any tender for less than tendered quantities without assigning any reason whatsoever. In case overall value of tender by a public sector undertaking of Central Government is upto 10% higher than lowest tender of a private tenderer, Railway reserves the right to give preference to tender of such public sector under taking over lowest price bid.

**1.1.19** Provisions of Make in India Policy 2017 issued by Govt. of India, as amended from time to time, shall be followed for consideration of tenders.

#### **1.1.20 Performance Guarantee**

The procedure for obtaining Performance Guarantee is outlined below:

(a) The successful bidder shall have to submit a Performance Guarantee (PG) within 21 (Twenty one) days from the date of issue of Letter of Acceptance (LOA). Extension of time for submission of PG beyond 21 (Twenty one) days and upto 60 days from the date of issue of LOA may be given by the Authority who is competent to sign the contract agreement. However, a penal interest of 12% per annum shall be charged for the delay beyond 21 (Twenty one) days, i.e. from 22<sup>nd</sup> day after the date of issue of LOA. Further, if the 60<sup>th</sup> day happens to be a declared holiday in the concerned office of the Railway, submission of PG can be accepted on the next working day.

In all other cases, if the Contractor fails to submit the requisite PG even after 60 days from the date of issue of LOA, the contract is liable to be terminated. In case contract is terminated railway shall be entitled to forfeit Bid Security and other dues payable to the contractor against that particular contract, subject to maximum of PG amount. In case a tenderer has not submitted Bid Security on the strength of their registration as a Startup recognized by Department of Industrial Policy and Promotion (DIPP) under Ministry of Commerce and Industry, DIPP shall be informed to this effect.

The failed Contractor shall be debarred from participating in re-tender for that work.

(b) **The successful bidder shall submit the Performance Guarantee (PG) in any of the following forms, amounting to 5% of the original contract value and Additional Performance Guarantee as per clause 16(4)(h) of GCC-2022 ACS-11 in any of the following forms:-**

(i) A deposit of Cash;

- (ii) Irrevocable Bank Guarantee;
- (iii) Insurance Surety Bond as per Annexure XVII of GCC-2022**  
**Note: In case of extension of Date of Completion, selected Bidder needs to submit extended Insurance Surety Bond/ Fresh Insurance Surety Bond/ Fresh Performance Security, in any form as given above, before expiry of existing Insurance Surety Bond.**
- (iv) Government Securities including State Loan Bonds at 5% below the market value;
- (v) Pay Orders and Demand Drafts tendered by any Scheduled Commercial Bank of India;
- (vi) Guarantee Bonds executed or Deposits Receipts tendered by any Scheduled Commercial Bank of India;
- (vii) Deposit in the Post Office Saving Bank;
- (viii) Deposit in the National Savings Certificates;
- (ix) Twelve years National Defence Certificates;
- (x) Ten years Defence Deposits;
- (xi) National Defence Bonds and
- (xii) Unit Trust Certificates at 5% below market value or at the face value whichever is less.
- Also, FDR in favour of FA&CAO (free from any encumbrance) may be accepted.

**Note As per Para 16(4)(h) of GCC-2022 ACS-11: If a Tender is accepted on the Quoted rates of Bidder which is below the advertised Tender Value, an additional performance security shall be submitted by the bidder as below:**

<b>Bid Quoted in % of advertised cost</b>	<b>Additional Performance Guarantee (%)</b>
<b>Below 0-5% (Inclusive)</b>	<b>Nil</b>
<b>Below 5%</b>	<b>5%</b>

(c) The Performance Guarantee shall be submitted by the successful bidder after the Letter of Acceptance (LOA) has been issued, but before signing of the contract agreement. This P.G. 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 P.G. extended to cover such extended time for completion of work plus 60 days.

(d) The value of PG to be submitted by the Contractor is based on original contract value and shall not change due to subsequent variation(s) in the original contract value.

(e) The Performance Guarantee (PG) shall be released after physical completion of the work based on 'Completion Certificate' issued by the competent authority stating that the Contractor has completed the work in all respects satisfactorily.

(f) Whenever the contract is rescinded, the Performance Guarantee already submitted for the contract shall be encashed.

(g) 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) Failure 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 clause 62 of these conditions.



Note:- The Performance Guarantee (PG) should be submitted as per Annexure-7 of Part-IV of the tender document

1.1.21 The tenderer shall furnish following information for making payment:

Bank Account no	_____
Bank address	_____
IFSC Code	_____
PAN no.	_____
GST no.	_____

XXXXXX

**PART I**  
**CHAPTER II**  
**SPECIAL CONDITIONS OF CONTRACT**

- 1.2.1.1 This Tender shall be governed by Preamble and General, Special conditions, Technical Specifications.
- 1.2.1.2 If there are varying or conflicting provisions in documents forming part of contract Sr. DEE/TRD/NR/LKO shall be deciding authority with regard to the intentions of the provision and decision will be final and binding on contractor.
- 1.2.3 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 public enemy, civil commotion, sabotage, serious loss or damage by fire, explosions, epidemics/pandemics, strikes, lockouts or acts of God (hereinafter, referred to events) provided, notice of the happening of any such event is given by either party to the other within 30 days from the date of occurrence thereof, neither party shall by 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 non-performance or delay in performance, and works under the contract shall be resumed as soon as practicable after such event has come to an end or ceased to exist, and the decision of the Engineer as to whether the works have been so resumed or not shall be final and conclusive, PROVIDED FURTHER that if the performance in whole or in part of any obligation under this contract is prevented or delayed by reason of any such event for a period exceeding 120 days, either party may at its option terminate the contract by giving notice to the other party.
- 1.2.4 Loss In Transit - If loss or damage occurs to stores or any part thereof during transit by rail, contractor shall have only such remedy as is available to Public against carrier under the Indian Railway (Amendment) Act - 1961, no.39 of 1961.
- 1.2.5 Scheme of work - Within a period of 45 days beginning from date of issue of Letter of Acceptance of Tender, Contractor shall submit detailed time schedule for design and various documents enumerated in tender papers to purchaser.
- 1.2.5(A) The contractor shall submit the relevant drawings and the assessment of the material. The purchaser or his representative shall approve the same, if found correct. Material shall be supplied (by the contractor) only after the approval of drawings and assessment.
- 1.2.6 Quality Assurance Programme in Supply and Erection
- a. All materials used in work shall be of best quality and of class most suited for purpose specified and procured from sources approved by Research, Design and Standard Organisation/ Central Organisation for 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. Requisite facilities for testing prototypes supplied against this contract should be available with manufacturer. In case of those equipments, components or fittings for which requisite facilities for testing of prototypes are not available with manufacturer, manufacturer shall arrange to carry out prototype tests on his own cost in a testing laboratory approved by Purchaser. Only tested quality steel shall be used. Contractor shall ensure that Purchaser's prescribed Quality Assurance Standards are rigidly followed in manufacture and erection/installation of all materials/components and fittings/equipments required for work.
  - b. Quality Of Materials and Erection - All erection work carried out shall also be of best quality acceptable to the Purchaser.

- 1.2.7 Other Railway Stores- If any material other than those specified is supplied by purchaser either at Contractor's request or suo-moto in order to prevent any possible delay in the execution of the works likely to occur due to Contractor's inability to make adequate arrangements for supply thereof or otherwise, recovery will be made from Contractor's bills at book rate or last purchase rate whichever is higher plus 5% on account of initial freight and 2% on account of incidental charges together with supervision charges at 12.5% of total cost inclusive of material, freight and incidental charges or Schedule 3 rate, whichever is higher, freight between Purchaser's source of supply and the contractor's depot or Rail head shall be to Contractor's account. If, however, material required by contractor is not available in Purchaser's stock or purchaser decides not to supply same, be that for whatever reason, purchaser shall not be bound to arrange for 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 contractor runs short of materials and such materials are available in Purchaser's stock, material may be supplied by Purchaser on loan to Contractor who will return these on receipt of his supplies or within six months whichever is earlier. Material shall be received by contractor's representative in supervisory category declared by contractor and who shall be authorised under duly executed Power of Attorney to receive material issued by purchaser to contractor. Value of loaned material would be computed by purchaser based on Schedule rates and equivalent amount would be withheld from subsequent progress payments due to contractor. In case contractor fails to return material within stipulated six months period from date of loaning of material, material loaned earlier would be treated as sold. Recoveries of value of sold material would be on basis of issue rate or market rate prevailing at time of supply or market rate at end of two months period whichever is higher, plus 5% freight charges and 2% incidental charges together with supervision charges at 12.5% of total cost inclusive of material, freight and incidental charges or Schedule rates whichever is higher. This recovery would be made from any bill submitted by Contractor subsequently either On Account or Progress payment duly adjusting the above referred withheld amount, if any on account of loaning material. However, in case the loaned material is returned within the stipulated six months or earlier, the withheld amount from the progress would be released.

1.2.8 **Contractor's Organisation -**

- (a) Contractor shall within fifteen days of issue of letter of acceptance of Tender, establish an office at a convenient place indicated in Part-III, Para 3.10 & 3.11 for progressing designs and drawings and field works, expeditiously, in consultation and with approval of Purchaser. He shall intimate Purchaser address thereof in which all correspondence shall be sent. Any communication sent to Contractor by post at his said address shall be deemed to have reached Contractor duly and in time. Important documents shall be sent by Registered post.
- (b) List of addresses to which correspondence and documents relating to contract should be sent, is included.
- (c) Main depots will be located at near stations of Lucknow Division. The proposed location/s of sub-depots and stabling lines is/are to be given by Tenderer for scrutiny and approval by Purchaser.
- (d) Electricity may be supplied at places where spare capacity is available for running of machinery and for lighting. The contractor shall provide his own distribution system in consultation and with approval of purchaser. Cost of providing connections and of energy consumed shall be paid by Contractor to Purchaser in accordance with relevant rules and prevailing rates of Railway.
- (e) At places where piped water supply is available purchaser may supply water to the contractor at convenient points for his office, workshop and stores if necessary connection with work. Contractor shall arrange to lay his own pipe lines for distribu-

tion in consultation and with approval of the Purchaser. The Contractor shall be charged for consumption by Railways at rate prevailing at that time. The Contractor shall arrange water at the work site at his own cost carried to work site.

- (f) 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) Contractor shall arrange an office for the purchaser's engineer. The office shall be equipped good quality furniture (Consisting of an executive table and chair along with 04 no good quality visiting chair of goderej or similar make) along with computer (comprising core i-5 cpu with 22" built in CPU screen) and printer for office work.

1.2.9 Contractor's drawings etc. – Any calculations, designs, drawings, schedules, information, data, progress charts etc. required by Purchaser's Engineer in connection with the contract shall be furnished by 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 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 (hereinafter called R.D.S.O.'s) and decision of Purchaser to implement the same basic drawings /designs/employment schedules will be submitted by contractor to Purchaser. If RDSO's drawings/ designs/ employment schedule is not revised, Contractor need not submit drawings/ designs/ employment schedules to Railway Electrification. In event of Contractor suggesting any alteration/deviation in standard drawings, he shall submit retraced drawings with full calculations and justification of change to Purchaser. Purchaser if convinced of need of alteration shall approach RDSO for necessary approval. In case of any ambiguity in interpretation of design and drawing, decision of purchaser shall be final and conclusive.

#### 1.2.10

- a. Quality Assurance Materials - All equipment, materials, fittings and component will be subject to Quality Control Programme of manufacturer, being a part of Quality Assurance Programme of Contractor. Materials may also be inspected by Purchaser or his representative either at manufacturer works or at Contractors' depot. Purchaser or his representative shall have right to be present during all stages of manufacture and shall be accorded free of charge all reasonable accorded facilities for inspection and testing as well as examine stage inspection report of manufacturer in addition to quality audit which Contractor may institute as a part of his programme so as to satisfy himself that 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 Quality Assurance Programme including inspection by Purchaser or his representative to ensure that work is done in accordance with specifications and approved drawings and designs and purchaser's prescribed Quality assurance standards.
- c. Expenses Of Purchaser' Representative - All expenses of Purchaser's representative shall be borne by Purchaser whether inspected material is finally utilised in work or not.
- d. Decision of Sr. DEE/TRD or his successor shall be final in respect of acceptability or otherwise of any material, fittings, component or equipment required for the work.
- e. Quality Assurance Programme - For proper control of quality and to ensure that materials, equipment and fittings are manufactured according to specification and erection in according to approved instructions, drawings, specifications, 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 work site as well as during erection. Such quality assurance programme shall also meet requirement of

purchaser's prescribed Quality Assurance Standards. This programme of the Contractor shall generally cover the following:

1. Organisation to manage and implement Quality Assurance Programme.
2. Documentation control system:-
  - i. Basic control system.
  - ii. Adopted at manufacturer's work
  - iii. Adopted at Contractor's Depot and work site.
3. Procedure adopted for:
  - i. Source Inspection.
  - ii. Incoming raw material inspection.
  - iii. Verification of material purchased.
  - iv. Fabrication Controls.
  - v. Site erection controls.
4. Inspection and Test Procedure for:
  - i. Manufacture and quality control procedure.
  - ii. Field activity.
5. System of handling and storage.
6. System of quality audit.
7. System of maintenance of records.
8. For purpose of obtaining On Account Payment, Contractor shall submit along with invoice, documents indicated in prescribed Quality Assurance Standards which should inter-alia cover following as may be applicable in each case.
  - i. Material test reports on raw materials used.
  - ii. Inspection Plan with reports of the inspection plan check points.
  - iii. Routine test report.
  - iv. Factory test results as required under specification.
  - v. Quality audit report including test check report of Purchaser's representative, if any.

#### 1.2.11 Traffic Blocks

- a. Purchaser will make arrangements to obtain traffic blocks (hereinafter referred to as blocks) necessary for running and operation of work train/light ladder trolleys/track Lorries for works to be carried out along or adjacent to track. Contractor shall, however, carry out 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 Railway. Contractor shall arrange a minimum of two mobile phones with internet and whatsapp function in working condition with Sim Card in working condition to improve communication with Railway Authorities at site/control/ divisional offices at Lucknow. It should be with respective divisional/control office to carry out maximum amount of work possible without blocks. Mobile sets shall be returned to contractor after completion of work.
- b. Blocks will normally be granted during day light hours, if however, it becomes absolutely necessary, blocks may be granted during night also. Contractor shall

confirm that he will equip himself to carry out all construction during night blocks efficiently by suitable special lighting equipments without any extra cost if required to do so. The blocks granted will ordinarily be for one track at a time.

- c. Block period shall be counted from time track is placed at Contractor's disposal at work-spot till it is cleared by the Contractor.
- d. Blocks will be subject to normal operating conditions and rules of the Railway. All formalities of exchanging private number etc with traffic control will be carried out by Purchaser's staff and for this purpose Purchaser will depute a representative for each erection gang, who will be responsible for imposing traffic blocks and also removing same after men, material and equipment have been cleared by the Contractor from running tracks and same declared safe for traffic by Purchaser's representative in case of works involving safety of running tracks.
- e. Blocks required for carrying out works necessitated by thefts, pilferage, accidents or such other incidents, shall be granted by Purchaser over and above normal requirements of block.

#### 1.2.12

- a. Correctness Of Work And Materials - Contractor shall be solely responsible for correctness of positions, levels and dimensions of works according to approved drawings, notwithstanding that he may have been assisted by Purchaser or his men in setting out same.
- b. If any dimension figured upon drawings differs from that obtained by scaling drawings figured dimensions should be normally taken as correct, unless it is a prima facie mistake. But all such cases shall be brought to notice of Purchaser's Engineers and discrepancy set right before execution.

#### 1.2.13

- a. Contractor's responsibility for discrepancy – All designs and drawings submitted by Contractor shall be based on a thorough study and shall be such that Contractor is satisfied about their suitability. Purchaser's approval will be based on these considerations, notwithstanding approval communicated by Purchaser, during progress of contract for designs and drawings, prototype samples of components, materials and equipment after inspection of materials, after erection and adjustments to installations, ultimate responsibility for correct design and execution of work shall rest with contractor unless Purchaser insists on adoption of his own designs in spite of Contractor not being agreeable to it.
- b. Contractor shall be responsible for and shall bear and pay cost for any alternation or works arising from any discrepancies, errors or omissions in designs and drawings supplied by him, whether such designs and drawings have been approved by Purchaser or not.

- 1.2.14 Additions and alterations to erected equipments - Purchaser may require ADDITIONAL INSTALLATIONS OR MODIFICATIONS OR REPLACEMENTS as per new designs as evolved or decided during currency of contract to be carried out on works, he deems necessary, either during execution or after a part or whole of installations coming with purview of contract has been put into commercial service. Further it may be necessary and expedient to energise overhead equipment which has been completed and finally adjusted in portions in yard/s. This will necessitate erection of new equipment in vicinity or joining energised equipment. In case prices for such additional works or modifications are not covered by schedule of price and are such that either party considers additional prices for such works justified, such additional works or modification shall be carried out by contractor. Any additional prices for such work Items would be mutually settled between purchaser and contractor, based on proper rate analysis and with reference to current prevalent market rates or rates available with Rly. Constn Administration in that or nearby area/s. In case additional installations or modifications or replacements are required to be carried out under this para, Purchaser shall grant a reasonable extension of time, should it be necessary.

#### 1.2.15 DEPLOYMENT OF TECHNICAL SUPERVISORS

"The contractor shall employ the following Qualified Engineer during the execution of this work:

1. One Qualified Graduate Engineer when the cost of the work to be executed is Rs.200 Lakh and above.
2. One Qualified Diploma – Holder Engineer when the cost of the work to be executed is more than Rs.25 Lakh and less than Rs.200 Lakh.

NOTE: - For track related contractual works of value, as specified in 1.2.15 (b) above, individuals having Diploma in Railway Engineering awarded by IPWE (India) shall also be considered as qualified Diploma Holder Engineers and contractors for track contract works can employ such individuals at their worksite on Railway.

- (c) Further, in case the contractor fail to employ the Qualified Engineer aforesaid in Para 1.2.15 above, he in terms of provisions of Clause 26 A 2 to the General Condition of Contract, shall be liable to pay an amount of Rs. 40,000/- and Rs. 25,000/- for each month or part thereof for the default period for the provision, as conditioned in Para 1.2.15 (a) & (b) above respectively.
  - (d) The contractor shall submit the copy of bio data and Degree/ Diploma certificate of the above technical staff employed by him for the scrutiny by Railway and for the record. Railway reserve the right to scrutinize the records of the contractor to ascertain as to whether the qualified staff has been actually employed by him and is paid for.
  - (e) While passing each "on" account bill, the DEE/ADEE incharge will certify the availability to technical staff on regular basis; otherwise the recovery as above shall be made from every bill.
  - (f) The decision of the Engineer Incharge, whether the required Technical staff was not employed by the contractor shall be final and binding upon the contractor.
- 1.2.16 Training Of Purchaser's Staff - Contractor shall train, free of charge, in a manner mutually agreed between Purchaser and contractor, such staff of Purchaser as may be deputed by him and wages and allowances and all other associated expenses of such staff shall be paid by Purchaser.

#### 1.2.17 Work By Other Agencies

- a. Any other works undertaken at same time by Purchaser or Railway direct or through some other agency at same time or section where contractor is carrying out his work will not entitle contractor to prefer any claim regarding any delays or hindrances he may have to face on this account but Purchaser shall grant a reasonable extension of time to the contractor. Contractor shall comply with any instruction which may be given to him by Purchaser in order to permit simultaneous execution of his own works and those undertaken by other contractors or Railway without being entitled on this account on any extra charge.
- b. Contractor shall not be entitled to any extra payment due to hindrance resulting from normal Railway operations, such as delay on account of adequate number of and duration of blocks not being granted, operational delay in movement of work trains etc. but Purchaser shall grant a reasonable extension of time to the contractor.
- c. Contractor shall take note that owing to works being carried out by Purchaser and others, there may be breaks in continuity of locations for work owing to works such as track remodeling being undertaken. But contractor shall not be entitled to claim any extra payment on account of such breaks. However, such breaks in continuity of work would be reasonable ground for extension of completion date/s for the work.
- d. If the purchaser is unable to supply materials to contractor as specified in contract, in time, contractor shall not be entitled to any extra payment on account of such delay in

supply. However, such delays in supplied will be reasonable ground for extension of completion date/s for work.

- e. In cases where the lines to be electrified are not in their final position, Purchaser will furnish remodeling plans for such lines to Contractor and/ or peg out altered or remodeled position of tracks to be electrified to enable preparation of designs and assessment of quantities of components required for work. However, contractor may not undertake field work on such tracks till they are in final position. The contractor shall not be entitled to any compensation in case of delay in such remodeling work, but Purchaser will grant a reasonable extension of time for completion.
- f. In course of checking overhead equipment layout plans, contractor shall prepare a list of infringements, if any exist, and advise Purchaser in time. Purchaser will arrange for removal of these infringements. 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 Railway requirements.
  - ii. Alterations to over-bridges, tunnels, foot-over-bridges and irrigation troughs, raising of bridges or troughs, or lowering of tracks to give sufficient clearance for overhead equipment.
  - iii. Protection at over bridges to prevent accidental or malicious interference with overhead equipment.
  - 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 building, signal gantries, signal cabins and other similar constructions, which may be required for erection of overhead equipment, with requisite electrical clearances.
  - vii. Diversion of drainage channels of concrete or earthen ware pipes required to accommodate foundations.
  - 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 work/s necessary for installation of track structures and overhead equipment on bridges and over bridges.
  - xi. Any special steel work and fittings for attachment for masts/portals on steel girder or other bridges, or for attachment to other non-traction structures of Railway for carrying or anchoring overhead equipment conductors.
  - xii. Dismantling and drilling of piers of bridges and walls, supply and grouting of dowel pins or holding down bolts, in piers of bridges or walls.
  - xiii. Clearing the way and removing all infringements for erection of 25 kV feeder lines from grid sub-stations.
  - xiv. Chopping/trimming of tree branches required for erection of Overhead equipment shall be done by contractor. At least four-meter clearance shall be made available before 25 kV charging between nearest 25 kV live parts and tree branches. Also, to ensure that there are no loose tree branches nearby or overhead which are likely to fall on the live OHE. However, cutting of the trees is NOT covered under this sub clause.



- g. In course of checking layout plans and general arrangement drawings for switching stations, contractor shall prepare a list of infringements if any exist, and advise purchaser in time. Purchaser will arrange for removal of these infringements at his own cost.

#### 1.2.18 Infringement of patents

- a. Contractor is forbidden to use any patents or registered drawings, process or patterns in fulfilling his contract without previous consent in writing of owner of such patent, drawing, pattern or trade mark, except where these are specified by Purchaser himself. Royalties where payable for use of such patented processes, registered drawings or patterns shall be borne exclusively by Contractor. Contractor shall advise Purchaser of any proprietary rights that may exist on such processes, drawings or patterns which he may use of his own accord.
- b. In case of patents taken out by Contractor of drawings or patterns registered by him, or of those patents, drawings, or patterns for which he holds a license, signing of Contract automatically gives Purchaser right to repair by himself the purchased articles covered by patent or by any person or body chosen by him and to obtain from any sources he desires component parts required by him in carrying out repair work. In event of infringement of any patent rights due to above action of Purchaser, he shall be entitled to claim damages from contractor on the grounds of any loss of any nature which he may suffer e.g., in case of attachment because of counterfeiting.
- c. Indemnification by contractor. - In event of any claim or demand being made or action being brought against Purchaser for infringement of later patent in respect of any equipment, machine, plant, work or thing used or supplied by Contractor under this contract or in respect of any methods of using or working by Purchaser of such equipment, machine, plant work or thing, contractor shall indemnify 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 Purchaser shall notify contractor immediately any claim is made and that contractor shall be at liberty, if he so desires with the assistance of Purchaser if required but at Contractor's expense, to conduct all negotiations for settlement of same or any litigations that may arise there from and PROVIDED THAT no such equipment, machine, plant work or thing, shall be used by Purchaser for any purpose or in any manner other than that for which they have been supplied by Contractor and specified under this contract.

#### 1.2.19 Insurance

- a. Contractor shall take out and keep in force a policy or policies of insurance against all liabilities of contractor or purchaser at common law or under any statute in respect of accidents to persons who shall be employed by contractor in or about site of Contractor's Offices for purpose of carrying out works on site. Contractor shall also take out and keep in force a policy or policies of insurance against all recognized risks to their offices and depots. Such insurance shall in all respects be to approval of Purchaser and if he so requires in his name.
- b. Insurance of materials and installations - Contractor shall take out and keep in force a policy or policies or insurance for all materials in storage and traction installation excluding foundations under erection and/or erected until such materials and installation are provisionally handed over to purchaser. For this purpose, traction installations in a section shall be deemed to have been provisionally handed over, when provisional acceptance certificate is issued for section or traction installations, in section or commissioned or on expiry of three months after installations are given ready in all respect for handing over, whichever is earlier, for commercial use. If validity of contract is extended, validity of insurance should also be extended subsequently. Contractor shall not be liable for losses or damages to equipments erected, in course of erection or in stores at contractor's depot in consequence of mutiny or other similar causes over which contractor no control has and which

- cannot be insured, such losses or damages shall, if required by purchaser, be made good by contractor, at cost of purchaser.
- c. Contractor should, however, insure materials brought to site against risks in consequence of war and invasion, as required under emergency risks (goods) Insurance Act in force from time to time.
  - d. Contractor shall take out all insurance covers in connection with the contract with Govt. recognized insurance company.

#### 1.2.20 Accident

- a. Contractor shall, in respect of all staff engaged by him or by his sub-contractor, indemnify and keep purchaser at all times indemnified and protected against all claims made and liabilities incurred under Workmen's Compensation Act, the factories Act and Payment of Wages Act and rules made there under from time to time or under any other labour and Industrial Legislation made from time to time.
- b. Contractor shall indemnify and keep 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 Railway premises and any loss or damage to Railway property sustained due to acts or omission of contractor, his sub-contractors, his agents or his staff during executions of this contract irrespective of whether such liability arises under the Workman's Compensation Act, or Fatal Accident Act or any other statute in force for time being.
- c. Contractor's liability to meet third party claims of the type outlined above will be applicable only in cases where accidents have been caused by bad design, workmanship, material or negligence on part of contractor and further liability of contractor will be limited to Rs. 25 lacs for any one accident.
- d. 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 cause, without delay to minimize or to avoid traffic detentions, in a section until installation is provisionally handed over to purchaser.
- e. Clearing Damaged Installations - Contractor shall at his cost arrange for expeditious clearing of Railway Track/s of traction installations, obstruction or fouling track/s when they are damaged as a result of railway accident or any other cause, upon oral/telephonic/written instructions from Purchaser's representative, until installations are provisionally handed over to purchaser. If contractor fails to clear tracks expeditiously and within reasonable time, purchaser will arrange to clear track/s of damaged installations and recover expenses incurred from contractor. If during such clearance operations further damage is caused to installations, purchaser is not liable to reimburse contractor cost of such further damage to installations.
- f. Contractor shall arrange for temporary slewing of overhead equipment for crane operations for derailment of rolling stock due to accidents for which contractor is not responsible, if required by Railway or purchaser, at the cost of purchaser until the installations are provisionally handed over to purchaser. If contractor fails to slew overhead equipment within reasonable time the purchaser will arrange to slew equipment and recover extra expenses, if any incurred from the contractor. After the crane operations are completed, the contractor shall restore overhead equipment to its normal position.

#### 1.2.21 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 siding 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 for 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 flagmen on duty take necessary steps to protect trains and the track is adequately protected by 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. The flagmen for protection of trains and the Track in such cases will be provided by the contractor but deputation at site will be done by the purchaser.
- 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 flagmen are on duty to protect the trolleys and the Purchaser's representative authorizes 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 of trains. No claims shall rest on the Purchaser in the event of a ladder being run over by train. The flagmen for the above job will be provided by the contractor.

Competency for the above shall, however, be given by the Railway authority. Protection of track by banner flags shall be done in accordance with General Rules of Indian Railways and Subsidiary Rules of the concerned zonal Railway where work is being carried out. Flagmen so deployed by the contractor shall be medically fit for A/3 category (as per Indian Rly Medical Manual). Prescribed fee for which shall be borne by the contractor.

- e. Contractor shall abide by all Railway regulations in force for the time being and ensure that the same are followed by his representatives, Agents, 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, especially on passenger platforms, contractor shall ensure that all times sufficient space is left for free movement of passenger traffic. He must cover and/or barricade 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, contractors or to Railway staff.
- g. Works must be carried out most carefully without any infringement of Indian Railway Act or General and Subsidiary Rules in force on Railway in such a way that they do not hinder Railway operation or affect proper functioning of or damage any Railway equipment, structure or rolling stock except as agreed to by purchaser, provided that all damage and disfiguration caused by contractor to any Railway property must be made good by contractor at his own cost failing which cost of such repairs shall be recovered from contractor.
- h. If safety of track or track drainage etc. is affected as a consequence of works undertaken by contractor, contractor shall take immediate steps to restore normal conditions. In case of delay, purchaser shall, after giving due notice to contractor in writing, take necessary steps and recover costs from contractor.

- i. Moreover, if any time works to be carried out directly concern safety of trains, contractor's staff must comply fully with Railway regulations given to him by the authorized Railway Staff. The contractor's employees and workers may for no reasons operate in installation concerning train safety or train movement. They shall notify authorized representative of purchaser who will take all necessary steps in this regard.
- j. Contractor shall be responsible for safe custody of all equipment till provisional acceptance.
- k. Contractor's liability to meet third party claims of the type outlined above will be applicable only in cases where accidents have been caused by bad design, workmanship material or  
  
Negligence on the part of the contractor and further liability of contractor will be limited to Rs. 25 lacs for any one accident.
- l. Contractor shall ensure that unauthorized, careless or inadvertent operation of switchgear, which may result in accident to staff and/or damage to equipment, does not occur.
- m. Contractor shall abide by all instructions issued by the purchaser from time to time in connection with protection/safety of track/ Railway installations /personnel as well as quality control. Contractor should not leave excavated pits un-filled overnight. Due to any reason if it becomes necessary to leave pit unfilled overnight, it should be filled back effectively with sand bags to the satisfaction of Purchaser's representative.
- n. During execution of work, contractors shall ensure that all safety precautions are taken by their men to protect themselves and site to prevent any untoward incident. In this regard contractor will ensure that adequate number of safety helmets, safety belts, safety jackets with reflective arms band; rope, ladders, emergency light etc. are available at site before the work is actually started. Above list is only indicative and is not exhaustive and safety item will be arranged as per requirement. Railway reserve the right to stop work in absence of proper safety gear and no claim shall be entertained in this regard. Decision of the Engineer-in-charge will be final and binding upon contractor. Cost of all safety gear is deemed to have been included in rates quoted and nothing extra is payable under this contract.

#### 1.2.22 Provisional Acceptance

- a) Immediately after completion of works at each switching station/LT transformer or in a section of overhead equipment, the Contractor shall certify and advise Purchaser in writing that station/s or section is/are (i) complete (ii) ready for satisfactory commercial service and (iii) ready to be handed over. He will also place at the disposal of Purchaser the required staff for checking it and putting it into operation.
- b) Test or tests as stipulated in Part-II, Chapter VII of specification excluding current 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 Purchaser and contractor within a month after receipt of contractor's notifications, as stated in sub-para/s above.
- c) After inspection and satisfactory conclusion of tests and when purchaser is satisfied with satisfactory working of 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, an extension of one month will be granted to contractor to make good defects and deficiencies pointed out by Purchaser. Fresh inspection and test will then be carried out after contractor has attended to defects and deficiencies. If these tests are also not satisfactory,

Purchaser may proceed at contractor's expenses by all means deemed expedient, to have installation made satisfactory until they comply with specifications and approved drawings and designs.

- e) In such a case, or in case of delay in completing the work under this contract within time limit, Purchaser reserves right if he deems it possible to use in a reasonable manner any section or any part of section even if some installations of section are not completely erected. Purchaser will give to contractor for this purpose seven days previous notice. Contractor shall then take at his own expenses all necessary steps to complete works in accordance with, provisions of the contract. In case it becomes impossible to proceed with above mentioned taking over tests, for reasons other than for which 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 relevant sections as indicated in sub-para/s above

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Note:

1. Provisional Acceptance Certificate for each section will be issued immediately after all tests (excluding current collection tests) are completed to satisfaction of purchaser. Should purchaser be unable to complete tests and energisation of line within a reasonable time which shall not exceed One month from date of contractor's notification, issue of Provisional Acceptance Certificate shall not be delayed and shall be issued within a maximum time of Three months after notification has been issued. Current collection tests shall normally be carried out for entire section within three months of date of energisation of section.
  2. The issue of Provisional Acceptance Certificate shall not be withheld for rectification of minor defects which may reasonably be considered not essential for energisation and operation of installation. In such cases, only value of materials and cost of rectification of minor defects shall be withheld from payments of Provisional Acceptance until rectification is completed.
  3. Contractor shall be responsible for upkeep of OHE & other assets even after issue of PAC till CRS inspection, section/station is put in commercial use & handing over to the Division.
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#### 1.2.23 Defective equipments to be changed

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

Purchaser to him in respect of such rejected equipment. Rejected/defective materials shall be returned to Contractor to extent possible.

- (b) Provisions of this para will apply only in respect of equipment and components supplied by Contractor or his sub-Contractor.

#### 1.2.24 Use of Rejected Equipments

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

#### 1.2.25 Guarantee

- a) Contractor shall guarantee that all equipment and works executed under this contract shall be free from all defect and faults in material, design, workmanship and manufacture and shall be of acceptable standards for contracted work and in full conformity with technical specifications, drawings and other contract stipulations, for a period of 12 months from the date of commissioning.
- b) During period of guarantee Contractor shall keep available an experienced engineer and necessary equipment to attend to any defective installations resulting from defective erection and/or defects in equipment supplied by 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. Contractor shall bear the cost of modifications, additions or substitutions that may be considered necessary due to faulty materials, design or workmanship for satisfactory working of the equipment. The final decision shall rest with the General Manager/Chief Electrical Engineer or his successor(s)/ Nominee.
- c) During period of Guarantee the Contractor shall be liable for replacement at site of any parts which may be found defective in equipment whether such equipment be of his own manufacture or those of his sub-contractor whether arising from faulty design, materials, workmanship or negligence in any manner on part of Contractor provided always that such defective parts as are not repairable at site are promptly returned to Contractor if so required by him at his (Contractor's) own expenses. In case of type defects in Contractor's equipment and components detected during guarantee period, contractor should replace all such Items irrespective of fact whether all such Items have failed or not. The Contractor shall bear cost of repairs carried out on his behalf by Purchaser at site. In such a case, contractor shall be informed in advance of works proposed to be carried out by Purchaser.
- d) If it becomes necessary for Contractor to replace or renew any defective portion of equipment under para-aforesaid then provision of said para shall also apply to portions of equipment so replaced or renewed until expiration of six month from date of such replacement or renewal or until end of above mentioned period whichever is later. Such extension shall not apply in case of defects of a minor nature, decision of General Manager or his successor/nominee being final in the matter. If any defect be not remedied within a reasonable time during aforesaid period Purchaser may proceed to do work at Contractor's risk and expense, but without prejudice to any other rights and remedies which Purchaser may have against the Contractor in respect of such defects or faults.
- e) Repaired or renewal parts shall be delivered and erected at site free of charge to purchaser.

- f) Any materials, fittings, components or equipments supplied under para 1.1.17 shall also be covered by provisions of this paragraph. Liability of Contractor under guarantee will be limited to re-supply of equipment, components and fittings made under para 1.1.17. Such re-supply shall be effected at the Contractor's depot or, in event of closure of depot, at stores depot of Engineer-in-charge of maintenance of overhead equipment of section covered by contract.
- g) In case of materials, components, fittings and equipment supplied by Purchaser no liability will rest on 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 Contractor to Purchaser and such quantities will be considered for purpose of final reconciliation over and above allowances as per Part I, Chapter IV.

#### 1.2.26 Final Acceptance

- (a) Final acceptance of entire equipment installed shall take effect from date of expiry of period of guarantee as defined in clause 1.2.24 of expiry of last of respective periods of guarantee of various sections for which provisional Acceptance Certificates are issued or brought into commercial operation, provided in any case that Contractor has complied fully with his obligations under clause 1.2.24 in respect of each section provided also that attention has been paid by way of maintenance by Purchaser.

#### 1.2.27 Payment

Payment will be governed by terms specified in Part-I, Chapter III and in accordance with accepted schedule of prices, read with relevant para of other parts and Chapters of Tender Papers. Purchaser retains right to withhold money due to contractor arising out of this contract for any default of contractor from other contracts which the contractor may have with Government of India.

- i) Contractor shall, whenever required, produce or cause to be produced for examination by 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 anywise relating to execution of this contract or relevant for verifying or ascertaining the cost of execution of this Contract (the decision of the purchaser on the question of relevancy of any documents, information or return being final and binding on parties). Contractor shall similarly produce vouchers etc., if required, to prove to the Purchaser that materials supplied by him are in accordance with specifications laid down in contract.
- ii) If any portion of work be carried out by a sub-contractor or any subsidiary or allied firm or company Purchaser shall have power to secure books of such sub-contractor or any subsidiary or allied firm or company, through Contractor, and such books shall be open to his inspection. The Contractor should seek prior permission from purchaser for subletting whole and/or part of work to any sub-contractor.
- iii) Obligations imposed by sub clause (i) and (ii) above are without prejudice to obligation of Contractor under any statute, rules or order binding to Contractor or other conditions of contract.
- iv) It is an agreed term of contract that purchaser reserves to itself right to carry out post-payment Audit and/or technical examination of works and final bill, including all supporting vouchers, abstracts etc. and to make a claim on Contractor for 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 contract.

#### 1.2.28 Equipments, components and material received for work

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

#### 1.2.29 All payments in respect of contract during currency of the contract shall be made through National Electronic Funds Transfer (NEFT) or Real Time Gross Saving (RTGS). The successful tenderer on award of contract must submit NEFT /RTGS mandate form complete in all respect as detailed at Form-14 of the tender document. However, if facility of NEFT/RTGS is not available at a particular location, the payments shall be made by cheque. In such cases the successful tenderer on award of contract will have to furnish contractor's Bank Account Number and Name of the Bank against which all payments in respect of the contract during the currency of the contract shall be made.

#### 1.2.30 EMERGENCY WORK

##### 1.2.30.1 In the event of any accident or failure occurring in or about the work or arising out for or in connection with the construction completion or maintenance of the work which in the opinion of the engineer required immediate attention, the railway may be with its own workmen or other agency execute or partly execute the necessary work or carry out repairs if the engineer considers that the contractors is not in a position to do so in time and charge the cost thereof, as to be determined by the Sr. DEE/TRD/LKO to the contractor.

##### 1.2.30.2 In terms of clause 32 of GCC, The materials and plant brought by the Contractor upon the site or on the land occupied by the Contractor in connection with the works and intended to be used for the execution thereof shall immediately be deemed to be the property of the Railway. Such of them as during the progress of the works are rejected by the Engineer under Clause 25 of GCC of these conditions or are declared by him not to be needed for the execution of the works or such as on the grant of the certificate of completion remain unused shall immediately on such rejection, declaration or grant cease to be deemed the property of the Railway and the Contractor may then (but not before) remove them from the site or the said land. This clause shall not in any way diminish the liability of the Contractor nor shall the Railway be in any way answerable for any loss or damage which may happen to or in respect of any such materials or plant either by the same being lost, stolen, injured or destroyed by fire, tempest or otherwise. The decisions in this regard of the Engineer-in-charge or his superiors i.e. Executive Elect. Engineer / Sr. DEE/TRD etc. shall be final and beyond the ambit of arbitration clause.

##### 1.2.30.3 Tenderer is required to submit the list of equipment, machinery, construction tools and plants available /deployed at site. The successful tenderer on receipt of acceptance letter and conveying their consent shall submit name, addresses, telephone numbers, Fax number/E Mail address of the persons to be contacted for requisitioning the above items as detailed in forgoing clause 15.2 and notify from time to time if any change in the list of equipments/machinery or the addresses/ individuals to the Engineer-in-charge in writing if required. The name and address, telephone numbers and the contractor officials name shall also be displayed at the site of work.



- 1.2.30.4 The man-power, consumable items and maintenance of the above tools & plants when requisitioned shall be the responsibility of the tenderer/contractor so that the equipments, machinery, tools & plants shall be available for effective utilization at the accident sites, natural calamities, breaches sites etc.

#### 1.2.31 **POLICE VERIFICATION**

Police verification of each contractor's staff will have to be obtained from Thana/SSP office as per approval by Railways. In case of non-submission of police verification report as per approval of Railway, penalty may be imposed.

#### 1.2.32 **Mandatory updation of Labour data on Railway's Sharamik Kalyan Portal by Contractor**

1. Contractor is to abide by the provisions of Payment of Wages act & Minimum Wages act in terms of clause 54 and 55 of Indian Railways General Condition of Contract. In order to ensure the same, an application has been developed and hosted on website 'www.sharamikkalyan.indianrailways.gov.in'. Contractor shall register his firm/company etc. and upload requisite details of labour and their payment in this portal. These details shall be available in public domain. The Registration /updation of Portal shall be done as under:
  - i. Contractor shall apply for onetime registration of his company/firm etc. in the Sharamikkalyan portal with requisite details subsequent to issue of Letter of Acceptance. Engineer shall approve the contractor's registration on the portal within 7 days of receipt of such request.
  - ii. Contractor once approved by any Engineer, can create password with login ID (PAN No.) for subsequent use of portal for all LOAs issued in his favour.
  - iii. The contractor once registered on the portal, shall provide details of his Letter of Acceptance (LOA) / Contract Agreements on sharamikkalyan portal within 15 days of issue of any LOA for approval of concerned engineer. Engineer shall update (if required) and approve the details of LOA filled by the contractor within 7 days of receipt of such request.
  - iv. After approval of LOA by Engineer, contractor shall fill the salient details of contract labours engaged in the contract and ensure updating of each wage payment to them on sharamikkalyan portal on monthly basis.
  - v. It shall be mandatory upon the contractor to ensure correct and prompt uploading of all salient details of engaged contractual labour & payments made thereof after each wage period.
2. While processing payment of any 'On Account bill' or 'Final bill' or release of 'Advances' or 'Performance Guarantee / Security deposit', contractor shall submit a certificate to the Engineer or Engineer's representatives that "I have uploaded the correct details of contract labours engaged in connection with this contract and payments made to them during the wage period in Railway's Sharamikkalyan portal at 'www.sharamikkalyan.indianrailways.gov.in' till \_\_\_\_\_ Months, \_\_\_\_\_ Year."

XXXXXX

**PART-I**  
**CHAPTER - III**  
**PRICE 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 condition of the Contract.

**1.3.2 SCHEDULE OF PRICES:**

(a) The schedule of prices has been uploaded on IREPS website.

All unit prices as above 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 not affect unit prices, so long as such changes are mutually agreed to by the Purchaser and the Contractor. The prices shall be for materials and erection, except for those materials specified in Part-IV, Annexure-4, for which only erection charges will be payable and for execution of work in accordance with specifications and approved drawings and designs. The Contractor shall carefully note the items of materials, equipments, fittings and components which will be supplied by the Purchaser.

**PRICE VARIATION:-**

**PVC shall be applicable only for contracts of advertised value Rs. 2 Crores and above)**

**A.1 Applicability:** Price Variation Clause (PVC) shall be applicable only in tender having advertised value above **Rs. 2 Crores**. Provided further that, in a contract where PVC is applicable, following shall be outside the purview of price adjustments (i.e. shall be excluded from the gross value of the work for the purpose of price variation) :

- a) Materials supplied by Railway to the Contractors, either free or at fixed rate;
- b) Any extra item(s) included in subsequent variation falling outside the purview of the Bill(s) of Quantities of tender, under clause 39. (1)(b) of these Standard General Conditions, unless applicability of PVC and 'Base Month' has been specially agreed, while fixing the rates of such extra item(s).

**A.2 Base Month:** The Base Month for 'Price Variation Clause' shall be taken as the one month prior to closing of tender, unless otherwise stated elsewhere. The quarter for applicability of PVC shall commence from the month following the Base month. The Price Variation shall be based on the average Price Index of the quarter under consideration.

**A.3 Validity:**

Rates accepted by Railway Administration shall hold good till completion of work and no additional individual claim shall be admissible except:

- (a) Payment/recovery for increase/decrease in GST on works contract or imposition/removal of any tax/cess on Works Contract as per Clause 37,
- (b) Payment/recovery for overall market situation as per Price Variation Clause given hereunder.

**A.4** Components of various items in a contract on which variation in prices be admissible, shall be steel, cement, ferrous material, non-ferrous material, insulators, zinc and other

materials, labour, plant & machinery, fuel, explosives, detonators etc. Adjustment for variation in prices of these items shall be determined in the manner prescribed.

**A.5** No price variation shall be admissible for fixed components.

**A.6** The percentages of various components in various type of works shall be as specified for all item (s)/ Bill(s) of Quantities in tender document and the same shall be fixed as per table & classifications given below:

**(I). For Civil Engineering Works**

S N	Classification		1A, 2 & 3A	4A	5A	6A	7	8A	9A	1B, 3B, 4B, 5B, 6B 8B & 9B	1C, 3C, 4C, 5C, 6C, 8C & 9C	3D, 4D, 5D, 6D, 8D & 9D	3E, 4E, 5E, 6E, 8E & 9E
	Components												
1	Fixed	*	15	15	15	15	15	15	15	15	15	15	15
2	Labour	L <sub>c</sub>	20	25	30	20	50	20	20	0	0	10	25
3	Steel	S <sub>c</sub>	0	0	20	0	0	0	0	85	0	50	0
4	Cement	C <sub>c</sub>	0	0	15	0	0	0	0	0	85	0	0
5	Plant Machinery & Spares	PM <sub>c</sub>	30	15	5	20	15	20	30	0	0	10	30
6	Fuel & Lubricants	F <sub>c</sub>	25	15	5	15	15	20	15	0	0	10	20
7	Other materials	M <sub>c</sub>	10	15	30	30	5	25	20	0	0	5	10
8	Detonators & Explosive	E <sub>c</sub>	0	15	0	0	0	0	0	0	0	0	0
Total			100	100	100	100	100	100	100	100	100	100	100

\* It shall not be considered for any price variation.

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

**1 Earthwork in Formation**

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

1B Item(s) for supply of Steel

1C Item(s) for supply of Cement

**2 Ballast Supply Works**

**3 Tunnelling Works (Without Explosives)**

3A All Item(s) excluding 3B or/and 3C or/and 3D or/and 3E

3B Item(s) for supply of Steel

3C Item(s) for supply of Cement or/and Grout

3D Item(s) for Fabrication & Erection of Structures including supply of Steel

3E Item(s) for Fabrication & Erection of Structures excluding supply of Steel.

**4 Tunnelling Works (With explosives)**

4A All Item(s) excluding 4B or/and 4C or/and 4D or/and 4E

4B Item(s) for supply of Steel

- 4C Item(s) for supply of Cement or/and Grout
- 4D Item(s) for Fabrication & Erection of Structures including supply of Steel
- 4E Item(s) for Fabrication & Erection of Structures excluding supply of Steel.

## 5 Building Works

- 5A All Item(s) excluding 5B or/and 5C or/and 5D or/and 5E
- 5B Item(s) for supply of Steel
- 5C Item(s) for supply of Cement
- 5D Item(s) for Fabrication & Erection of Structures including supply of Steel
- 5E Item(s) for Fabrication & Erection of Structures excluding supply of Steel.

## 6 Bridges & Protection work

- 6A All Item(s) excluding 6B or/and 6C or/and 6D or/and 6E
- 6B Item(s) for supply of Steel
- 6C Item(s) for supply of Cement
- 6D Item(s) for Fabrication, Assembly, Erection& Launching of Girders including supply of Steel
- 6E Item(s) for Fabrication, Assembly, Erection & Launching of Girders excluding supply of Steel

## 7 Permanent Way linking

## 8 Platform, Passenger Amenities

- 8A All Item(s) excluding 8B or/and 8C or/and 8D or/and 8E
- 8B Item(s) for supply of Steel item/fittings
- 8C Item(s) for supply of Cement Item
- 8D Item(s) for Fabrication & Erection of Structures including supply of Steel
- 8E Item(s) for Fabrication & Erection of Structures excluding supply of Steel

## 9 Any Other Works not covered in Classification 1 to 8

- 9A All Item(s) excluding 9B or/and 9C or/and 9D or/and 9E
- 9B Item(s) for supply of Steel
- 9C Item(s) for supply of Cement or/and Grout
- 9D Item(s) for Fabrication & Erection of Structures including supply of Steel
- 9E Item(s) for Fabrication & Erection of Structures excluding supply of Steel

**46A.7 Formulae:** The Amount of variation in prices in various components (labour, material etc.) shall be worked out by the following formulae:

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

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

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

$$(iv) \quad E = \frac{(W) \times (E_Q - E_B) \times E_C}{E_B \times 100}$$

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

$$(vi) \quad S = \frac{(W \text{ or } W_S \text{ or } W_{SF}) \times (S_O - S_B) \times S_C}{S_B \times 100}$$

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

**(II) For Railway Electrification Works:**

$$(viii) \quad T = [0.4136 \times (C_Q - C_B) / C_B] \times 85$$

$$(ix) \quad R = [0.94 \times (R_T - R_O) / R_O + 0.06 \times (Z_T - Z_O) / Z_O] \times 85$$

$$(x) \quad N = [(P_T - P_O) / P_O] \times 85$$

$$(xi) \quad I = [(I_T - I_O) / I_O] \times 85$$

$$(xii) \quad G = [(M_Q - M_B) / M_B] \times 85$$

$$(xiii) \quad Er = [(L_Q - L_B) / L_B] \times 85$$

Where,

L	Amount of price variation in Labour
M	Amount of price variation in Materials
F	Amount of price variation in Fuel
E	Amount of price variation in Explosives
PM	Amount of price variation in Plant, Machinery and Spares
S	Amount of price variation in Steel Supply Item
C	Amount of price variation in Cement Supply Item
T	Percentage variation payable on the gross value of bill of Concreting (Bill(s) of Quantities for concrete items)
R	Percentage variation payable on the gross value of bill of Ferrous Items (Bill(s) of Quantities for ferrous items)
N	Percentage variation payable on the gross value of bill of Non-Ferrous Items (Bill(s) of Quantities for non-ferrous items)
I	Percentage variation payable on the gross value of bill of Insulator (Bill(s) of Quantities for Insulator items)
G	Percentage variation payable on the gross value of bill of General Works (Bill(s) of Quantities for General items)
Er	Percentage variation payable on the gross value of erection (Bill(s) of Quantities for Erection Item)
L <sub>C</sub>	% of Labour Component in the item(s)
M <sub>C</sub>	% of Material Component in the item(s)
F <sub>C</sub>	% of Fuel Component in the item(s)
E <sub>C</sub>	% of Explosive Component in the item(s)
PM <sub>C</sub>	% of Plant, Machinery and Spares Component in the item(s)
S <sub>C</sub>	% of Steel Supply item Component in the item(s)
C <sub>C</sub>	% of Cement Supply item Component in the item(s)
W	Gross value of work done by Contractor as per on-account bill(s) excluding the Gross value of work under W <sub>S</sub> or/and W <sub>C</sub> or/and W <sub>SF</sub> or/and W <sub>F</sub> or/and W <sub>SFL</sub> or/and W <sub>FL</sub> and cost of materials supplied by Railway either free or at fixed rate,

W <sub>S</sub>	Gross value of work done by Contractor for item(s) of supply of steel.
W <sub>C</sub>	Gross value of work done by Contractor for item(s) of supply of cement and /or supply of grout material.
W <sub>SF</sub>	Gross value of work done by Contractor for item(s) of Fabrication & Erection of Structures including supply of Steel.
W <sub>F</sub>	Gross value of work done by Contractor for Fabrication & Erection of Structures excluding supply of Steel.
W <sub>SFL</sub>	Gross value of work done by Contractor for item(s) of Fabrication, Assembly, Erection / Launching of Girders including supply of Steel.
W <sub>FL</sub>	Gross value of work done by Contractor for item(s) of Fabrication, Assembly, Erection / Launching of Girders excluding supply of Steel.
L <sub>B</sub>	Consumer Price Index for Industrial Workers - All India: Published in R.B.I. Bulletin for the base period
L <sub>Q</sub>	Consumer Price Index for Industrial Workers - All India: Published in R.B.I. Bulletin for the average price index of the 3 months of the quarter under consideration
M <sub>B</sub>	Wholesale Price Index: All commodities – as published in the R.B.I. Bulletin for the base period
M <sub>Q</sub>	Wholesale Price Index: All commodities – as published in the R.B.I. Bulletin for the average price index of the 3 months of the quarter under consideration
F <sub>B</sub>	The average of official prices of Diesel available on the official website of 'Petroleum Planning and Analysis cell' under Ministry of Petroleum and Natural Gas for Delhi, Kolkata, Mumbai & Chennai, for the base period
F <sub>Q</sub>	The average of official prices of Diesel available on the official website of 'Petroleum Planning and Analysis cell' under Ministry of Petroleum and Natural Gas for Delhi, Kolkata, Mumbai & Chennai, for the 3 months of the quarter under consideration
E <sub>B</sub>	Index number of Monthly Whole Sale Price Index for the category 'Explosive' of (g). Manufacture of other chemical products under (J) MANUFACTURE OF CHEMICALS AND CHEMICAL PRODUCTS, published by Office of Economic Adviser, Govt. of India, Ministry of Commerce & Industry, Department of Industrial Policy & Promotion (DIPP), for the base period.
E <sub>Q</sub>	Index number of Monthly Whole Sale Price Index for the category 'Explosive' of (g). Manufacture of other chemical products under (J) MANUFACTURE OF CHEMICALS AND CHEMICAL PRODUCTS, published by Office of Economic Adviser, Govt. of India, Govt. of India, Ministry of Commerce & Industry, Department of Industrial Policy & Promotion (DIPP), for the average price index of 3 months of the quarter under consideration.
PM <sub>B</sub>	Index Number of Wholesale Prices in India by Groups and Sub Groups (Averages) for 'Manufacture of machinery for mining, quarrying and construction'– published in RBI (Reserve Bank of India) Bulletin, for the base period.
PM <sub>Q</sub>	Index Number of Wholesale Prices in India by Groups and Sub Groups (Averages) for 'Manufacture of machinery for mining, quarrying and construction'– published in RBI (Reserve Bank of India) Bulletin, for the average price index of 3 months of the quarter under consideration.
S <sub>B</sub>	The average rate provided by the Joint Plant Committee for the relevant category of steel item as mentioned in Clause 46A.9; for the base period.

S <sub>Q</sub>	The average rate provided by the Joint Plant Committee for the relevant category of steel item as mentioned in Clause 46A.9; for the 3 months of the quarter under consideration.
C <sub>B</sub>	Index No. of Wholesale Price Index of sub-group Cement, Lime & Plaster as published in RBI Bulletin for the base period
C <sub>Q</sub>	No. of Wholesale Price Index of sub-group Cement, Lime & Plaster as published in RBI Bulletin for the average price index of the 3 months of the quarter under consideration
R <sub>T</sub>	IEEMA price index for Steel Blooms (size 150mmx150mm) for the month which is two months prior to date of inspection of material.
R <sub>O</sub>	IEEMA price index for Steel Blooms (size 150mmx150mm) for the month which is one month prior to date of opening of tender.
P <sub>T</sub>	IEEMA price index for Copper wire rods for the month which is two months prior to date of inspection of material.
P <sub>O</sub>	IEEMA price index for Copper wire rods for the month which is one month prior to date of opening of tender.
Z <sub>T</sub>	IEEMA price index for Zinc for the month which is two months prior to date of inspection of material
Z <sub>O</sub>	IEEMA price index for Zinc for the month which is one month prior to date of opening of tender
I <sub>T</sub>	RBI wholesale price index for the sub-group “Insulators” for the month which is two months prior to date of inspection of material
I <sub>O</sub>	RBI wholesale price index for the sub-group “Insulators” for the month which is one month prior to date of opening of tender

**A.8** The demands for escalation of cost shall be allowed on the basis of provisional indices as mentioned above in Clause 46A.7. Any adjustment needed to be done based on the finally published indices shall be made as and when they become available.

**A.9: (1)** Relevant categories of steel for the purpose of operating Price Variation formula as mentioned in this Clause shall be as under:

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

**(2).** Relevant city for referring “JPC (Joint Plant Committee)” rates of steel items (S<sub>Q</sub> /S<sub>B</sub>) in different Zonal Railways shall be as under :

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

### **A.10 Price Variation during Extended Period of Contract**

The price adjustment as worked out above, i.e. either increase or decrease shall be applicable upto the stipulated date of completion of work including the extended period of completion where such extension has been granted under Clause 17A of the Standard General Conditions of Contract. However, where extension of time has been granted due to Contractor's failure under Clause 17B of the Standard General Conditions of Contract, price adjustment shall be done as follows:

- a.** In case the indices increase above the indices applicable to the last month of original completion period or the extended period under Clause 17A, the price adjustment for the period of extension granted under Clause 17B shall be limited to the amount payable as per the Indices applicable to the last month of the original completion period or the extended period under Clause 17A of the Standard General Conditions of Contract; as the case may be.

In case the indices fall below the indices applicable to the last month of original/ extended period of completion under Clause 17A, as the case may be; then the lower indices shall be adopted for the price adjustment for the period of extension under Clause 17B of the Standard General Conditions of Contract.

- (b) **QUANTITIES**  
The approximate estimated quantities of various items of work are included in Schedule of IREPS website.
- (c) **EXPLANATORY NOTES**  
Explanatory notes for various items of work included in Part-I chapter-IV.
- (d) **NEW ITEMS OF WORK**
- e) If during the execution of the work the Contractor is called upon to carry out any new item of work not included in Schedule, the Contractor shall execute such works at such prices as may be mutually agreed upon with the Purchaser before commencement and these will be based on the rate analysis as per the current market /prevalent rates of such or similar items available with the Rly Administration in that or nearby areas.
- ii) Provided that if the Contractor commence work or incurs any expenditure in regard thereto before the rates are determined and agreed upon as lastly hereon-to-forementioned, then and in such a case the Contractor shall only entitled to be paid in respect of the work carried out or expenditure incurred by him prior to the date of determination of the rates as aforesaid according to the rates as shall be the Purchaser. However, if the contractor is not satisfied with the decision of the Purchaser in this respect, he may appeal to Sr. DEE/TRD/LKO within 30 days of getting the decision of the Purchaser, supported by analysis of the rates claimed. The Sr. Divisional Electrical Engineer's (Sr. DEE)/TRD decision after hearing both the parties in the matter would be final and binding on the contractor and the Railway.

- 1.3.3 Price of Equipments, Components and Materials –  
Rates given in Schedule should be quoted inclusive of all taxes etc.

- 1.3.4 DELETED

- 1.3.5 Payments and recoveries –



Subject to any deduction or recoveries which Purchaser may be entitled to make under Contract. Contractor shall, unless otherwise agreed to, be entitled to get following payments subject to conditions stipulated in subsequent paragraphs.

- i) Payment of mobilization advance.
- ii) Payment for designs.
- iii) Payments for foundations.
- iv) "On Account" payments.
- v) Progress payments for supply and erection.
- vi) Payments for additional supplies.
- vii) Reimbursement on account of price variation (para 1.3.2 (d)).
- viii) Payment for provisional acceptance for each sub-group.
- ix) Payment for surplus materials taken over.
- x) Final settlement.

#### 1.3.6 Invoicing procedure

- a) The contractor shall submit his invoicing procedure for approval by Purchaser within two months from date of receipt of Letter of Acceptance of Tender. Separate invoices shall be submitted for different types of payment mentioned above. All invoices shall be submitted with original supporting documents or certified true copies of supporting document wherever these are acceptable to Purchaser's Engineer. Where copies of original documents are required in support of several invoices, true certified copies of original documents may be forwarded to Purchaser's Engineer, with his consent.
- b) Invoices shall be submitted only on basis of agreed principles and prices, quantities and measurements of works completed shall be approved by Purchaser's Engineer prior to submission of invoices. For this purpose, schedule of quantities and measurements submitted by contractor for approval of Purchaser's Engineer may be only upto extent of work completed except in case of payments on provisional acceptance.

#### 1.3.6.1 PAYMENTS FOR DESIGNS

The entire payments for designs against items will be made in the final bill.

#### 1.3.7 On account payments

- a) On account payment will be made for equipment, components, fittings and materials required for execution of work and additional supply as described below. No On Account payment will be made on supplies of concreting materials. On Account payment made will subsequently be adjusted against progress payment and against payment due on provisional acceptance and /or against payment due on supply of spares and other supplies.

#### 1.3.8 Recoveries from Contractor

- a) All recoveries for materials supplied and services rendered by Purchaser to Contractor and other refunds due from contractor shall unless otherwise specified, ordinarily be made by deductions from payments due to Contractor covering value of supply and erection in progress payment for erection, and from payment on Provisional Acceptance.

#### 1.3.9 Payments of work:

Payments for the 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 shall not be entitled to any extra payment unless the dimensions are increased on account of physical impossibility of carrying out the work in accordance with approved designs and drawings, subject to approval by the Railway before execution. In case the dimensions of work are less than those shown in the approved designs and drawings and

the work is accepted without being rejected, payment will be made for the quality of work actually executed and accepted.

(i) Progress payments made to the contractor shall be without prejudice to the final making up of the accounts and shall in no respect be considered or used as evidence of any facts stated in or to be inferred from such accounts or not of any particular quantity of work having been executed.

(ii) Payment to the contractor shall be made as under:

(a) 80% of the item price (material cost) on receipt of materials in Railway custody after successful inspection and due certification by Engineer's representative at manufactures works and or at site of work. For this purpose 80% of contract value of each item will be considered as material cost of that item.

(b) Further payment of material & erection cost to cover 90% of the contract price on successful completion of inspection and due certification of installation and testing of all material including equipment by Engineer's representative.

(c) Balance 10% payments shall be released after successful completion of work and certification by Engineer's.

1.3.10 'e-Measurement Book' will be implemented as per Railway Board letter no. 2017/CE-I/CT/9 dated: 31.05.2023

1.3.11 Income Tax

Under Section 194-C of the Income Tax Act 1961 deduction of 2% plus surcharge as applicable on Income Tax will be made for sums paid for carrying out the work under this contract.

#### 3.11.1 **TAXES**

The contractor shall be governed by the Taxes applicable at the place of actual execution of work.

1.3.11.1 Taxes on works contract, octroi, royalty, toll tax, local tax on materials as well as services and any other tax levied by Central Govt /State Govt. or local bodies shall be borne by the tenderer. No part of such taxes on contractor's labour/material or any other account will be paid by the Railways. Therefore, the contractor must ascertain the various taxes levied by the concerned Govt or local bodies at the place of execution of work and take into account for the same while quoting the rates. This should be kept in view before tendering.

NOTE:

i Works contracts shall be treated as supply of services as per Schedule –II GST Act.

ii GST Act and Rules issued from time to time by the Government /concerned authorities shall be applicable

iii Contractor/suppliers/service providers/parties shall register their firms State wise under GSTIN (GST Identification Number) and submit at the time of opening of tender or before the signing the agreement and shall mention places of business, registered office address and email id.

1.3.11.2 If there is any increase/decrease/imposition of new tax/removal of existing tax by Central Govt/State Govt/Local bodies in respect to any of the tax mentioned above, the same shall be borne by the contractor and neither any additional payment will be made, nor any recovery will be made on this account. This should also be kept in view before tendering, as no subsequent changes will be made in the rates payable to the contractor on this account.

1.3.11.3 Railways will deduct the sales tax or any other tax specified by the concerned Central Govt/State Govt/Local bodies if required to be deducted at source under the relevant laws as applicable on the date of making the payment. Railway will issue a certificate regarding tax so deducted. It will be responsibility of the contractor to make further correspondence with concerned Govt or local bodies to ensure full deposition of the tax or for claiming a refund, if due, as is done in case of income tax.

1.3.11.4 In case any tax is notified to be deducted at source from a specified date and certain payments have already been made in the period that lapsed between the date of applicability of tax and the actual date of implementation of the same, tax required to be deducted at source for this period will be recovered from the subsequent payment.

1.3.11.5 Implementation of – The Building and Other Construction Workers (RECS) Act, 1996 and the Building and Other Construction Workers Cess Act, 1996 in Railway Contracts.

1.3.12 Deleted

1.3.13 Deleted

1.3.14 Final settlement

On expiry of Guarantee period and issue of Certificate of Final Acceptance of entire installations security deposit will be released to contractor after adjustment of any dues payable by contractor.

1.3.15 Measurements

(a) Payment 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 dimensions of work are more than those shown in approved designs and drawings, the contractor will not be entitled to any extra payment, unless dimensions where increased on account of physical impossibility of carrying out work in accordance with approved drawings and designs. In case dimensions of work are less than those shown in approved designs and drawings and work is accepted without being rejected, payment will be made as per work actually done.

(b) Measurements will be made generally in accordance with standard engineering practice and in conformity with the explanatory notes for Schedule.

(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 re-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.

1.3.16. DELETED

1.3.16 Release of Security Deposit: Security deposit will be released as per GCC-2022.

### **1.3.18 'Letter of Credit' as Mode of Payment**

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

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

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

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

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

- (a) The LC shall be a sight LC.
- (b) The contractor shall select his Advising/Negotiating bank for LC. The incidental cost towards issue of LC and its operation thereof shall be borne by the contractor.
- (c) SBI, New Delhi, Main Branch will be the nodal branch for issue of LCS based on online requests received from Railway Accounts Units for tenders opened in financial year 2018-19. SBI branches where the respective Railway Accounts Office has its Account (local SBI branch) will be the issuance/reimbursing branch for LC issued under this arrangement. The Bank shall remain same for this tender till completion of contract. The incidental cost @0.15% per annum of LC value, towards issue of LC and operation thereof shall be borne by the contractor and shall be recovered from his bills.
- (d) The LC shall be opened initially for duration of 180 to 365 days in consultation with contractor. The LC shall be extended time to time as per the progress of the contract, on the request of the contractor. The value of LC to be opened initially as well as extended thereafter shall be finalised by the engineer in consultation with the contractor on the basis of expected progress of work.
- (e) The LC terms and conditions shall inter-alia indemnify and save harmless the Railway from and against all losses, claims and demands of every nature and description brought or recovered against the Railways by reason of any act or omission of the contractor, his agents or employees, in relation to the Letter of Credit (LC). All sums payable/borne by Railways on this account shall be considered as reasonable compensation and paid by contractor.
- (f) The LC terms and conditions shall inter-alia provide that Railways will issue a Document of Authorisation after passing the bill for completed work, to enable contractor to claim the authorized amount from their bank.
- (g) The acceptable, agreed upon document for payments to be released under the LC shall be the Document of Authorisation.
- (h) The Document of Authorisation shall be issued by Railway Accounts Office against each bill passed by Railways.
- (i) On issuance of Document of Authorisation, a copy of Document of Authorisation shall be posted on IREPS for download by the contractor. A digitally signed copy of Document of Authorisation shall also be sent by Railway Accounts Office to Railway's bank (Local SBI Branch).
- (j) The contractor shall take print out of the Document of Authorisation available on IREPS and present his claim to his bank (advising Bank) for necessary payments as per LC terms and conditions. The claim shall comprise of copy of Document of Authorisation, Bill of Exchange and Bill.
- (k) The payment against LC shall be subject to verification from Railway's Bank (Local SBI Branch).
- (l) The contractor's bank (advising bank) shall submit the documents to the Railway's Bank (Local SBI Branch).
- (m) The railway's bank (issuing bank) shall, after verifying the claim so received w.r.t. the digitally signed Document of Authorisation received from Railway Accounts Office, release the payment to contractor 's bank (advising bank) for crediting the same to contractor 's account.
- (n) Any number of bills can be dealt within one LC, provided the sum total of payments to contractor is within the amount for which LC has been opened.
- (o) The LC shall be closed after the release of final payment including PVC amount, if any, to the contractor.
- (p) The release of performance guarantee or security deposit shall be dealt directly by railway with the contractor i. e., not through LC.

1.3.19 Public Procurement (Preference to Make in India), Order 2017 and its revision from time to time will follow.

1.3.19.1 Guidelines regarding Public Procurement (Preference to Make in India), Order 2017-Revision of order no. P-45021/2/2017-PP (BE-II) dated: 28<sup>th</sup> May, 2018 of Department of Industrial policy and Promotion (Public Procurement Section), Ministry of Commerce and Industry, Government of India will follow.

**“This tender complies with Public Procurement Policy Order 2017 dated 15/6/2017”**

I/We accept the above conditions.

Signature of the contractor

XXXX

**PART-I**  
**CHAPTER-IV "A"**  
**EXPLANATORY NOTES OF SCHEDULE**  
**SCHEDULE OF PRICES**  
**Part "A"-GENERAL**

**SECTION I**

1. Explanatory notes for various items of work in schedule are given below.
2. All the tools & equipment such as drilling machine etc. required during execution of the work shall be arranged by the contractor.
3. All the safety precautions for men and material working within Railway premises should be taken by the contractor. The contractor shall be responsible in all respect, if any of their workmen meets with an accident due to non-observation of the safety precautions. Tenderer shall indemnify Railway against any or all claims which may arise because of any reason under any circumstances/incident/accident.
4. The contractor shall store/stock the required quantity of the material in the TRD depots required for providing the bonds over the depot jurisdiction and at work site and shall be used only after inspection and approval by the authorized representative of Sr.DEE/TRD/NR/LKO.
5. The contractor shall carry out the work daily on Railway working days by their skilled labour as per rule.
6. The work shall be planned by the contractor in consultation with concerned SSE/TRD to avoid any interruption to normal power supply and train movements.
7. The Railway shall not be responsible for any loss or damage to contractor material/equipment, tools and plants etc. from any cause what so ever.
8. The works shall be carried out to the full satisfaction of authorized representative Sr. DEE/TRD/NR/LKO.
9. To and fro transportation, loading and unloading of T & Ps and material from the firm's works place to Railway site shall be arranged by the contractor.
10. The rates quoted by the tenderers and accepted by the Railway administration shall hold good till completion of the work and no additional individual claims will be admissible on account of the fluctuation in market rates, increase in taxes/levies/GST/ toll taxes etc.
11. Railway reserves the right to reject all or any tender without assigning any reason thereof or relax or change any of the conditions/ specifications stipulated in the tender.
12. The contractor shall intimate inspection programs of the work in advance. The equipments/instruments required for checking at site or in office place shall be arranged by the contractor.
13. The basic quantities of components and materials required to make up for selected items, are indicated for guidance only. There may be minor variation to suit erection but no adjustment in prices of schedule shall be made on that account. In estimating the prices for various items of work provision for loss and wastage in transit and erection should be provided for over and above the basic quantities of work, indicated herein, except where otherwise specified for materials supplied by the purchaser.
14. In the explanatory notes given in this chapter, the term "small parts steel work" is meant to cover fabricated steel work made from rolled steel sections, complete with bolts, nuts and washers work to any structural member. The term "attachment" where ever used is intended to cover castings, forgings, machined or welded components or fittings, which are attached directly to a structural member, or mounted on small parts steel work and shall include bolts and nuts for fastening the attachment to the structure member or small parts steel work.

15. In the explanatory notes given in this chapter, the term “bimetallic connection” is meant to cover any connection between a copper conductor and aluminium conductor. The clamps used for such connection shall be made of a suitable aluminium alloy and the copper/aluminium conductor shall be wrapped with a bimetallic (aluminium copper) strip to prevent direct contact between aluminium and copper.
16. Reconciliation of material supplied by the purchaser
  - a. The following procedure shall be adopted for the final reconciliation of the various equipments, materials fittings and conductors supplied by the purchaser.
  - b. All the materials supplied by the purchaser shall be correctly accounted for and quantities reconciled on completion of the work by the contractor. On completion of work, all surplus materials supplied by the purchaser together with the ones found defective or that have become defective or broken on account of defective or materials and/or workmanship shall be returned to him by the contractor.
  - c. The contractor will supply all wires and conductors including bridle wire, dropper wire, jumper wire and aluminium spider required for the work based on unit quantities, inclusive of erection allowances together with the length of finished wires and conductors for new items of work and the length of wires and conductors out of quantity as calculated above.

**NOTE**

If there are any shortage during final reconciliation, their cost will be recovered by the purchaser from the contractor at the book rate or the last purchase rate or the prevailing market rates whichever is higher plus 5% of account of initial freight 2% on account of incidental charges together with supervision charges at 12.1/2% of the total cost inclusive of material freight and incidental charges. Freight between the purchaser's source of supply and the contractor's depot or residing shall be the contractor's account.

17. **Released Material**

The contractor shall return to railway all the released OHE materials from the existing system at the first available opportunity but not later than a week at the respective TRD Depot in concerned Area. If the contractor fails to return the released material in specified time, the cost of released material will be recovered from the progress bill before releasing any payment.

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**PART- I**  
**CHAPTER-IV "B"**  
**PARTICULAR**  
**SECTION II**

- (1) Notwithstanding anything to the contrary in this section, the purchaser to the contractor will supply the entire requirement of the equipments components and fittings for the work, listed in Annexure. The prices in the schedule shall be exclusive of cost of supply of these items mentioned in Annexure.
- (2) In the case of wires, conductors, etc., the prices for erection shall include any assembly work to be done in the Contractor's depot prior to erection at site, such as fabrication of droppers etc to shapes and sizes required.

**For SOR SCHEDULES:** Schedule 1-Section- 1 (General), Schedule 2-Section- 2 (Concrete), Schedule 3-Section- 3 (Ferrous), Schedule 4-Section- 4 (Non- Ferrous), Schedule 5-Section- 5 (Insulators), Schedule 8-Section- 8C (Other items) & Schedule 9-Section- 9A: **Please see attached explanatory notes SOR**

**Sub- Section-6 Non-Schedule Items**

**ITEM No. NS-01: Galvanized Steel Stranded wire Traction bonds with lugs duly crimped at both ends for 25KV ac Electric traction system as per latest RDSO specification (Supply)**

The price shall cover supply of Galvanised steel stranded wire traction bond with lugs duly crimped at both the ends as per RDSO spec No: TI/SPC/OHE/GALSTB/0040 Rev-1 or latest.

**Signature of Contractor**



**PART II**  
**CHAPTER I**  
**GENERAL SPECIFICATIONS**

**SECTION-1: GENERAL**

<b>PARA No</b>	<b>SUBJECT.</b>
2.1.1	Introduction.
2.1.2	Climatic Data.
2.1.3	Wind pressure
2.1.4	System particulars.
2.1.5	Rolling stock
2.1.6	Power supply

**SECTION -2 : OVERHEAD EQUIPMENT**

2.1.10	Track.
2.1.11	Sectioning.
2.1.12	Pantographs.
2.1.13	Overhead equipment.
2.1.14	Types of equipments
2.1.15	Plane of contact
2.1.16	Tensions.
2.1.17	Clearances.
2.1.18	Height of contact wire
2.1.19	Stagger.
2.1.20	Termination.
2.1.21	Type of structures
2.1.22	Cantilever assembly
2.1.23	Overlaps.
2.1.24	Points and crossings.
2.1.25	Section insulators
2.1.26	Isolators.
2.1.27	Return conductors
2.1.28	Bridges and tunnels
2.1.29	Bonding and earthing.
2.1.30	L.T. supply transformer stations.
2.1.31	Lightning Arrestors
2.1.32	Ceramic beaded glass fiber type short neutral section assembly.

**Section 3 : Switching Stations, Booster Transformer Stations and L.T. Supply Transformer Stations.**

<b>PARA No</b>	<b>SUBJECT.</b>
2.1.40	Description.
2.1.41	Scope of work.
2.1.42	Clearances.
2.1.43	Setting of gantries.
2.1.44	Datum level.
2.1.45	Mounting of equipment and bus-bar arrangements.
2.1.46	Fencing and anti-climbing devices.
2.1.47	Numbering.
2.1.48	Interlocking arrangements.
2.1.49	Earthing arrangements.
2.1.50	Cable connections.

**SECTION-4 TRACTION SUB-STATIONS**

<b>PARA No</b>	<b>SUBJECT.</b>
2.1.51	Introduction.
2.1.52	Definitions.
2.1.53	Functions.
2.1.54	Locations.
2.1.55	System Particulars
2.1.56	Description
2.1.57	Auxiliary Supplies
2.1.58	Scope of Work
2.1.59	Clearances
2.1.60	Equipment & Bus bar Layout
2.1.61	Numbering
2.1.62	Bus bars
2.1.63	Earthing
2.1.64	Earth Screen

**SECTION-5 SCADA WORKS**

**DETAILS OF SERVICE CONDITIONS, TRACTION SYSTEM, EQUIPMENTS, DESIGN, TECHNICAL DATA, TECHNICAL DEVIATION, SPARES, ERECTION, TESTING AND COMMISSIONING BASED ON LATEST STANDARD SCADA SPECIFICATION OF RDSO. RDSO TECHNICAL SPECIFICATION No. TI/SPC/RCC/SCADA/0130 (Rev-2) with A&C Slip No. 1, 2 & 3 and latest amendments**

The above specification shall be available at RDSO Lucknow. Tenderers shall be required to purchase the above specification from RDSO on payment basis.

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**PART II**  
**CHAPTER I**  
**GENERAL SPECIFICATIONS**  
**SECTION I**  
**GENERAL**

**2.1.1 INTRODUCTION :**

(a) This part of Tender papers is divided into eight Chapters and contains general, technical and other specifications for design and erection of complete 25 kV A.C. 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 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 and Traction Sub-stations. A list of the standard drawings is included in Annexure-1, Part-IV.

**(b) SCOPE OF WORK:**

The sections of the Indian Railways to be equipped with traction overhead equipment in accordance with this specification are detailed in part-III where the particular features of the sections to be electrified and their special requirements are indicated.

**(c) Indian Railways Schedule of Dimensions:**

To avoid infringements of various parts of OHE {Structures, Foundation, live parts, equipments etc. included in Para - 2.1.12(d) "INSULATION CLEARANCE", 2.1.17 (a) "CLEARANCE" and 2.6.9 (c) "INFRINGEMENT TO STANDARD DIMENSIONS"} with standard dimensions mentioned in "Indian Railways Schedule of Dimensions 1676 mm Gauge (BG) Revised - 2004 with Addendum & Corrigendum slip Nos. 1 to 16 or its latest revision issued by Railway Board " shall be followed.

**2.1.2 CLIMATIC DATA:** The data pertaining to section are given in part-III.

**WIND PRESSURE: 2.1.3**

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 and Station Sub-stations shall be designed for the wind pressure indicated in part-III.

**SYSTEM PARTICULARS: 2.1.4**

The nominal voltage of the overhead equipment will be 25 kV A.C. 50 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 switchgear provided at the traction sub-station and at the feeding station.

**2.1.5 ROLLING STOCK:**

**(a) LOCOMOTIVES**

The electric locomotives will generally be equipped with DC motors fed through rectifiers installed on the locomotives.

**(b) OVERSIZE CONSIGNMENTS**

The specific requirement 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) TRACTION SUB-STATIONS**

Electric power will be supplied at 25 kV A.C. 50 Hz. single phase from traction sub-stations to feeding stations spaced 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 oil circuit breakers capable of repeatedly interrupting normal full load current. There are three types of switching stations :-

- (1) Feeding stations;
- (2) Sectioning stations, and
- (3) Sub-sectioning stations.

**(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 STATIONS**

The sub-stations cannot, as a rule be paralleled and consequently a 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 A.C. 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 to booster transformers and to the rails. The sections in which return conductors shall be provided are indicated in part-III.

**(g) BOOSTER STATIONS**

Booster transformer stations are provided in conjunction with return conductors to reduce inductive interference to telecommunication circuits arising from single phase 25KV AC traction. The Booster stations are located along the track.

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

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## SECTION 2 OVERHEAD EQUIPMENT

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**SECTION-3**  
**SWITCHING STATIONS, BOOSTER TRANSFORMER STATIONS AND L.T.SUPPLY**  
**TRANSFORMER STATIONS.**

**2.1.40 DESCRIPTION :**

**(a) Switching Stations**

Every switching station has a gantry with two or more main masts (Up-right). The interrupters are located behind the gantry. Isolators, Potential Transformers, station class lightning Arrestors and pedestal Insulators are 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 centre (see part-III). A small masonry cubicle, called the control cubicle, shall be constructed at each switching station to house control equipment, batteries, battery charger, S.&T. terminal equipment, a terminal board for terminating cables from the switching station equipment, a telephone and telephone equipment and A.C. 240V distribution board. In the case of the Feeding stations that are located within the Traction sub-stations premises, all the above equipment will be provided inside the sub-station control room. The switching station and its control cubicle shall be enclosed by fencing except at feeding stations that are located within the Traction sub-stations premises.

**(b) Booster Transformer**

Booster stations are provided for each track at the insulated overlap spans. The primary terminals are connected directly in 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-1.

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-1. 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.

**(c) L.T. supply transformer stations**

The low tension supply required at switching stations will be obtained through L.T. supply transformers included as 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 sq.mm 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 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-1.

**2.1.41 DELETED**

**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 500mm. 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 clearances 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 3.5m. Setting of the individual gantries of different stations will be furnished by the Purchaser.

**2.1.44 DATUM LEVEL :**

The datum level will be the finished 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 on 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 bus-bar arrangement for typical switching stations is schematically indicated in a drawing included in Annexure-1.

#### **2.1.46 FENCING & ANTICLIMBING DEVICES :**

Every switching station, together with its associated control cubicle shall be enclosed by fencing except at feeding stations 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 galvanised steel clamp fixtures shall be mounted on each mast. 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-1.

#### **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-1). The Purchaser will furnish the actual numbers to be allocated to the various equipments as per specification No. ETI/OHE/53 (Latest version as indicated in Annexure-1).

#### **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 lock 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 transformer stations and L.T. supply transformer stations shall generally comply with the code of practice for earthing IS: 3043 (Latest version as indicated in Annexure-1) except where otherwise specified below:

##### **(b) Earthing system**

##### **(i) Switching stations**

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 station is shown in the relevant drawing included in Annexure-1.

##### **(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 galvanised 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 50x6 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-1.

##### **(iii) HT earth circuit**

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 a minimum size 50 mm x 6 mm. Potential transformers and lightning arrestors shall be bonded 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 those feeding stations that are

located within the traction sub-station premises. All low tension equipment control boards, one terminal of the secondaries of the potential and LT supply transformers, metal casing of battery chargers, each connections of 8 SWG galvanised iron wire to the LT earth bus. The section of the LT earth bus shall be the 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 (Latest version as indicated in Annexure-1) with a minimum thickness of 1.5 mils (40 microns) and with two finishing coats of bitumen 85/25 (blown grade to IS:702(Latest version as indicated in Annexure-1) 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 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 or 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.

**(vi) Inter connection**

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 (Latest version as indicated in Annexure-1) and finished with two coats of bitumen 85/25 blown grade as described above, to the non-track circuited rail in a single-railtrack-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.

**(c) Booster Transformer stations**

**(i) Earthing system**

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 galvanised 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 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 of 50 mm x 6mm 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 be bonded to the gantry mast by means of copper 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 (Latest version as indicated in Annexure-1) with a minimum thickness of 1.5 mils (40 microns) and with two finishing coats of bitumen 85/25 (blown grade to IS:702: (Latest version as indicated in Annexure-1) 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 buries 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 150mm above the foundation.

**(d) L.T. supply Transformer Stations.**

The earthing arrangement of a pole mounted LT supply transformer station shall comprise interconnected earth electrode/electrodes having a resistance not exceeding 10 ohms. If this value can not be achieved with two electrodes, additional electrodes shall have surrounding earth treated with charcoal and salt filling. The transformer and lightning arrestor shall be connected to the supporting steel structure by means of 2 independent connections at the top by means of 25 mm x 3 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 50 mm x 6 mm. In addition, the earth

electrode should be connected to the traction rail by means of a minimum size of 75 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 (Latest version as indicated in Annexure-1) with a minimum thickness of 1.5 mils (40 microns) and with two finishing coats of bitumen 85/25 (blown grade to IS :702 (Latest version as indicated in Annexure-1) 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 CONNECTION :**

(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.

##### **(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.

□□□□□



## **SECTION-4**

### **TRACTION SUB-STATIONS**

#### **2.1.51 INTRODUCTION**

This part deals with general information and criteria for design, manufacture, supply, erection and testing of equipment at 220 or 132 or 110/25kV traction sub-stations, feeding stations and 25kV Shunt Capacitor Bank. These 220 or 132 or 110/25kV traction sub-stations are also referred to as "SUB-STATIONS" in the Tender Papers.

#### **2.1.52 DEFINITION**

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

- a) "Grid Sub-station" means the sub-station of a power supply authority which is connected to the grid network in the area and from which 220kV or 132kV or 110kV power is supplied to the Railway for electric traction.
- b) "Interrupter" means a single pole single phase non-automatic circuit breaker capable of interrupting normal full load current.
- c) "Return Feeder" means the conductor of the feeder line from a traction sub-station to the corresponding feeding station which is connected to the earth terminal of the 220 kV or 132 kV or 110kV /25kV traction transformer secondary winding.
- d) "Traction overhead equipment" means the overhead conductors and other associated equipment and structures erected over the track to supply power to the electric locomotives.
- e) "Traction sub-station" means a 220 or 132 or 110/25kV sub-station for supply of power to traction overhead equipment (installed by the Purchaser), in accordance with this specification.
- f) "25 kV Feeder" means the conductor or feeder line from the traction sub-station to the corresponding feeding station and which is connected to the unearthed terminal of the 220 or 132 or 110/25 kV traction transformer secondary winding.
- g) "Feeding station" means the 25 kV interrupters and other associated equipment as also structures erected near the track, within or outside the sub-station boundary, for feeding different sections of the traction overhead equipment.
- h) "Shunt Capacitor Bank" means shunt capacitor equipment, along with control gear, protective relays, series reactor and accessories erected on 25 kV side of a traction sub-station for the purpose of improvement of power factor and reduction of maximum demand.

#### **2.1.53 FUNCTIONS**

The traction sub-stations covered by this specification will be installed to supply power for electric traction at 25 kV A.C. 50 cycles single phase through the traction overhead equipment.

#### **2.1.54 LOCATIONS**

The locations of the traction sub-stations are at AMS/TSS.

#### **2.1.55 SYSTEM PARTICULARS**

- a) Power will be received at 220 or 132 or 110/25 kV single phase, 50 cycles at the traction sub-stations as indicated in Part-III and stepped down to 25kV by means of single phase traction transformer. On the primary side the traction transformers will be connected across two phases of the 220 kV or 132 kV or 110 kV, 3 phase system. On the secondary side one terminal of the transformer will be solidly earthed and also connected to the traction rails, the other terminal will be connected to the traction overhead equipment through 25kV switchgear.

- b) Adjacent sub-stations will normally be connected across different phases to reduce the unbalance on the three phase power supply system. In order to keep the supply from two adjacent sub-stations separate, a neutral section is provided on the traction overhead equipment approximately midway between them. The neutral section is normally kept dead. Electric locomotives coast through the neutral section with power off.
- c) The traction sub-stations, will normally be unattended and all switching operations will be carried out by remote control from a Remote Control Center.
- d) The capacitor bank shall be of outdoor type, mounted on steel racks for connection to the 25kV bus through single pole isolator and circuit breaker. The capacitor bank shall consist of groups of individual capacitor units, connected in series parallel combination to deliver the rated output, at normal rated system voltage, rated frequency and other rated system conditions.
- e) **Series reactor (Harmonic suppression reactor)**

A series reactor shall be provided to limit the inrush current and surge voltage at the time of switching in the capacitor bank. The switching surge voltage shall not exceed 70kVP. The series reactor which is also meant to filter a part of the harmonics generated by the traction loads shall have inductive reactance ( $X_L$ ) equal to or greater than 13% of capacitive reactance ( $X_C$ ) of the capacitor bank. The series reactor shall be natural air cooled, air Cored, dry insulated and outdoor type. The reactor shall be rated for maximum current including harmonic current that would flow through the capacitor bank under operating condition.

## 2.1.56 DESCRIPTION

### A) TRACTION SUB STATION

- a) At the traction sub stations, normally one transformer will be in service to supply power to the overhead equipment while the other will be kept as standby. However, with the development of load at these traction substations, two transformers either existing or by installation of another where necessary may be connected and worked in parallel. The control and protection circuits shall be designed suitably to permit any change over or parallel working of transformers. The transformers are designed to take 50% overload for 15 minutes and 100% overload for 5 minutes.
- b) The incoming 220 kV or 132 kV or 110 kV transmission line will be terminated by the supply authorities on gantries erected inside the traction substation. The supply to the transformers will be controlled through single phase double pole circuit breakers. On the secondary side the transformers will be connected to the 25 KV bus through single phase single pole circuit breakers and associated isolators. From the busbars 25 KV supply will be extended to feeding station through circuit breakers called feeder circuit breakers. The feeder circuit breakers will form a part of the substation and will be covered by the specification.
- c) At the feeding station, the 25 kV supply will be fed to different sections of the traction over head equipments by means of interrupters. All interrupters will be remote controlled.
- d) Normally, the traction substation will be located along side the Railway track. The feeding stations will be located within the substation boundary and connected to the traction substation by extension of the 25 kV busbars. Where the traction substation is located some distance away from the track, the 26 kV supply will be extended to the feeding station by means of two overhead feeders carried on tower/masts. Each feeder line will comprise two conductors one called the 25 kV feeder and the other return feeder.
- e) A small masonry building called the control room will be provided at each substation to house the control and instrument panels, remote control equipment, batteries, battery chargers, telecommunication terminal equipment, telephones and AC and DC LT distribution boards.
- f) Fire protection baffle wall will be provided in between the two bays of the power transformer.
- g) The entire traction substation and the control room will be protected by a fenced enclosure. A Railway siding from the nearest Railway station will be terminated inside each substation, where

feasible, to enable unloading of heavy equipment at site. Road access will also be provided wherever possible.

## **B) FEEDING STATION**

Every feeding station has a gantry with two or more main masts (Up-right). The interrupters are located behind the gantry. Isolators, Potential Transformers, station class lightning Arrestors and pedestal Insulators are mounted on a gantry. From the gantry, connections are made to various sections of overhead equipment by cross feeders and jumper connections. Feeding stations are unattended and remote controlled from a remote control center (see part-III). Feeding stations will be located within the traction sub-station premises. Control equipment, S&T terminal equipments, arrangement for termination of cables from feeding station equipments will be provided inside the sub-station control room.

## **C) SHUNT CAPACITOR BANK**

Capacitor Bank, alongwith associated equipments, will be located inside traction sub-station premises. Capacitor Bank and series reactor shall be mounted on steel racks for connection to 25kV bus through single pole isolator and circuit breaker. The control panel for the capacitor bank shall be installed inside the control room of the traction sub-station.

### **2.1.57 AUXILIARY SUPPLIES**

- a) The following auxiliary supplies shall be provided at each traction sub-station
  - i) 110 V, 200 Ah battery for operation of switchgear
  - ii) Single phase 240 V AC supply

### **2.1.58 SCOPE OF WORK**

- a) The traction sub-stations, feeding stations and 25 kV shunt capacitor banks when erected shall be in accordance with the specification and functionally complete in all respects. All works required in this connection shall be deemed to be a part of the contract, whether specifically stated or not in this Specification. The following works, however, are excluded from the contract.
  - 1) Supply of items of equipment listed in Annexure-4.
  - 2) 220 kV or 132 kV or 110 kV incoming lines and their termination on the gantries within the sub-station. The connections from the transmission line to the sub-station equipment shall, however, be made by the Contractor.
  - 3) Filling and leveling of the ground to the extent necessary.
  - 4) Provision of Railway siding where necessary and road access.
  - 5) Control Room building.
  - 6) Lights, fans and plug points inside the control room and yard lighting.
  - 7) Telecommunication terminal equipment and telephones.
  - 8) The works covered by item 2 to 8 will be arranged by the Purchaser or his agent at the cost of the Purchaser.
- b) The supply and erection of feeding station will come within the purview of this Contract. However, the gantry erection at feeding stations outside the premises of traction sub-stations will be done by the OHE contractor. Stringing of cross feeders and jumper wires at feeding stations shall, however, be done either by OHE contractor or TSS contractor whosoever does the work later or as decided by the purchaser depending upon the ground situation during the course of progress of OHE/TSS work. Necessary materials (other than

Railway supply items) for the above stringing works will, however, be required to be arranged by OHE contractor in any case.

(C) Supply and erection of 25kV shunt capacitor bank alongwith series reactor and other accessories will come within purview of the contract.

### **2.1.59 CLEARANCES**

a) No part of the installation which is ordinarily live shall be erected at a height less than:

- i) 4.6 m on the 220 KV or 132 KV or 110 KV side.
- ii) 3 m on the 25 KV side.

from the datum level. The equipment will be so mounted that the bottom most portion of any insulator or bushing in service is not less than 2.5 metres above ground level.

b) Clearances between any live part and parts at earth potential (or parts likely to be earthed) shall not be less than 1800 mm and 500mm for 220 KV or 132 KV or 110 KV and 25 KV respectively.

c) On the 220 kV or 132 KV or 110 KV side clearance between phases shall not be less than 4 m. The centre distance of 220 KV or 132 KV or 110 KV bays shall not be less than 14 m.

d) The layout of the sub-station shall be such as to provide suitable clearances to permit work on the equipment in one bay safely with the adjacent bay alive.

### **2.1.60 EQUIPMENT AND BUSBAR LAYOUT**

The layout of equipment and busbar arrangement for typical sub-stations is shown schematically in drawing incorporated in Annexure-1.

### **2.1.61 NUMBERING**

Each circuit breaker, potential transformer, current transformer, Traction Power Transformer, L.T. Supply Transformer, Isolator and Lightning Arrestor shall carry a vitreous enameled steel number plate of approved design (See Annexure-1). The Purchaser will furnish the actual numbers to be allotted to the various switchgear installed at the sub-station.

### **2.1.62 BUSBARS**

All equipment to equipment connections on the 220 KV or 132 KV or 110 KV side as well as busbars strung between gantries/ portals to which the HV terminals of the transformers shall be connected, shall comprise ACSR conductors and aluminum alloy tubes. The busbars and busbar connections on the 25 kV side shall consist of aluminum alloy tubes supported on pedestal insulators wherever necessary at intervals of not more than 4.5m.

### **2.1.63 EARTHING**

a) Earthing of traction substation shall generally comply with the code of practice for earthing IS: 3043-1987 and RDSO's code of practice No.ETI/PSI/120 (2/91) with A&C Slip No.1 except where otherwise specified. The earthing system shall also conform to Indian Electricity Rules 1956 with latest amendments.

b) **Earthing System**

At each substation, two separate earth circuit will be provided, one for earthing the HT Equipment and the other for earthing the LT Equipment inside the control room.

c) **HT earthing grid.**

A combined resistance of earthing system, in any sub-station shall not be more than 0.5 Ohms. To ensure this, the HT earthing grid shall be formed by means of bare mild steel rods of

appropriate size as indicated in Clause (d) below buried at a depth of about 600 mm below the ground level and connected to earth electrodes by means of two separate and distinct connections made with 75 mm x 8 mm MS flats. The connection between the MS flat and MS rod shall be made by welding, while that between, the earth electrodes and the MS flats through MS links by bolted joints. As far as possible the earthing grid conductor shall not pass through the foundation block of the equipments. All crossings between longitudinal conductors and transverse conductors shall be jointed by welding. The transverse and longitudinal conductors of the earthing grid shall be suitably spaced so as to keep the step and touch potentials within acceptable limits. The overall length of the earthing grid conductor shall not be less than the calculated length as per the code of practice. The earth electrodes shall be provided at the outer periphery of the grid as indicated in the sketch enclosed in Specification No. ETI/PSI/120 (2/91) with A&C Slip No.1 or latest. The earth electrodes shall be embedded as far away as possible from each other. Mutual separation between them shall usually be not less than 6m. The contractor shall submit detailed design calculation for the earthing system and obtain approval of the design/drawings.

d) **Earthing Grid Conductor.**

The size of the earthing grid conductor shall be decided based on the incoming system voltage and fault level. The size of the grid conductor for fault level upto 12000 MVA will be 32mm dia and above 12000 upto 160000 MVA 36mm dia and above 16000 upto 20000 MVA, 40 dia MS rod respectively.

e) **Earth Electrodes.**

The earth electrodes shall normally be of mild steel galvanised perforated pipe of not less than 40mm nominal bore of about 3m length provided with a spike at one end and welded lug suitable for taking directly MS flat of required size at other end. The pipe shall be embedded vertically into the ground as far as possible except in case of hard rock, it may be buried inclined, the inclination being limited to 30 degree from the vertical. The connection of MS flats to each electrode shall be made through MS links by bolted joints. A typical drawing of one earth electrode installation is indicated in Annexure-1. If the value of earth resistance specified may not be achieved with a reasonable number of electrodes connected in parallel such as in rocky soil or soil of high resistivity, the earth surrounding the electrodes shall be chemically treated by alternative layers of finely divided coke, crushed coal or charcoal and salt at least 150mm all around. However, coke treatment shall be used only where absolutely necessary and such electrodes shall not be situated within 6 m of other metal work. In high embankments, use of electrodes longer than 3 m shall be considered so as to reach the parent soil to achieve earth resistance as specified.

f) **Buried Rail.**

A steel rail of section 52 Kg/m and length about 13 m shall be buried near the track at the traction sub-station at a depth of about 1 m to form part of the earthing system. Two separate and distinct connections shall be made by means of 75 mm x 8 mm MS flats between the earthing grid and the buried rail. The buried rail shall also be connected by means of two separate and distinct connections made with 75 mm x 8 mm MS flats to the non-track circuited rail in a single rail track - circuited section and to the neutral point(s) of impedance bond(s) in a double- rail track circuited section. In case where the feeding post is located separately away from the traction substation, the buried rail shall be provided at the feeding post (where one terminal of the secondary winding of the traction power transformer is grounded).

g) **System earthing .**

One terminal of the secondary winding of each traction transformer shall be earthed directly by connecting it to the earthing grid by means of a 75mm x 8mm MS flat and to the buried rail by means of another 75 mm x 8 mm MS flat. One designated terminal of the secondary of each potential, current and LT supply transformer shall also be connected to the earthing grid by means of two separate distinct earth connections made with 50 mm x 6mm MS flat.

h) **Equipment earthing.**

The metallic frame work of all outdoor equipments such as transformers, circuit breakers, Interrupters & Isolators. As well as steel structures shall be connected to the earthing grid by means of two separate and distinct connections made with MS flat of size 50 mm x 6 mm upto 10000 MVA and by 75 mm x 8 mm MS flats above 10000 MVA upto 20000 MVA. Equipments on the secondary side of the traction power transformer and steel structures shall be connected to the earthing grid by means of two separate and distinct connections made with MS flats of size 50 mm x 6 mm. One connection shall be made with the nearest longitudinal conductor while the other shall be connected with the transverse conductor.

i) **Earthing inside the control room.**

An LT earth circuit shall be provided inside the Control Room by means of 50 mm x 6 mm mild steel flat and connected to the main earth ring by two independent connections made with 50 mm x 6 mm mild steel flat. The metallic frame work of control panels, L.T., AC and DC distribution boards, battery chargers, remote control equipment, cabinets, etc. shall be connected to the earth ring by means of 8 SWG galvanised steel wire.

j) **Earthing of lighting arrestors.**

In addition to the earth electrodes provided for the main earthing grid, an independent earth electrode shall be provided for each lightning arrestor. The earth electrode shall be connected to the ground terminal of the lightning arrestor as well as the main earthing grid by means of two separate and distinct connections made with 50 mm x 6 mm MS flat for 25kV side lightning arrestor, and with 75mm x 8 mm MS flat for the primary side lightning arrestor. The earth electrode shall be provided as close as possible to the lightning arrestor and the connection shall be as short and straight as possible avoiding unnecessary bends. For lightning arrestors provided for the traction transformers, there shall also be a connection as direct as possible from the ground terminal of the lightning arrestor to the frame of the transformer being protected by means of two separate and distinct connections made with 50mm x 6 mm MS flat for 25kV side arrestor and with 75mm x 8mm MS flat for primary side arrestor.

k) **Earthing of fencing uprights and panels.**

Each metallic fencing uprights shall be connected to the main earthing grid by means of two separate and distinct connection made with 50 mm x 6 mm MS flat. In addition, all the metallic fencing panels shall be connected to the uprights by means of two separate and distinct connections made with 6 SWG GI wire. All the metallic door panels shall also be connected to the supporting uprights by means of two separate and distinct connections made with 6 SWG GI wire.

l) **Method of jointing**

All the joints between the MS flats, MS rods or between MS flat and MS rods shall be made by welding only. No soldering shall be permitted. For protection against corrosion, all the welded joints shall be treated with red lead and afterwards thickly coated with bitumen compound.

m) **Painting of MS Flats.**

For protection against corrosion, all the exposed surfaces of earthing connections (MS flats) above ground level shall be given all around two coats of painting to colour grass green, shade-218 of IS:5.

#### **2.1.64 EARTH SCREEN.**

The area covered by outdoor sub-station equipment shall be shielded against direct strokes of lightning by an overhead earth screen comprising 45 tone quantity 7/9 SWG, 19/2.5mm galvanised steel stranded wire strung across pinnacles of the metallic structures as indicated in the drawings included in Annexure-1. The earth screen wires shall be fixed not less than 2.5 Mt above the live conductors so as to provide an angle of protection, not exceeding 30 degree to the

equipment/busbar below and shall be solidly connected to the sub-station earth circuit by means of 50 mm x 6 mm MS flats.

**PART-II  
CHAPTER -II  
FOUNDATIONS**

<b>PARA NO</b>	<b>SUBJECT</b>
2.2.1	SCOPE.
2.2.2	DESIGN OF FOUNDATION
2.2.3	BEARING PRESSURE
2.2.4	CONCRETE.
2.2.5	SIZE AND GRADING OF AGGREGATES
2.2.6	SAND CORED FOUNDATIONS
2.2.7	SINKING OF CONCRETE SHELLS.
2.2.8	TYPES OF FOUNDATION IN BLACK COTTON SOIL.
2.2.9	CEMENT



PART-II  
**CHAPTER-II**  
FOUNDATIONS

**2.2.1 SCOPE :**

(a) This chapter deals with the design of foundations and anchor blocks for traction structures carrying overhead equipment (including those on bridges), structures at switching stations and booster stations and other concrete work. It also deals with the specification for concrete.

(b) While casting a foundation, care shall be taken to ensure that no part of it and mast erected therein do not infringe the dimensions given in Schedule of Dimensions as mentioned in Para - 2.1.1 (c) "Indian Railways Schedule of Dimensions".

**2.2.2 DESIGN OF FOUNDATION:**

**(a) SOIL 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 size 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 6403:1981) should be followed. In addition, at every 250 m the soil bearing pressure should be determined by dial gauge type penetrometers. Dial gauge type penetrometers shall also be made available by the Contractor at each foundation site so as to facilitate cross check at each individual location.

For design of foundation for masts and gantries at switching stations and booster stations, the Contractor shall determine the type and allowable bearing pressure of soil at the locations of such stations and shall prepare designs for the foundations suitable for each location to suit the bearing pressure of the soil in consultation with the Purchaser.

**(b) STRUCTURES CARRYING OVER-HEAD EQUIPMENT**

Foundations for traction structures carrying overhead equipment shall be either of the side bearing side gravity or 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 cast-in-site 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/TSS**

Foundations for the masts of gantries at switching stations and TSS shall be of the pure gravity type, the base of which shall rest on consolidated soil.

**(e) FENCING POSTS**

Foundation for fencing posts shall rest on consolidated soil if the depth of unconsolidated soil is less than 1.5 m below the datum level and shall be rectangular parallel piped in shape. If the depth of unconsolidated soil is more than 1.5 m the foundation block shall rest on reinforced concrete piles cast-in-site or reinforced concrete foundation may be adopted as desired by the Purchaser.

**(f) TYPICAL DESIGN**

Typical design 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**

(i) 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 especially pile foundations of under reamed type as per RDSO'S standard designs (Reference RDSO'S Drawings No.ETI/C/0062 MOD-B or latest) or any other approved design may have to be cast at limited locations for trial purpose. The tenderer may furnish the technical details of alternative design, construction methods proposed to be adopted and their previous background/experience if any.

**(ii) Foundation in Contact/Buried under Non-aggressive Soil/Ground Water :**

The Foundation Concrete shall be of M-15 Grade. The Core concrete shall be M-20 Grade. It shall be adopted in the areas where concrete is in contact/buried under Non-aggressive soil/Ground water as per IS: 456-2000.

(iii) **Foundation in Coastal Areas:**

The Foundation Concrete shall be of M-20 Grade. The Core concrete shall also be M-20 Grade. It shall be followed in the areas where concrete is exposed to Coastal Environment as per IS: 456-2000.

(iv) For casting the OHE foundation in Soft Rock and Hard Rock, RDSO drawings mentioned at Sl. No. - 123 of LIST OF STANDARD DRAWINGS AND SPECIFICATIONS (ANNEXURE - 1 of Part-IV) of tender Document.

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. Pedestal for Power transformers shall be made of mass concrete with base resting on consolidated soil. Foundation for circuit breakers supported on steel structures and for other items of equipments such as isolator, instruments transformers, bus bar support insulators etc. shall be of the pure gravity type, the base of which shall rest on consolidated soil, and shall be left with core holes into which the legs of the supporting structures shall be suitably fixed by grouting.

(j) **CABLE TRENCHES**

The cable trench shall rest on original ground if the depth of unconsolidated soil is less than 0.5 m. If the depth of the unconsolidated soil is more than 0.5 m., the cable trench shall be made of reinforced cement concrete of approved design supported at suitable intervals on concrete pillars.

**2.2.3 BEARING PRESSURE:**

(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 cutting ... 11,000 kg/sq.m.
- (ii) Moorum soil in cutting ... 22,000 kg/sq.m
- (iii) New banks & bad soils in banks and cutting ... 5,500 kg/sq.m.
- (iv) Black cotton soil-pure gravity foundation shall normally be adopted. However, under reamed pile foundations may be adopted at the option of the Purchaser in limited locations for trial purpose. In the case of dry black cotton soil, the soil should be subjected to a bearing pressure as close as possible but not exceeding 16,500 kg/sq.m. the depth of the foundation block being not less than 2.8m. In the case of wet black cotton soil, the soil should be subjected to a bearing pressure as close as possible but not exceeding 8,000 kg/sq.m.

*In the case of hard rock, a hole should be blasted in the rock, or by means of any other drilling and pneumatic method and the mast sealed into it with concrete.*

**2.2.4 CONCRETE:**

Concrete for foundations shall be nominal mix of grade M 10 (or M 15) obtained by mixing cement, coarse aggregate, fine aggregate and water in accordance with proportions given vide Table 3 of IS:456 (Latest version as indicated in Annexure-1) reproduced below. For grouting, mugging, embedding of structures in foundations and for cable trenches at switching stations, nominal mix concrete M 15 (or M 20) obtained by mixing materials in proportions as indicated in Table-3 of IS:456 (Latest version as indicated in Annexure-1) shall be used. Volume batching may be adopted vide clause 9.2.2. of IS:456 (Latest version as indicated in Annexure-1) reproduced below :-

**IS: 456-2000** (latest version)

**TABLE - 3: PROPORTIONS FOR NOMINAL MIX CONCRETE**

(Clause 9.3 and 9.3.1)

Grade of concrete	Total quantity of dry aggregate by mass per 50 kg of cement, to be taken as the sum of the individual masses of the fine and coarse aggregates kg max.	Proportion of aggregate (by mass)	Quantity of fine aggregate (by mass)	Quantity of water per 50 kg of cement (max. Liters)
1	2	3	4	
M 5	800	Generally 1:2	but 60	

M 7.5	625	subject to an upper limit	45
M 10	480	of 1 : 1.5 and a	34
M 15	350	lower limit of 1 : 2.5	32
M 20	250		30

**NOTE:** The proportions of the fine to coarse aggregates should be adjusted from upper limit to lower limit progressively as the grading of the fine aggregates becomes finer and the maximum size of coarse aggregate becomes larger. Graded coarse aggregate shall be used.

**Example:**

For an average grading of the fine aggregate (that is zone II of Table 4 of IS : 383 (Latest version as indicated in Annexure-1) the proportions shall be 1:1.5, and 1:2 and 1:2.5 for maximum size of aggregate 10 mm, 20 mm and 40 mm respectively.

\* Specification for coarse and fine aggregates from natural sources for concrete (second revision).

"Volume batching may be allowed only where weigh-batching is not practical and provided accurate bulk densities of materials to be actually used in concrete have earlier been established. Allowance for bulking shall be made in accordance with IS: 2386 (Part-3) (Latest version as indicated in Annexure-1). The mass volume relationship should be checked as frequently as necessary, the frequency of the given job being determined by Engineer – In charge to ensure that the specified grading is maintained."

In judging the acceptability of the materials, quality of concrete and the method of work, the Purchaser will generally observe the provisions of the "Indian Standard code of Practice for Plain and Reinforced Concrete, IS:456 (Latest version as indicated in Annexure-1). The crushing strength of concrete shall not be less than the limits given below:-

**Specified characteristic Compressive strength of 15 cm cubes at 28 days.**

Grade of Concrete	At 28 days age
(a) M. 10	10 N/mm <sup>2</sup>
(b) M. 15	15 N/mm <sup>2</sup>
(c) M 20	20 N/mm <sup>2</sup>

**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 (Latest version as indicated in Annexure-1) . 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 40 mm nominal size (table 2 of IS: 383 (Latest version as indicated in Annexure-1)) shall be used for foundation. A coarse aggregate for grouting muffs and embedding shall be of 20 mm graded nominal size as per table 2 of IS: 383 (Latest version as indicated in Annexure-1) (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 hemispherical shaped muff shall be provided on such foundations in lieu of standard type.

**2.2.7 SINKING OF CONCRETE SHELLS:**

Where the water-table is high, one or more sections of reinforced concrete shells may have to be sunk before casting concrete. The size of each of shell shall be 1,200 mm outside dia x 50 mm thick x 600mm high reinforced with 6 mm (1/4") dia rods spaced 150 mm apart, both longitudinally and circumferentially, the concrete shall be of grade M.20 as per provisions of para 2.2.4.

**2.2.8 TYPE OF FOUNDATION IN BLACK COTTON SOIL :**

The foundations in dry black cotton soil should be of type BC or NBC or any other type as approved by the Purchaser.

**2.2.9 CEMENT:**

The cement to be used in the construction of PCC / RCC structures should be of Ordinary Portland Cement to IS:269 (Latest version as indicated in Anexure-1) or Portland Pozzolana cement (fly ash based) as per IS: 1489 Pt-I (Latest version as indicated in Anexure-1).

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**PART - II**  
**CHAPTER - III**  
**STRUCTURES**

<b>Para No.</b>	<b>Subjects</b>
2.3.1	Scope.
2.3.2	Types.
2.3.3	Design.
2.3.4	Cantilever masts.
2.3.5	Anchor masts.
2.3.6	Head-Spans.
2.3.7	Portals.
2.3.8	Structures on bridges.
2.3.9	Special structures.
2.3.10	Setting of structures.
2.3.11	Numbering of structures.
2.3.12	Steel work for switching stations and gantries.
2.3.13	Steel.

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**PART - II**  
**CHAPTER - III**  
**STRUCTURES**

**2.3.1 SCOPE :**

(a) 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 specification for steel and prestressed concrete trial mast.

(b) This Chapter deals with the design of all structural steel work including gantry structures, supporting structures and small parts steel work including chairs, brackets and other fabricated steel-work for mounting various equipments, busbars, cables etc. at Traction sub-stations, feeding stations and shunt capacitor banks

**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 secured by means of holding down bolts. Limited quantity (approx. 700 nos.) of circular spun prestressed concrete masts may also be used at the sole discretion of the Purchaser.

**2.3.3 DESIGN :**

**2.3.3.1 FOR OHE :**

**(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 (Latest version as indicated in Annexure-1). The thickness of smallest steel sections used shall be 5 mm for galvanised members.

(b) All the steel Structures and small part steel for carrying overhead equipment are to be fully galvanised after drilling and fabrication as per specification **ETI/OHE/13 (4/84)** (Latest version as indicated in Annexure-1) and no painted structures are to be used.

**2.3.3.2 FOR TSS :**

**(a) GENERAL**

The steel structures may be of riveted, bolted or welded construction as convenient for installation. The thickness of smallest steel section used shall not be less than 6 mm (or 1/4"). Legs of gantry structures/portals and supporting steel work and uprights or busbar supports shall generally be embedded in concrete foundation blocks and for equipment and in special cases secured by means of holding down bolts.

**(b) DESIGN**

a) All the steel structures like gantries/portals, other supporting members, small part steel work etc. shall be galvanised after fabrication with a minimum value of average mass of zinc coating being not less than 610 g/m<sup>2</sup> as per RDSO's specification No.ETI/OHE/13 (4/84) with Amendment No.1,2 & 3.

b) All designs for special steel work shall be furnished by the Contractor, for approval of the Purchaser. 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, other relevant IS Specifications and statutory regulations.

c) For purposes of design, all possible loads which may occur in the worst combination shall be considered.

**d) Steel Structures**

For calculation of wind load on structures, conductors and equipment, the basic wind pressure shall be taken as 112.5 Kg/sq.m.

e) For purposes of design of gantries, the tension in the 220 kV incoming/outgoing lines shall be taken as 200 kg. at 4 degree C (without wind) in each conductor and 150 kg. at 4 °C (without wind) in the earthwire. The tension in the 66 kV strung busbars and earth screen wire at 66/25 kV sub-stations shall not exceed 200 kg. at 4 °C (without wind).

**f) Uprights and fencing posts.**

Uprights carrying equipment such as potential transformers, current transformers, lightning arrestors, busbar support insulators, shall be made from standard metric steel sections viz. channels, angles or small joists, either single or fabricated.

g) Notwithstanding the provisions contained in I.S. and other regulations referred to in Para 2.3.3.2(b) above regarding permissible deflection, the following should apply.

The deflection at the top of the mast or structure shall be limited to one eightieth ( $1/80$ ) of its height above foundation.

h) The torsional rotation of the mast due to permanent loads shall not exceed 0.1 radian.

#### **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/metre for each conventional and 1.32 kg/metre 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) Weight of feeder, return conductor or other special equipment wherever they occur.
- (vi) The effect of eccentricity of vertical and horizontal loads on the bracket due to variation in temperature.
- (vii) Wind loads perpendicular and parallel to the track. The wind pressure adopted shall be taken as that indicated in part-III.
- (viii) Radial forces on the mast, due to stagger, curvature, anchorage etc.
- (ix) Weight of the mast itself.
- (x) Any other load or loads that may occur due to special location of the Structures.

##### **(b) DEFLECTION**

Notwithstanding the provisions contained in IS:800(Latest version as indicated in Annexure-1) 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 8 cm and the mast shall be so erected that it becomes reasonably vertical after application of permanent loads.
- (ii) The additional deflection under maximum wind pressure shall not exceed 8 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 are 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 approx. one-tenth ( $1/10$ ) of the span.

##### **(c) MINIMUM TENSION IN CROSS SPAN & 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 MAST**

Deflection at the top of the mast or Structure shall be limited to one-eightieth ( $1/80$ th) 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 of purchaser's designs. The most important designs are covered by Drawings listed in Annexure-1, part-IV.

**(b) LOAD**

The load shall be as detailed in para 2.3.4 (a) as applicable.

**2.3.8 STRUCTURES ON BRIDGES :**

(a) The structure may be either cantilever masts or portals (hinged or fixed at base) depending on the type and condition of bridge pier capping. As far as possible cantilever masts grouted in foundations blocks on pier 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-1, Part IV. Minimum setting of structures shall be 2.8 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/ turn-out 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) STRUCTURES WITH COUNTER WEIGHTS**

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) STRUCTURES ON PLATFORM**

The setting of structures on platform 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, Part-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 marked on the mast/structure by a horizontal red painted stroke.

**2.3.11 NUMBERING OF STRUCTURES CARRYING OVERHEAD EQUIPMENT :**

All structures shall be numbered in accordance with the numbering given in the approved overhead equipment layout plans. Enameled/Retro-Reflective number plate 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 AND GANTRIES:****(a) HORIZONTAL MEMBERS OF GANTRY**

Horizontal member 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 masts by means of clamps to avoid drilling of masts sections.

(b) For purpose of design, all possible loads which may occur in the worst combination shall be considered. The loads shall include the followings:-

(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 designs, 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. 1500 kgf.
- (iv) Tension in anchored overhead equipment in case of sectioning and paralleling stations 2,000 kgf.

**(d) DEFLECTION OF GANTRY MASTS**

Deflection under the permanent loads (at an average temperature of 35°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 gantry 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, lighting arrestors, insulators, etc, shall be made of fabricated steel and be mounted on the main auxiliary gantry preferably by means of clamps to avoid drilling of mast sections.

**(g) UPRIGHTS AND FENCING**

Uprights carrying operating handles of isolators and fencing posts shall be made from steel sections, viz. channels, angles or small joists, either single or fabricated.

**2.3.13 STEEL:**

Steel conforming to IS: 2062 (Latest version as indicated in Annexure-1) shall be used for all fabricated steel work.

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**PART-II**  
**CHAPTER-IV**  
**EQUIPMENTS,COMPONENTS AND MATERIALS**

<b>PARA NO.</b>	<b>SUBJECT</b>
2.4.1.	General.
2.4.2	Compliance with standard specification.
2.4.3	Quality assurance
2.4.4	Prototype test.
2.4.5	Inspection and tests.
2.4.6	Test certificates.
2.4.7	Bulk manufacture.
2.4.8	Inter-changeability.
2.4.9	Technical specifications.
2.4.10	Nomenclature and marking.
2.4.11	Steel work and protection against rust.
2.4.12	Bracket assembly components.
2.4.13	Droppers.
2.4.14	Insulators.
2.4.15	Ending fittings and splices.
2.4.16	Electrical connections for overhead equipment.
2.4.17	Terminal connection for other equipments.
2.4.18	Regulating equipment.
2.4.19	Head span construction.
2.4.20	Isolator
2.4.21	Insulation level.
2.4.22	Bus-bars(at switching stations, booster stations and Gentries.)
2.4.23	Cabling.
2.2.24	Literature for equipment.

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**PART-II**  
**CHAPTER-IV**  
**EQUIPMENTS, COMPONENTS AND MATERIALS**

**2.4.1 GENERAL:**

(a) This chapter deals with the details and specifications of the equipment, 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 Bureau of Indian Standards, British Standard Institution etc. Specifications have been issued by the Purchaser. Such specification may be bought separately from the office of the Purchaser. All these specifications are included in the set of drawings and specifications referred to in Para 1.1.10.

(b) This chapter deals with details and specifications of the equipments, components and materials to be used at the traction sub-station, feeding station and shunt capacitor bank. It does not cover foundations and structures which are dealt with in Chapters II and III respectively. The detailed specifications for various items of equipment and materials issued by the Purchaser may be bought separately from the design office of the Purchaser's Engineer (See 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:

- (i) International Electro Technical Commission (abbreviated as IEC) publications.
- (ii) British Standards (abbreviated as BS)
- (iii) Bureau of Indian Standards (abbreviated as IS)

Tenderers may, however, offer equipment in accordance with the appropriate national standard specifications of the country of manufacture, but such offers will be treated as deviations and should be quoted for in the manner specified in Para 1.1.7 (d) English rendering of the text and illustrations of the national standard specifications and explanatory notes on the specific deviations from IEC, British or Bureau of Indian Standards in question, shall also be submitted in the relevant Annexures. 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 (See para 1.2.25)

**2.4.4 PROTO TYPE TESTS :**

**(a) FITTINGS, COMPONENTS AND MATERIALS**

All the fittings, components and materials to be supplied by the contractor, in terms of this contract, the requisite number of prototypes 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 tests conducted at his own cost.

**(c) RESPONSIBILITY**

Any testing and approval by the Purchaser of prototype shall in no way absolve the contractor of his responsibility under the terms of the contract for the equipment supplied and erected.

**(d) EXEMPTION FROM PROTOTYPE TESTS**

If prototype samples of equipments, components or fittings of any manufacturer have already been approved in connection with the electrification of other sections of Indian Railways, on the 25 KV 50 HZ single phase A.C. 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 this respect will be ground for extension of time for completion under para 1.2.45.

**2.4.5 INSPECTION AND 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.

#### **2.4.6 TEST 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 manufacturer 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 prototypes have already been approved in connection with it manufacturer may proceed after exemption from prototype tests is received from the Purchaser in writing.

#### **2.4.8 INTER CHANGEABILITY:**

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 of CORE.

#### **2.4.9 TECHNICAL SPECIFICATIONS:**

Please see at **Anexure-1** (A, B, C, D, E, F& G). List of standard RDSO drawings, RDSO specifications and IS specifications for important materials, components and equipments [As per version available as on date of opening of tender (Packet-A)].

#### **2.4.10 NOMENCLATURE AND MARKING:**

(a) All components and fittings supplied by the Contractor's shall bear the respective identification number and a mark to identify the source of supply except in the case of galvanised tubes, bolts and nuts and/or any other fittings as may be agreed to by the Purchaser.

(b) In case of insulators, galvanised 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) GALVANISING**

All ferrous materials and fittings shall be hot dip galvanised according to the specification ETI/OHE/13 (4/84) (Latest version as indicated in Anexure-1).

##### **(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)** (Latest version as indicated in Annexure-1) or any other method approved by the Purchaser. The Contractor shall in all such cases obtain prior permission from the Purchaser before carrying out repairs.

#### **2.4.12 BRACKET ASSEMBLY COMPONENTS (see para 2.1.22) :**

##### **(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 of bracket will be furnished to the Contractor.

##### **(b) BRACKET**

Bracket tubes shall be of seamless cold drawn or electric resistance weld steel complying with **ETI/OHE/11 (5/89)** (Latest version as indicated in Anexure-1) with an insulator near the support. The length of the tubes shall be such that there is a free length of about 200 mm beyond the catenary suspension bracket. To facilitate adjustment during track maintenance [(see para 2.6.10 (b))].

##### **(c) TUBULAR STAY ARM**

Steel tubes with adjustable steel rods shall be used for tubular stay arm of all bracket assemblies.

##### **(d) REGISTER ARM**

The register arm shall also be electrical resistance weld or cold drawn steel tubes or proper dimensions duly formed. It shall be suspended by a dropper from the catenary suspension clamp/bracket tube. A hook and eye arrangement shall be used at the bracket end to permit free movement in every directions.

**(e) STEADY ARM**

Steady arm shall normally be fitted in all assemblies for overhead equipment in running. The steady arm shall be of light alloy BFB section arranged to work always in tension in accordance with **ETI/OHE/21(9/74)** (Latest version as indicated in Annexure-1). Steady arms of secondary tracks may be off solid galvanised steel rodding. The contact wire shall be fixed by a simple swivel clip without threaded parts. Steady arms shall normally be 1.0 m long but for special locations such as turnouts, diamond crossing etc. Steady arms shall be longer 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) (Latest version as indicated in Annexure-1) shall be used for neutral section overlap and in the central mast of a 4 span insulated overlap.

**(f) BRACKET FOR UNREGULATED TRAMWAY TYPE EQUIPMENT**

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 DESIGNS**

The droppers shall generally be designed as shown in standard drawings and made of copper wire about 5 mm diameter conforming to **IS:282** (Latest version as indicated in Annexure-1) and shall be attached to the catenary wire by a copper dropper clip. The contact wire shall be held by a clip of aluminum bronze as shown in the standard drawings. The distribution of dropper shall be in accordance with standard 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) The permissible tolerance in the over all length of a dropper will be  $\pm 5$  mm.

**2.4.14 INSULATORS :**

(a) All insulators except 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 TI/SPC/OHE/INS/0070 (Latest version as indicated in Annexure-1) or Specification No. TI/SPC/OHE/INSCOM/0991 (Latest version as indicated in Annexure-1) is for Composite Insulators wherever applicable.

**(b) INTER-CHANGEABILITY**

For free inter-changeability only the following types of insulators shall be used. While the shapes of the insulators may vary slightly from those shown in the drawings, the essential dimension of the galvanised malleable cast iron caps as given in standard drawings shall be adopted.

- |       |                                     |  |
|-------|-------------------------------------|--|
| (i)   | <b>Stay arm Insulators:</b>         | These insulators will be used in conjunction with The tubular stay arm of all bracket assemblies.  |
| (ii)  | <b>Bracket Insulators:</b>          | These will be used at the base of each bracket assembly in conjunction with bracket tubes.   |
| (iii) | <b>9-Tonne Insulators:</b>          | These will be used at all places for cut-in and Terminal insulation including those in return conductors, but excluding those in earth wire. |
| iv)   | <b>Solid core post insulators :</b> | These will be used at all places for supporting isolators mechanisms, -bus-bars, -jumpers etc. of 25 kV.                                     |
| (v)   | <b>Disc insulators 255 mm :</b>     | Clevis type 255 mm disc insulators will be used for return conductor suspension and for earth wire cut-in insulator.                         |
| (vi)  | <b>11 kV post insulators :</b>      | These will be used at all places for supporting bus-bars, jumpers etc. In conjunction with   |

return conductor/return feeders.

(c) The pedestal insulators for service voltage of 220/132/110 kV shall be of Solid Core type conforming to specification as indicated in Annexure-1. The pedestal insulators for service voltage of 25 kV shall be of the solid core type conforming to specification as indicated in Annexure-1.

**2.4.15 ENDING FITTINGS AND SPLICES:****(a) GENERAL DESIGNS**

(a) Terminating or ending fittings and splices on copper conductor shall be of the cone type clamping on both the inner and outer strands of conductor except for contact wire ending clamps which may be of wedge type. The arrangement shall be easy to install and also be such as would apply the clamping pressure gradually without shock (See **TI/SPC/OHE/Fittings/0130**)

(Latest version as indicated in Annexure-1). For Aluminum Alloy/conductor, the end fittings shall be either cone type, strain clamp 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 thread 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 37/2.1 mm (as used in head span construction). may be used as additional terminating wires for extending single and double conductors respectively, if termination at the nearest structure is not feasible .

**2.4.16 ELECTRICAL CONNECTIONS FOR OHE:**

**(a) GENERAL DESIGNS**

All electrical connections between conductors shall be made by parallel clamps. The general arrangements of connections are shown in the standard drawings, listed in Annexure-1.

**(b) JUMPERS**

Copper jumpers shall be of any of the followings:

(i) Large jumpers of annealed copper in accordance with specification **ETI/OHE/3 (2/94)** (Latest version as indicated in Annexure-1).

(ii) Small jumper of annealed copper in accordance with the specification **IS:9968 (PT.2)** (Latest version as indicated in Annexure-1).

Aluminum jumpers wherever used, shall be of all Aluminum stranded conductor 19/7/ 1.4 mm bare 3/4 H generally conforming to IS:8130 (Latest version as indicated in Annexure-1).

**(c) BUSBARS**

Bus-bars or rigid jumpers of copper where used shall be of 18mm dia copper rod in accordance with RE/30/OHE/5(11/60) (Latest version as indicated in Annexure-1). Aluminum bus-bars wherever used shall be of 36/28 mm tubing (See 2.4.22). Aluminum tubular bus-bars shall be made of Al. Alloy grade 63401 (WP condition) to IS:5082 (Latest version as indicated in Annexure-1). The tolerance on diameter and thickness shall be as per class I, IS:2673 (Latest version as indicated in Annexure-1

**(d) FEEDERS**

Feeders shall be of all Aluminum conductor 19/3.99 mm (SPIDER).

**(e) RETURN CONDUCTOR**

The return conductor shall be of all Aluminum conductor 19/3.99 mm (SPIDER). The arrangement of return conductor carried on traction structures is shown in a drawings 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)** (Latest version as indicated in Annexure-1).

**2.4.17 TERMINAL CONNECTORS FOR EQUIPMENTS:**

Booster Transformer along with the terminal connectors suitable for taking jumpers/ bus bar as required shall be supplied by the Purchaser.

However, Power Transformer, Circuit Breaker, and L.T. supply Transformer shall be supplied by the Contractor along with the terminal connectors suitable for taking jumper/bus-bar as required including Al-Cu strips for bimetallic connections wherever required. The Al-Cu strips required for the connection of Booster Transformers shall also be provided by the Contractor if following equipment will be under the scope of Supply as per Annexure-4, otherwise Tenderer shall make its own arrangement to provide.

**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 TI/SPC/OHE/WR/1060(Latest version as indicated in Annexure-1) shall be used in these equipments and these shall be sufficiently flexible for the purpose.

**(b) COUNTER WEIGHT**

Counter weights and arrangements used shall be such that these could be accommodated within 330 mm (13 inches) measured transverse to the track under the worst conditions of wind. The vertical upward movement shall be limited with a fixed top.

**(c) REDUCTION RATIO**

Reduction ratio in the arrangement used shall be five for winch type and three in case of three pulley type.

**2.4.19 HEADSPAN CONSTRUCTION** (See para 2.1.21. and 2.3.6.) :

**(a) SIZE AND FACTOR OF SAFETY**

All span wires used in head-span construction shall be of stranded cadmium copper conductor 65 sq. mm or 130 sq. mm cross section. All the wires shall be designed with a factor of safety of not less than 4 under the most unfavorable conditions.

**(b) TURN BUCKLES**

Each span wire shall be equipped with a turn buckle at each end of the span.

**(c) ADDITIONAL INSULATORS**

Additional insulators shall be provided as necessary in head span, cross span and steady span, wires to ensure electrical independence between the equipment in different elementary electrical sections.

**2.4.20 ISOLATORS:**

25 kV Isolator switches shall comply with specifications as indicated in para 2.4.9.

**2.4.21 INSULATION LEVEL :**

(a) Interrupters, Potential Transformers line indication type, 42kV Lightning Arrestors and other equipments shall be suitable for insulation levels indicated in the relevant specifications.

(b) All equipment including insulators to be used at the traction sub-stations, feeding station and shunt capacitor banks shall be suitable for the insulation level specified below:-

		SERVICE VOLTAGE				
		220 kV	132 kV	110 kV	66 kV	25 kV
i)	Power frequency 1 min. wet withstand test-kV (rms)	460 kV	275 kV	230 kV	275 kV	100 kV
ii)	Impulse (1.2/50 microsecond) withstand test positive and negative polarity(crest value) -KV (peak)	1050 kV	650 kV	550 kV	650 kV	250 kV

**2.4.22 BUSBARS:**

(i) ACSR Conductors used as bus-bar or bus-bar connections shall be of ZEBRA ACSR size 61/3.18mm (28.62 mm dia) at 220 or 132 or 110/25 kV Traction Sub-station.

(ii) Aluminum tubes used as bus-bars or bus-bar connections shall be of dia 50X39 mm for Traction sub-station and Shunt Capacitor banks and of size 36/28 mm for Feeding Stations. Aluminum tubular bus-bars shall be made of Al. Alloy grade 63401 (WP condition) to IS:5082 and IS: 6051-1970 (Latest version as indicated in Annexure-1). The tolerance on diameter and thickness shall be as per class I, **IS: 2673** (Latest version as indicated in Annexure-1).

(iii) Bus-bar junctions and connectors shall be made with aluminum alloy Grade 4600 M to IS: 617-1994 or equivalent. The bus-bar shall be clean, smooth mechanically sound and free from surface and other defects. No splices will be allowed in the bus-bar unless the length of bus-bar exceeds 6m. The ends of the tubular bus-bar shall be covered with suitable end caps. The joints in bus-bars where unavoidable, shall be mechanically and electrically sound so that the temperature rise under normal working conditions does not exceed 40 degree centigrade for a max. ambient temp. of 45 degree centigrade.

**2.4.23 CABLING:**

**(a) CABLE FOR L.T. SUPPLY**

240V A.C. supply from L.T. supply transformer at switching stations shall be brought and terminated on the L.T. A.C. distribution board in the remote control cubicles at the switching stations by 1100 Volt 25 sq.mm aluminum two-core PVC insulated PVC sheathed and steel armoured heavy duty cable conforming to IS:1554(part-I) (Latest version as indicated in Annexure-1).

**(b) CONTROL AND INDICATIONS CIRCUITS**

All other cables for control and indication at switching stations shall be 1100-V grade PVC insulated and sheathed un-armoured (heavy duty) complying with IS: 1554(part-I (Latest version as indicated in Annexure-1). The cables shall be provided as indicated in the Table below:-

PURPOSE	RUN	CIRCUIT VOLTAGE	CORE SIZE & MATERIAL	NO OF CORES
<b>FOR SWS:</b>				
Control indication & of interrupters	From each Interrupter to terminal board	110 V/D.C.	2.5 sq.mm copper	7
Catenary indication	From each P.T. line indication type to terminal board	110 V/A.C.	2.5 sq.mm copper	2
Heater supply for interrupters control mechanism cabinet	i) From interrupter to interrupter	240 V A.C.	4.0 sq.mm Aluminum	2
	ii) From each interrupter to fuse box.	-do-	-do-	-do-
	iii) From fuse box. to distribution board.	-do-	-do-	-do-

Battery supply	i) 110V battery charger to 110V battery	110 V/D.C.	2.5 sq.mm copper	-do-
	ii) 110V battery to 15A, DC fuse box.	110 V/D.C.	2.5 sq.mm copper	-do-
	ii) 15A, DC fuse box to terminal board.	-do-	-do-	-do-
<b>FOR TSS:</b>				
Control and indication of circuit breakers	From each circuit breaker to control board.	110 V DC	7x2.5	Three cables to be used.
Transformer alarm/trip circuits & tap changer control	From each transformer to control board.	110 V DC	10x2.5	Five cables to be used.
Transformer protection (bushing transformer to current transformer connections)	From each transformer to control board.	110 V DC	4x4.0	One cable for each bushing CT to be used.
Current transformer & neutral connections	From each current transformer to control board.	110 V DC	2x4.0	One cable for each core of CT/Neutral CT
Potential transformer connections	From each potential transformer to control board.	110 V DC	2x2.5	One cable to be used
110V DC supply	(i) Connection between battery chargers & DC distribution board.	110 V DC	4x4.0	One cable to be used with two core connected in parallel
	(ii) Connection between batteries & DC distribution board.	110 V DC	4x4.0	One cable to be used with two core connected in parallel

	(iii) Connection from DC distribution board to control board.	110 V DC	4x4.0	Two cables to be used with each circuit breaker and one cable for DC supply to control boards.
Control & indication of bus coupler interrupter	From interrupter to control board.	110 V DC	7x2.5	Two cables to be used.
240V AC supply	Connection from AC distribution board to control board.	240 V AC	2x2.5	One cable to be used

c) **Cables for heater circuits.**

The 240 V AC supply to space heaters provided in control cabinets of various equipments shall be provided by means of 4 sq.mm. 2-core aluminum PVC insulated (heavy duty) cables complying with IS: 1554 (Part-I)-1988. Three circuits shall be provided on the LT A.C. distribution board for this purposes, one for the heaters in the control cabinets of 220/132/110 KV circuit breakers, the second for the heaters in the control cabinets of 25 KV circuit breakers and bridging Interrupters and the third for heaters in marshalling box of traction transformers. Each circuit shall be provided with a fuse of approved type and suitable rating in the LT A.C. distribution Board.

d) **Cables for battery charger.**

240 V A.C. supply to each of the battery chargers in the Control Room shall be provided by means of 4 sq.mm. 2 core PVC insulated, PVC sheathed (heavy duty) copper cables complying with IS: 1554 (Part-I)-1988. Two circuits each with a fuse of approved type and suitable rating in the LT A.C. distribution board shall be provided for the two battery chargers in the Control Room. The 240 V A.C. supply to Control Board from A.C..distribution board shall be provided by means of 2.5 sq.mm. 2- core PVC insulated PVC sheathed (heavy duty) copper cable complying with IS:1554(Part-I)-1988.

e) **Cables for blower fans.**

240 V A.C. supply to blower fans fixed on the traction transformer shall be provided by means of 2 core 25 sq.mm. aluminum conductor cables. The cables shall be PVC insulated, PVC sheathed and armored cables of 1100 V grade complying with IS:1554(Part-I)-1988. Separate cables shall be laid from the L.T. A.C. distribution board in the control room to marshalling box of each traction transformer. Individual circuits from the LT A.C. distribution board shall be provided for this purpose with each circuit protected by a fuse of suitable rating.

f) The cable shall be resistant to decay, mechanical abrasion, acids, alkaline and other corrosive materials.

**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 given above, the Tenderer shall assure himself that various cables would suit the ratings of equipments offered by him.

**(g) SPECIFICATION**

The cables shall be resistant to decay, abrasion, acids, alkalies and other corrosive materials. All indoor wiring on walls shall be clamped neatly on teak wood battens fixed to the wall by means of wall plugs/wooden pegs. The cable run layout at a typical switching stations 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 5 copies of booklets containing manufacturer's instructions for operation and maintenance of each of the items of equipments the supply of which is, Herded by the contract. In addition, 25 copies of detailed schedule of components, catalogues and drawing of all parts of the equipment shall also be supplied.

□□□□□□



**PART-II**  
**CHAPTER -V**  
**DESIGNS AND DRAWINGS**

<b>PARA NO.</b>	<b>SUBJECT</b>
2.5.1	General
2.5.2	Contractor's Drawings
2.5.3	Standards for Drawings
2.5.4	Basic Designs
2.5.5	Special Designs
2.5.6	Particular Designs and working drawings for OHE
2.5.7	Particular Designs and working drawings for SWS & BT Stations
2.5.8	Booster and L.T. supply Transformer Stations drawing.
2.5.9	Schedule of Quantities
2.5.10	Submission of Drawings and schedules.
2.5.11	Completion drawings and schedules.
2.5.12	Addresses.

□□□□□

## 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 and complete supply and erection of Traction Sub-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 and ETI/PSI/31(5/76)(Latest version as indicated in Annexure-1).

### 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, equipments, components and fittings of traction overhead equipment, switching stations booster transformer stations and LT supply transformer stations and TSS 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 arrangements, components and fittings drawings and employment schedules, which he will adopt for the purpose of the work. The procedure outlined in para 1.2.23 shall be followed for approval of basic designs. The contractor for his use and reference shall obtain Ferro copy 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 results of his experience or other development, he shall justify his proposals with supporting explanatory 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 alongwith supporting calculations and notes for scrutiny and approval of the Purchaser.
- (b) Such special designs shall generally be in conformity with basic designs furnished by the Purchaser and in accordance with the specifications. If the Contractor wishes to adopt special designs which do not conform to the general basic designs of the Purchaser, he shall submit alternative designs and drawings justifying his proposals.

### 2.5.6 PARTICULAR DESIGNS & WORKING DRAWINGS:

#### 2.5.6.1 FOR OHE:

##### (a) PURCHASER'S PEGGING PLANS

The pegging plans for sections to be equipped indicating the type of overhead equipment, locations of masts and other general particulars prepared on the basis of the latest survey will be furnished by the Purchaser. The Contractor shall verify and check these plans at site.

**(b) CONTRACTOR'S PEGGING PLANS**

If the Contractor is called upon to carryout survey and prepare overhead equipment pegging plans, he shall submit such plans for approval after checking their feasibility at site.

**(c) PRINCIPLES OF LAYOUT**

The Contractor shall in all cases ensure that the final pegging plans are in conformity with the latest 'Principles of preparation and checking of OHE layout plans and sectioning diagram' issued by RDSO.

**(d) PROVISIONAL LAYOUT PLANS**

The Contractor shall prepare and submit overhead equipment layout plans incorporating the following in formations:-

- (i) The run of wires in different thickness or colour in special cases and termination.
- (ii) The run of wires for future wiring indicated to the Contractor, in dotted lines.
- (iii) Exact position of all cut-in-insulators, including section insulators.
- (iv) Direction and value of stagger at each traction structure location.
- (v) Clearance of live conductors to Structures in the vicinity including bridges, signals gantries etc.
- (vi) Layout of feeders.
- (vii) Jumper connections and connection to switches and switching stations.
- (viii) List of infringements.
- (ix) Kilometer numbers and type of Structures.
- (x) Location and numbers of switches.
- (xi) Schematic sectioning diagram drawn to convenient scale showing section insulator, number of switches, elementary sections and connections to switches and switching stations.
- (xii) Table giving references of approved profile drawings, feeder layout plans and other relevant drawings.

**(e) OHE PROFILE DRAWINGS**

After completion of the overhead equipment layout plans, the Contractor shall prepare an overhead equipment profile drawings 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 finalised, 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 -----

Sl. No.		1	2	3	4	5	6	7	8	10	11	12	13
LOCATION No.		14	15										
CHAINAGE													
D E T A I L S	SETTING DISTANCE IN 'm'												
	STEP DISTANCE IN 'm'												
	F.B.M. CODE												
	SOIL TYPE & PRESSURE												
	FOUNDATION TYPE AND SIZE												
	MAST SIZE & LENGTH IN 'm'												

	MAST EMBEDDED LENGTH 'M'	
	REVERSE DEFLECTION in cm	
	SUPER MAST LENGTH (m)	
	CROSS ARM LENGTH (m)	
	ANY OBSTRUCTION	

**(g) FINAL LAYOUT PLANS**

After all the cross section drawings in a section covered by the layout plan are finalised 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 structure 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 finalised at time of structure erection drawings.

Sl.No.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
LOCATION No.	
CHAINAGE	
1 ENCUMBRANCE	
2 CONTACT WIRE HEIGHT.	
3 STAGGER i) CATENARY ii) CONTACT	
4 STAY ARM i) (a) ii) CODE	
5 BRACKET i) (b) M ii) CODE	
6 REGISTER : i) C/D (M) ii) CODE	
7 STD/BENT CODE	
8 IDENTIFICATION MARK (SEE PARA 2.5.11)	
OTHER REFERENCES/CODES FOR MISC. ITEMS LIKE STEEL WORK FOR STAY/BRACKET ATTACHMENT MISC. SINGLE/DOUBLE CAT. ETC. WILL BE INDICATED. ITEMS :-	

**Tolerances to be adopted while Erection of Bracket Assembly, conducting SED checking & Tower Wagon checking:**

Sl. No.	Item	Limits/Tolerances
(i)	Register Arm Tube Projection	150 - 200 mm in case of Push off locations. For Pull off locations, it shall project over Contact Wire Plane.
(ii)	Bracket Tube Projection	150 - 200 mm
(iii)	Dip between Register Arm Tube & Steady Arm	250 - 300 mm on Tangent Track. (BFB Steady Arm). 250 - 320 mm on Curves. (BFB Steady Arm & Bend

		Tubular Steady Arm).
(iv)	Encumbrance	$\pm 50$ mm
(v)	Length of 'A' Dropper (1 <sup>st</sup> Dropper from Support)	$\pm 5$ mm
(vi)	Spacing of 'A' Dropper (1 <sup>st</sup> Dropper from Support)	$\pm 30$ mm
(vii)	Length of Other Droppers	$\pm 5$ mm
(viii)	Spacing of Other Droppers	$\pm 50$ mm
(ix)	Stagger of Catenary Wire	$\pm 30$ mm
(x)	Height of Catenary Wire	$\pm 50$ mm
(xi)	Stagger of Contact Wire	$\pm 10$ mm
(xii)	Position of Compensation Plate	It shall be in vertical plane.
(xiii)	Difference between mainline Contact wire and the Crossover Contact Wire at Support.	50 mm (minimum)

(j) **SUB-STATION FEEDER DRAWINGS** - Deleted.

**NOTE:** The proforma for SED at individual locations shall be as per standard proforma already circulated and to be adopted in consultation with Purchasers.

#### 2.5.6.2 FOR TSS:

##### a) **Purchaser's location plans**

##### (A) **FOR TRACTION SUB-STATIONS**

The location plans and schematic diagram of connections for each of the traction sub-stations will be furnished by the Purchaser to the Contractor. These will indicate.

- i) Position of incoming lines on the gantries to be erected inside the traction sub-station.
- ii) Location of switching station gantry showing where the 25kV outgoing feeders will be terminated.
- iii) Schematic diagram of connections of Transformers, Circuit breakers Isolators etc.
- iv) Position of the control room with respect to the traction sub-station.
- v) Fencing outline with gates.

##### (B) **FOR FEEDING STATIONS**

The location plans and schematic diagrams of connections for all the feeding 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 feeding stations.
- ii) Location of main masts.
- iii) Arrangement 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 feeding stations.

##### (C) **SHUNT CAPACITOR BANK**

The location plans and schematic diagram of connections for capacitor bank installation at each of the traction sub-stations will be furnished by the Purchaser to the Contractor. These will indicate.

- i) Schematic diagram of connections of circuit breakers, isolators, L.As etc.
- ii) Position of the control room with respect of the traction sub-station.
- iii) Fencing outline with gates.

##### b) **Contractor's responsibility.**

The Contractor shall satisfy himself about the correctness and applicability of the location plans given by the Purchaser before adopting them for detailed designs.

#### 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) Arrangement 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**

**(A) OHE WORKS :**

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 under-ground constructions like pipes, cables etc. after collections 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 a schematic connection/diagram and an isometric view of busbars and connections. The drawings shall include an elevation view of the switching stations 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 drawings 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/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 alongwith drawing 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 isolator beams, potential transformer beams weight of the component shall also be given in the drawings.

**(iv) FOUNDATION LAYOUT AND CROSS-SECTION DRAWINGS**

Foundation layout & 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 anti-climbing device in plan. Each upright, fencing panel and fixture on the upright shall be indicated on the drawing by its reference number. A schedule of components viz. Uprights, panel's fixer, and barbed wire shall be included in the drawings indicating the drawing references of components. An individual drawing shall be made for each type panel, fencing post and fixture 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 drawing giving drawing references of components.

**(vii) CABLE RUN LAYOUT.**

Cable run layout of each switching station indicating inter-connection between various equipments, indoor and outdoor, along with schematic arrangements and physical disposition of equipments, colour coding or code number and the index scheme adopted for terminals. The drawings shall also indicate the cable size and grades of insulation. The quantity of various cables required shall be indicated on the drawings.

**(viii) EQUIPMENT DRAWINGS**

Equipment drawings applicable to all switching station except the ones for the equipments to be supplied by the Purchaser. Drawings should be dimensioned and should indicate:-

1. Fixing or mounting hole dimensions 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 for 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.

**(B) FOR TSS WORKS:**

Contractor shall submit for approval the following drawings.

a) **Cross section drawings.**

Cross section drawings for each traction sub-station, indicating the transverse and longitudinal cross-section of the soil along the center line of the equipments, busbar supports and cable trenches. 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, cross-section of the parent soil. In the preparation of the drawings, care shall be taken to show all obstructions to be removed, such as telegraph posts, underground pipes, cables etc. after collection of such information from the site.

b) **General arrangement drawings.**

General arrangement drawings for each traction sub-station shall indicate the general arrangement of all equipments, run of busbars, position of pedestal insulators and steel frame work. The drawings shall also give a schematic connection diagram and an isometric view of busbars and connections wherever required. The drawings shall include an elevation view of the traction sub-station, transverse cross section and plan views. The drawings shall have a schedule of all equipments required at the traction sub-station alongwith drawing references of the details of these equipments.

c) **Structural drawings**

Structural drawings for each supporting steel frame work of pedestal. The drawing shall include one elevation view of the steel frame work assembly from behind, a transverse cross section and plan view. In the assembly each component member shall be marked with its reference number. The drawing shall also have a schedule of components members along with drawing references of various members. The weight of the component members shall also be indicated. 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 drawing. Unit weight of the components shall also be given in the drawing.

d) **Foundation layout and cross section drawings.**

Foundation layout and cross section drawings for each traction sub-station indicating layout of all foundations in plan, longitudinal and transverse cross-sections of various foundations through centre line of gantry/portal legs, various equipment busbar supports, fencing uprights and cable trenches. All foundations shall be marked serially on the drawing indicating the volume of concrete for each foundation block.

e) **Earthing layout drawings.**

Earthing layout drawing for each traction sub-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 leads and connections to equipment, gantry/portal columns, fencing uprights, structural supports etc. 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 traction sub-stations may be made and references to these drawings marked on the layout. A schedule of components shall be made out in the drawing giving drawing references of components. These drawings shall be prepared duly taking into account the actual soil resistivity of the respective traction sub-station area, measured in the presence of the Purchaser's representative in accordance with the procedure laid down in IS:3043 -1966. The necessary design calculations for the proposed earthing system of the traction sub-station shall also be submitted by the Contractor for Purchaser's approval.

f) **Cabling & Wiring drawings.**

Cabling and wiring diagrams for each traction sub-station indicating the schematic arrangement and physical disposition of equipment, run of cables and wires for inter-connections between various equipments indoor and outdoor, colour coding and the index scheme adopted for terminals. The drawings shall also indicate the sizes of wires and grades of insulation. The quantity of various cables required shall be indicated on the drawings.

g) **Fencing layout drawings.**

Fencing layout drawings for each traction sub-station indicating the layout of 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. A schedule of components viz. uprights, gates, panels fixtures and barbed wires shall be included in the drawing indicating the drawing reference of the components. Type drawings shall be prepared for the various fencing components. An individual drawing shall be made for each type of panel, fencing post, gate and fixture for mounting the anticlimbing device. The drawing of each fencing post shall indicate the unit weight of the fencing post.

h) Equipment drawings applicable to all traction sub-stations complete with drawings of components parts except the ones for the equipment to be supplied by the Purchaser. The Contractor shall submit 5 copies for distribution to field office and one transparent print for the equipments to be supplied by Contractor. Drawings should be dimensioned and should indicate.

- 1) Fixing or mounting hole dimensions & arrangement.
- 2) Net weight of the equipment.
- 3) Characteristics and ratings including those of motors and resistors etc.
- 4) Schematic and detailed circuit diagrams.
- 5) Overall dimensions and other important dimensions.
- 6) Height and disposition of all exposed live parts, height of the bottom most point of all bushings and insulators.
- 7) Notes explaining the operation of the equipment.

For equipment to be supplied by the Purchaser, drawings showing the above particulars will be furnished to the Contractor to enable him to carry out the installation, wiring and commissioning of such equipment.

i) **General Drawings.**

General drawings applicable to all traction sub-station. These drawings shall include the drawings or sketches made for study of clearances, Isolator alignment details, number plates of various equipments, caution or instruction boards, non-standard busbar connectors, clamps and U-bolts for cable mounting etc.

j) **Schedule of quantities.**

On receipt of approval of relevant drawings for each traction sub-station, the following schedules of quantities relating to each traction sub-station shall be submitted within a fortnight of receipt of approval.

- i) Schedule of foundations, showing volume of each type and total volume.



- ii) Schedule of steel work, types, weights of each member and total weight.
- iii) Schedule of quantities of various items of work of Schedule-1, Section-8 & 9 not included in item (i) & (ii) above.

**(C) FOR FEEDING STATIONS**

The Contractor shall submit for approval of the Purchaser the following drawings:-

a) **CROSS SECTION DRAWINGS**

Cross-section drawings for each feeding 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 under-ground constructions like pipes, cables etc. after collections such information from the site.

(b) **GENERAL ARRANGEMENT DRAWINGS**

General arrangement drawings for feeding 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 a schematic connection/diagram and an isometric view of busbars and connections. The drawings shall include an elevation view of the feeding stations 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 feeding station alongwith drawing references of details of these equipments.

(c) **STRUCTURAL DRAWINGS**

Structural assembly drawing for feeding stations indicating the steel frame work assembly. The drawings 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/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 alongwith drawing 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 isolator beams, potential transformer beams weight of the component shall also be given in the drawings.

(d) **FOUNDATION LAYOUT AND CROSS-SECTION DRAWINGS**

Foundation layout & cross-section drawings for each feeding 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.

(e) **EARTHING LAYOUT DRAWINGS**

Earthing layout drawing for each feeding 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 feeding stations may be made and references to these drawings marked on the layout. A schedule of components shall be made out in the drawing giving drawing references of components.

(f) **CABLE RUN LAYOUT**

Cable run layout of each feeding station indicating inter-connection between various equipments, indoor and outdoor, alongwith 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.

(g) **EQUIPMENT DRAWINGS**

Equipment drawings applicable to all feeding station except the ones for the equipments to be supplied by the Purchaser. Drawings should be dimensioned and should indicate:-

1. Fixing or mounting hole dimensions 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
7. Notes explaining the operation of the equipment

(h) **MISCELLANEOUS DRAWINGS**

Miscellaneous drawings applicable to all feeding 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.

(i) **EMPLOYMENT SCHEDULES AND CHARTS**

Employment schedules and charts applicable to all feeding stations. These will include:

1. Employment schedule for 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.

(j) **SCHEDULE OF QUANTITIES**

Within a fortnight of receipt of approval of relevant drawings for each feeding station, the following schedules of quantities shall be submitted.

- i) Schedule of number of foundations, types, volume of different foundation and total volume. foundations will be treated as one foundation;
- ii) Schedule of number of masts, types, weight of different masts, and the total weight of masts of each gantry.
- iii) Schedule of steel work, types, weight of each member and total weight; and

(D) **FOR SHUNT CAPACITOR BANK**

Contractor shall submit for approval of the following drawings:-

a) **Cross section drawings**

Cross section drawings for each capacitor bank installation indicating the transverse and longitudinal cross-section of the soil along the centre line of the equipments, busbar supports and cable trenches. 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, cross section of the parent soil. In the preparation of the drawings, case shall be taken to show all obstructions to be removed, such as telegraph posts, underground pipes, cables etc. after collection of such information from the site.

b) **General arrangement drawings**

General arrangement drawings for each capacitor bank installation indicating the general arrangement of all equipments run of busbars, position of pedestal insulators and steel framework. The drawings shall also give a schematic connection diagram and an isometric view of busbars and connections wherever required. The drawings shall include an elevation view of the capacitor bank installation transverse cross section and plan views. The drawings shall have a schedule of all equipments required at the sub-station along with drawing references of the details of these equipments.

c) **Structural drawings**

Structural drawings for each supporting steel framework of pedestal. The drawing shall include one elevation view of the steel framework assembly from behind, a transverse cross section and plan view. In the assembly each component member shall be marked with its reference number. The drawing shall also have a schedule of components members along with drawing references of various members. The weight of the component shall also be indicated. 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 drawing. Unit weight of the components shall also be given in the drawing.

d) **Foundation layout and cross-section Drawings**

Foundation layout and cross section drawings for each capacitor bank installation indicating layout of all foundations in plan, longitudinal and transverse cross-sections of various foundations through centre line of various equipment busbar supports, and cable trenches. All foundations shall be marked serially on the drawing indicating the volume of concrete for each foundation block.

e) **Earthing layout drawings**

Earthing layout drawing for each capacitor bank installation indicating the layout of full earthing system in plan. The drawing shall show the location of earth electrodes and mark the runs of earthing leads and connections to equipment, structural supports etc. 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 traction sub-stations may be made and references to these drawings marked on the layout. A schedule of components shall be made out in the drawing giving drawing references of components. These drawings shall be prepared duly taking into account the actual soil resistivity of the respective traction sub-station area, measured in the presence of the Purchaser's representative in accordance with the procedure laid down in IS:3043 -1966. The necessary design calculations for the proposed earthing system of the traction sub-station shall also be submitted by the Contractor for Purchaser's approval.

**f) Cabling and Wiring drawings**

Cabling and Wiring diagrams for each traction sub-station indicating the schematic arrangement and physical disposition of equipment, run of cables and wires for inter connections between various equipments indoor and outdoor, colour coding and the index scheme adopted for terminals. The drawings shall also indicate the sizes of wires and grades of insulation. The quantity of various cables required shall be indicated on the drawings.

g) Equipment drawings applicable to all traction sub-stations complete with drawings of components parts except the ones for the equipment to be supplied by the Purchaser. Drawings should be dimensioned and should indicate:

- i) Fixing or mounting hole dimensions and arrangement
- ii) Net weight of the equipment.
- iii) Characteristics and ratings including those of motors and resistors, etc.
- iv) Schematic and detailed circuit diagrams.
- v) Overall dimensions and other important dimensions.
- vi) Height and disposition of all exposed live parts, height of the bottom most point of all bushings and insulators.
- vii) Notes explaining the operation of the equipment.

For equipment to be supplied by the Purchaser, drawings showing the above particulars will be furnished to the Contractor to enable him to carry out the installation, wiring and commissioning of such equipment.

**h) General drawings**

General drawings shall be applicable to all capacitor bank installation. These drawings shall include the drawings of sketches made for study of clearances, isolator alignment details, number plates of various equipments, caution or instruction boards, non standard busbar connectors, clamps and U-bolts for cable mounting etc.

**2.5.8 BOOSTER & L.T. SUPPLY TRANSFORMER STATIONS DRAWINGS:**

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 combined together:

- (i) Cross-section and foundation layout drawings;
- (ii) General arrangement, structural and earthing layout drawings.

**2.5.9 SCHEDULE OF QUANTITIES:**

(a) Within five 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 and submit Schedule 1 (Assess.1) 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-assessments denominated as Schedule 1 (Assess. 2) (Assess. 3) etc., shall also be submitted for approval of the purchaser.

On receipt of approval of each final layout plan from the Purchaser, the followings Schedules of quantities relating to each layout plan shall be submitted within a fortnight.

- i) Schedules of number of masts, types, weight of different masts and total weight of masts;
- ii) Schedules of number of foundation, types, volume of different foundations and total volume;
- iii) Schedule of quantities of various items of work other than masts and foundation under Schedule.
- iv) Schedule of net tension lengths of contact, catenary and feeder wires and lengths required to be ordered;
- v) Schedule of lengths of other wires and conductors required to be ordered;

**and**

vi) Schedules of small parts steel work to be supplied; either by the Contractor or 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 foundations, types, volume of different foundation and total volume. Overlapping foundations will be treated as one foundation;
- ii) Schedule of number of masts, types, weight of different masts, and the total weight of masts of each gantry;
- iii) Schedule of steel work, types, weight of each member and total weight; and
- iv) Schedule of quantities of various items of work of schedule 1 not included in Item (i), (ii), and (iii) above.

**(c ) TRACTION Sub-Stations:**

On receipt of approval of relevant drawings for each Traction Sub-Station, the following schedules of quantities relating to each Traction Sub-Station, shall be submitted within a fortnight of receipt of approval.

- i) Schedule of foundations, showing volume of each type and total volume.
- ii) Schedule of steel work, types, weights of each member and total weight.
- iii) Schedule of quantities of various items of work of Schedule not included in item (i) and (ii) above.

**2.5.10 SUBMISSION OF DRAWINGS & 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 he should submit to the purchaser revised drawings with full details of deviation sought explaining the necessity of deviation, calculations and other supporting documents. The purchaser, if satisfy about the necessity and adequacy of deviations, shall refer the matter to RDSO for necessary approval. In case of deviations on working drawings- decision shall be communicated by the purchaser to the Contractor. The numbers of copies of drawings which shall be submitted are indicated in the following sub-para. 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 on such comments and shall endeavor to settle any difference of opinion on the comments by discussions with the purchaser's Engineers. No drawings shall be resubmitted without incorporating the modifications required by the comments of the purchaser, unless the purchaser has agreed to the deletion of such comments.

**(b) DEVIATION FROM STANDARD DESIGN**

In case of deviation from standard designs and drawings, copies of correspondence and drawings shall be sent in duplicate to the Chief Electrical Engineer, Railway Electrification, Allahabad-211001 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 used. In addition, four samples of the modified fittings 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 and local conditions shall be submitted in due time in duplicate for approval.

**(d) PURCHASER'S PEGGING PLANS**

Two copies of the purchaser's pegging plans shall be sent back after verification if found correct. If modifications are required, fresh pegging plans incorporating the modifications shall be submitted in two copies for approval (see para 2.5.6).

**(e) CONTRACTOR'S PEGGING 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 for 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**

Overhead equipment 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.

**(j) SCHEDULE OF QUANTITIES**

Schedules 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 thereafter. On receipt of these tracings from the purchaser, the Contractor shall submit copies for distribution to field officers and other departments as 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 peggings 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) Deleted	
ix) Schedule of quantities	6 copies
x) Drawings for switching stations, booster transformer stations & L.T. transformer stations.	9 copies

In all the above cases, the Contractor has the option to supply only six copies of the approved drawings provided one of them is a transparent paper print.

**2.5.11 COMPLETION DRAWINGS & SCHEDULES:**

After completion of works, all drawings and designs submitted by the Contractor for OHE, TSS & SCADA works and approved by the purchaser shall be made upto date incorporation actual supply and erection particulars including the name and make of insulators, galvanised steel tubes, stainless steel wire rope, Transformers, Circuit Breakers, ATs, CTs, PTs, Interrupters, RTUs etc. The mark of conductors shall be specified in the "As erected" OHE layout plans, SED and other relevant drawings for identification. Such drawings and schedules shall then be verified and corrected, if necessary, by the Contractor jointly with the purchaser's representatives. The verified and corrected drawings shall be supplied in four sets, one of which shall be transparencies of linen or film reproduction or any other durable material approved by the purchaser. In addition, the contractor shall also supply the soft copy of approved drawings. The soft copy shall be in Auto Cad, Coral draw or any other similar format as mutually agreed between the contractor and the purchaser.

**2.5.12 ADDRESSES:**

Addresses to which designs and drawings should be submitted are indicated in part-III.

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**PART - II**  
**CHAPTER - VI**

ERECTION AND INSTALLATION OF EQUIPMENT

**Section-1: PRINCIPLES**

<b>PARA No.</b>	<b>SUBJECT</b>
2.6.1	<u>Scope</u>
2.6.2	Method of erection
2.6.3	Sectioning
2.6.4	Inspection
2.6.5	Measurements
2.6.6	Bolts, nuts etc.
2.6.7	Damage to galvanizing, painting
2.6.8	Foundations
2.6.9	Masts and Structures
2.6.10	Overhead equipments
2.6.11	Isolators
2.6.12	Busbars and connections
2.6.13	Earthing
2.6.14	Tolerances
2.6.15	Supplementary Instructions
2.6.16	Equipment
2.6.17	Cabling

**Section - 2: WIRING PROCEDURE**

<b>PARA No.</b>	<b>SUBJECT</b>
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	

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**PART - II**  
**CHAPTER - VI**  
**ERECTION AND 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 and Traction Sub-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 centre 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 & split cotter pins etc. shall be properly tightened and secured. Contractor shall carry out systematic inspection of this aspect of work after all adjustments to overhead equipment/installation are completed and prior to offering completed sections of equipment/Sub-Station to the purchaser for inspection and testing. No bolts may project more than 10mm beyond the nut/locknut after full tightening.

**2.6.7 DAMAGE TO GALVANISING PAINTING :**

In loading, transport and erection, all galvanized/ painted materials shall be handled with care to avoid damage to galvanising/painting. If galvanising/painting is damaged inspite 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 accepted by the purchaser for the design of foundations.

**(b) LOCATION**

The location of each foundation or anchor block shall be set out correctly in accordance with approved structure cross-section drawings or foundations layout drawings, as the case may be, in the presence of the Purchaser's representative.

**(c) METHOD OF INSTALLATION**

The Contractor shall adopt mechanised method (Concrete mixer) for installation of foundation in the station areas with five track lines or more. The Contractor may adopt either manual or mechanised method for installation of foundations in the other areas. He may erect traction masts or structures in the same operation as casting of foundations or erect them subsequently in cored holes left in foundation blocks and grout them separately. In any case, the method of casting of foundation blocks and erection of masts or structures shall be subject to the approval of the purchaser.

**(d) EXCAVATION**

Normally, excavation of soil for foundations or anchor blocks along side the tracks may be done upto 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 temped. In case the length of excavation is 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 be safe

and concrete is cast on the same day. Shoring shall be done to the satisfaction of the purchaser's representative, if the excavated hole is left overnight. All water logged locations will come under the purview of this para. In poor soil or ash banks, no excavation shall be done without adequate shoring and piling. For large foundations and water logged locations shoring shall be done in accordance with drawings submitted 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) and 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 covers so as to prevent any injury to rail users even if the core hole cover gets damaged or is displaced. The track ballast should be restored to its original form promptly after casting of the foundation block. The excavated earth should be removed well clear of the area so as to avoid any mixing up with the track ballast or any obstruction to the track drains. In case of cuttings, the earth should be thrown well away from the shoulders so that there is no risk of its flowing back to the drain during the rains.

**(e) CONCRETING**

All concreting or grouting shall be done in accordance with para 2.2.4 with ballast graded for the purpose specified in para 2.2.5. The concrete shall be poured and temped 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**

**(i) FOR OHE:**

All anchor blocks and foundations of structures carrying overhead equipment shall be provided with concrete muffs. The top of these muffs shall be above the level of ground of the track formation and of adequate height of not less than 15 cm to afford reasonable protection during rainy weather. Muffs may be installed at the same time masts are grouted or after the mast/structure is loaded with equipment. The foundations of structures for switching stations need not, however, be provided with muffs. The top of such foundations shall be given a slope of 1 in 50 towards the edge to ensure that water does not collect at the base of the structure of the frame work of the equipment.

**(ii) FOR Foundation Level of TSS:**

The top of all foundations and anchor blocks shall always be above the level of the ground and of adequate height, not less than 15 cm. to afford reasonable protection during rainy season. The top of foundation shall be finished to make a smooth surface sloping 1/20 outwards to drain rain water.

(g) Suitable grooves or niches shall be provided in the foundation blocks, wherever required, at the time of casting, to enable embedment of earth strips etc. to avoid the necessity of chipping of concrete.

(h) Conduits for cables should be embedded in the foundation blocks, wherever required, to avoid subsequent chipping off and breaking of the foundation blocks.

(i) All foundations will be cast in the presence of the Purchaser's representative with regard to fixed datum level.

**2.6.9 MASTS AND 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/structure shall be embedded in the foundation blocks for the correct length specified in approved drawings.

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**NOTE:** Mast/uprights should be grouted on the same day they are dropped in the foundations.

**(b) REVERSE DEFLECTION**

All traction masts and structures shall be erected with the correct reverse deflection so that they become reasonably vertical after they are loaded. The method of erection of masts with the correct reverse deflection shall be submitted to the Purchaser for approval.

**(c) INFRINGEMENT TO STANDARD DIMENSIONS**



In erection, care shall be taken to ensure that no part of the traction mast, structure or any fitting located on such mast or structure infringe the Schedule of Dimensions mentioned in Para - 2.1.1 (c)

" Indian Railways Schedule of Dimensions".

**(d) ALINGMENT OF MAST AT GANTRIES**

The main masts of gantries shall be carefully aligned to enable easy and good assembly of fabricated steel work.

**2.6.10 OVERHEAD EQUIPMENT :**

(a) A 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 stretch 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 200mm to facilitate adjustment during maintenance.

**(c) STAY ARMS**

The choice of stay arms shall be such that their adjuster are capable of adjustments of minimum of 90 mm in either direction except as otherwise relaxed.

**(d) INSULATORS**

Before insulators are used in bracket assemblies or dispatched to work site for erection from Contractor's Stores Depot, they shall be tested as specified for routine mechanical test. NO chipped or cracked insulators shall be installed. All insulators shall be cleaned before offering complete sections of equipment for inspection and testing.

For testing of all types of Insulators, RDSO's Guidelines No. TI/MI/0011 (05/01) Rev.1 & TI/MI/0042 (12/2008) Rev. 0 or latest are to be followed.

**(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 swivelling 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 bracket assemblies. Shorter periods may, however, be allowed by the Purchaser.

**(f) STRINGING CONTACT WIRE**

Care shall be taken to avoid formation of kinks, twists and damage to contact wire in stringing and subsequent operations. While stringing the contact wire, it shall be suspended from pulleys hung from droppers fitted to the catenary in their final position. In curves, the contact wire shall be run in pulleys located at traction masts or supports, corresponding to the approximate final position of the wire.

**(g) LOCATION OF DROPPERS**

Droppers shall be correctly positioned in each span to ensure correct level of contact wire as per dropper chart applicable to the span.

**(h) CLIPPING DROPPERS**

The 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) -NIL-

**(j) AUTO TENSIONING DEVICE**

The auto-tensioning device shall be erected with the correct height of the counter-weight above rail level with corresponding distance between the pulleys of the device for a temperature of 35° C before it is connected to the overhead equipment and put into action. The installation of the device shall be such as to permit free, easy and unobstructed movement of counter-weight. RDSO's Guidelines No. TI/MI/0035 (09/01) Rev. 1 shall be followed at crossovers and short tension length ATDs.

**(k) CUT-IN-INSULATORS**

All insulators in out of run shall be so positioned that they are away from the swept zone of the pantographs and will not foul with them. The live parts of these insulators shall also be so located that they are at least 2 m away from Structures other than those supporting traction overhead equipment.

**(l) SECTION INSULATORS**

All section, insulators shall be so located that they are beyond the swept zone of the pantograph running on adjacent tracks and there is no unusual sag due to the same. Where section insulators are installed, the contact plane of the runners of the insulators as well as those of overhead equipment connected to it shall be parallel to the track plane.

**(m) ANTI -WIND CLAMP**

Anti-wind clamp shall be provided as shown in drawing (Annexure-1).

**(n) CONNECTIONS**

All jumper connections including anti-theft jumpers shall be made properly with parallel clamps and finished neatly without any loose wire or cables. The length of flexible jumpers shall be adequate to avoid any disturbance to overhead equipment or restraint in the relative movement of conductors, but the jumpers should not be excessively long. The ends of jumpers shall be tinned, including the portion inside the first parallel clamp.

**(o) SEPARATION BETWEEN OHE**

In erection, the physical separation required between overhead equipments and bracket assemblies on the same Structure at insulated overlaps shall be ensured.

**(p) GRADIENT OF CONTACT WIRE**

The gradient of the contact wire on either side of overline Structures with restricted clearances shall be correctly adjusted and adequate clearance maintained between the overline Structure and live equipment.

**(q) ADJUSTMENT AT TURNOUTS ETC**

Careful adjustment of equipment shall be made on equipments at Turnouts, cross overs, diamond crossings, overlaps and special Locations, for position of bracket assemblies, stay arms and height of contact wire to ensure that pantographs of electric rolling stock on the run will not foul with any parts of the bracket assemblies and change over of the contact wire is effected smoothly.

**(r)** 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 easy operation.

**2.6.12 BUS BARS AND CONNECTIONS :**

a) The busbar connections on the incoming side, shall be as tight as possible, all similar connections in adjacent bays being uniformly shaped and bent to give a good appearance. The tubular Aluminum busbars shall be supported at a uniform height throughout. Wherever tubular busbars are required to be bent, the radius of the bend shall not be less than 375 mm.

b) All Aluminum busbar joints shall be made carefully. The contact surfaces of the busbars and the connectors shall be cleaned vigorously either by hand with a dry coarse emery cloth or by power driven wire wheel brush. The surfaces shall be smeared with a suitable corrosion inhibiting joint compound approved by the Purchaser. The joint closed-up as soon as possible thereafter and a final light application of joint compound shall be made. Similar procedure shall be followed while connecting the equipment terminals to be busbar by means of bi-metallic connectors.

**2.6.13 EARTHING :**

**FOR OHE:**

The copper earth strips or MS flats used for earthing 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 15 cm from the datum level of a switching station. Before making earth connections the ends shall be cleaned 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.

**FOR TSS:**

Typical clamping arrangement of M.S Flat inside Control Room is shown in the relevant drawing in Annexure-1. The joints on mild steel flats shall be welded type. The welds shall be treated with

barium chromate before painting the welded surfaces. The connections to the various items of equipments shall be made with galvanised steel bolts (16mm dia), nuts with locknuts or spring washers as required. The earth connections to the structural members shall be made at height not exceeding 150 mm from the ground level. The steel flats shall be bent and shaped neatly before connection to the structures or frame work of equipment. The earth flats to run along the structures for connections of equipments to earth mat shall be properly supported on the structures with galvanised steel bolts (12mm dia), nuts with lock-nuts or spring washers, as required, at suitable intervals.

#### 2.6.14 TOLERANCE :

The permissible tolerance in dimensions for erections from those included in the appropriate drawings or schedules for different items are given below :-

##### (a) MEASUREMENTS

The span length shall not vary more than  $\pm 50$  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 OF STRUCTURES

The setting of structures shall be not less than that included in the appropriate cross section drawings, especially those with the minimum setting of 2.36m. A tolerance of  $\pm 20$  mm will be permitted subject to minimum specified value, if the structure is not located in between tracks.

##### (c) HEIGHT OF CONTACT WIRE

$\pm 20$  mm will be permitted on the height of contact wire at points of supports as shown in the relevant structure erection drawings, except under over line structures where no tolerance will be permitted.

(d) **STAGGER** : Generally  $\pm 200$  mm will be permitted for stagger.

(e) **DROPPER LENGTHS** :  $\pm 5$ mm will be permitted for dropper lengths.

(f) **DROPPER LOCATION** :  $\pm 100$  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.

#### 2.6.16 EQUIPMENT :

The installation of the equipment shall be carried out strictly in accordance with the instructions issued by the Manufacturer. The equipment shall be leveled carefully before being fixed finally in position. The bushings of insulators shall be protected adequately during erection of equipment to avoid chipping or damage to the porcelain. The following methods shall be adopted for mounting the various equipments.

	Equipment	Method of mounting.
i)	Main Power transformer	On two 90 lb/yd flat-footed rails laid on concrete foundations with a spacing of 1676 mm between the inner face of the rails
ii)	220/132/110 kV Circuit breaker	On steel supports mounted on concrete foundation with operating mechanism kiosk on concrete pedestal where necessary
iii)	25kV Circuit breakers and interrupters	On fabricated steel supports erected on concrete foundations
iv)	Isolators, potential transformers, Current transformer L.T supply transformers, 25 kV fuse Switches & Lightning arrestors.	On steel supports mounted on concrete foundations
The Circuit breakers, interrupters and Isolators shall be mounted in such a way that they can be manually operated conveniently by a person standing on the ground or on a concrete pedestal of suitable height.		
v)	Shunt capacitor bank & series reactor	On steel racks which in turn shall be mounted on a concrete plinth with suitable base frame.

#### 2.6.17 CABLING :

a) Laying of cables.

All PVC cables provided out-door shall be either laid in trenches or neatly clamped to the structures as approved by the Purchaser. If it becomes necessary to take the cable connections along the steel supports for the equipment, the cables shall be laid through bent or shaped G.I. pipes embedded in concrete while the foundations are being cast. All cables in the cable trenches and along the structures shall be neatly secured with proper clamping arrangement at suitable intervals. Each cable in the cable trench/on the structure shall also be provided at suitable intervals with identification labels of durable material bearing indelible engraved or punched markings to facilitate easy identification.

b) Termination of cables.

The cables shall be terminated neatly and the cores arranged and dressed properly. Suitable terminal strips and ferrules made of PVC or other durable materials shall be provided on terminals and wire ends respectively to facilitate identification. The marking on the terminals strips and ferrules shall be either engraved or punched so as to be indelible.

c) Indoor wiring.

As far as possible all cables shall be laid in the trenches/ pipes provided for the purpose in the Control Room. Wherever necessary indoor wiring on walls shall be clamped neatly on teak wood battens/M.S flats fixed to the wall by means of rag bolts grouted in the wall. The typical clamping arrangement is shown in the relevant drawing in Annexure-1.

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## **SECTION2: WIRING PROCEDURE**

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## **PART - II**

### **CHAPTER - VII**

#### **INSPECTION AND TESTING**

<b>PARA NO.</b>	<b>Subject</b>
2.7.1	Scope
2.7.2	Overall performance.
2.7.3	Responsibility.
2.7.4	Tests on overhead equipment.
2.7.5	Inspection and testing of switching stations etc.
2.7.6	Earthing.
2.7.7	Detailed procedure for tests.

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**PART - II**  
**CHAPTER - VII**  
**INSPECTIONS AND TESTING**

**2.7.1 SCOPE :**

This chapter deals with the inspection and testing of completely erected overhead equipment, switching stations, booster transformer stations, L.T. supply transformer stations and Traction Sub-Station as provided in Part - I.

**2.7.2 OVERALL PERFORMANCE :**

The overall performance of the overhead equipment should be such as would permit collection of current by electric rolling stock with full load at speeds, upto 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 TESTS OF OHE :**

**(a) GENERAL**

As soon as a section is ready for inspection and testing, the Contractor shall advise the Purchaser in writing. Tests to be carried out by the Purchaser will be done in the presence of the Contractor's representative and shall include the following apart from other reasonable tests that the Purchaser may like to conduct with a view to ensure, himself of the soundness of the 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 2500V Megger.

**(c) CONTINUITY**

The electrical continuity of the line and the existence of bad Contacts, if any, will be tested with a Megger.

**(d) ELECTRICAL INDEPENDENCE**

The electrical independence of individual elementary sections in relation to one another shall also be tested with a Megger.

**(e) SWITCHES**

All isolators shall be tested for smooth and trouble free operation.

**(f) TENSION DEVICES**

All automatic Tensioning devices installed shall be tested for sensitive functioning and adjustment.

**(g) STAGGER AND HEIGHT**

The stagger and height of contact wire over the entire section of completed overhead equipment and the 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 energising the overhead equipment.

**(i) ENERGISING**

If the overhead equipment, after being subjected to the above tests in an un-energised condition, is found to be satisfactory, it will be energised with the normal 25 KV A.C. supply.

(j) Tests shall then be conducted to check if the power collection performance of the overhead equipment is satisfactory after ensuring that the contact wire is adequately clean. For this purpose, an observation car shall be attached next to the electric locomotive. The behavior of the overhead equipment will be watched at various speeds. Power collection shall be considered unsatisfactory if a long blue flash is observed, indicating that the contact between the contact wire and the pantograph is not continuous.

## 2.7.5 INSPECTION AND TESTING OF SWITCHING STATIONS ETC.:

### (a) GENERAL

As soon as a switching station, booster transformer station or LT supply transformer station and Traction Sub-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. These shall include the tests which the Purchaser may like to conduct with a view to assure himself of the soundness of the equipments and their erection in compliance with these specification. However, testing equipments 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) 5000V/2500 V & 500 V meggers.
- (iii) Earth megger and accessories.
- (iv) Continuity test apparatus.
- (v) Avometer
- (vi) Relay testing kit.
- (vii) Primary injection test set.

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) OPERATIONS TEST

This tests 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 operations 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 5000V/2500 V/500 V megger, as required.

### (e) DI-ELECTRIC STRENGTH OF OIL

The di-electric strength of the oil of the Instrument Transformers (except if they are of sealed construction), Booster transformer Circuit Breaker & LT supply transformer, at each station shall be tested before commissioning in accordance with IS:335(Latest version as indicated in Annexure-1) should this be 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. Correct function-ing of interlocking device shall be checked.

### (g) INTERRUPTORS

Operation of trip and close coils for interrupters shall be tested for satisfactory performance with the respective equipments de-energised.

### (h) Instrument transformer

Tests shall be conducted to check the polarity of current and potential transformers.

### (i) Ammeter and Voltmeter

The Calibration of ammeters and voltmeters provided on the control board shall be checked.

### (j) Protective relays

The Contractor, shall arrange for all protective relays to be tested and calibrated in a recognised test laboratory at his own cost, just prior to installation on the control board, and shall submit six copies of the test certificates to the Purchaser.

### (k) Primary & secondary injection tests

Operation of all protective relays, auxiliary relays and trip and close coils for circuit breakers shall be tested for satisfactory performance with the respective equipments de-energised. Correct functioning of all electrical interlocks inter- tripping etc. shall also be checked during these tests.

### (l) Performance tests

To verify the performance of the complete capacitor bank, tests as specified in respective clause of RDSO specification No. TI/SPC/PSI/FC & SR/0100 (01/2010) shall be carried out at site after installation.

#### **2.7.6 EARTHING :**

(a) Earth wires will be checked for continuity and electrical isolation every 1000 m approx.  
 (b) Clearances between earth wires and out-of-run wires of overhead equipment and signals shall be checked.

(c) Earth resistance shall be measured separately for each earth electrode. In the case of interconnected earth electrodes, the nett resistance of the inter-connected electrodes shall also be measured.

(d) Earth resistance will be measured separately for each earth electrode and when they are connected together and to the equipment at each sub-station, feeding station and shunt capacitor bank.

#### **2.7.7 DETAILS PROCEDURE FOR TESTS :**

The detailed procedure for inspection and testing will be furnished to the contractor. The contractor shall submit the results of tests in the proforma which will be furnished by the Purchaser, in quadruplicate.

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**PART - II**  
**CHAPTER - VIII**  
**SWITCHING STATION BUILDING**

<b>PARA NO.</b>	<b>SUBJECT</b>
2.8.1	General
2.8.2	Earth work
2.8.3	Foundations
2.8.4	Reinforced Cement concrete work
2.8.5	Super structure
2.8.6	Flooring
2.8.7	Roofing
2.8.8	Doors, windows, ventilators
2.8.9	Building material
2.8.10	Wiring
2.8.11	Main Switchgear and Switch Board
2.8.12	Earthing
2.8.13	Electrical Fittings and Appliances
2.8.14	Testing and Commissioning

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**PART - II**  
**CHAPTER - VIII**  
**SWITCHING STATION BUILDING**

**2.8.1 GENERAL :**

This chapter deals with details and specifications for design and construction of switching station buildings and associated electrical works. This chapter also gives reference to technical specifications of materials and components and procedure of designs and drawings for above works. A list of standard drawings is included in Annexure-I, Part IV.

**2.8.2 EARTH WORK:**

(a) Earth work in cutting or embankment in the premises of switching station buildings is included in the scope of construction of building. The buildings will be adequately levelled with earth duly consolidated in the premises or as directed by the purchaser.

**(b) Mechanical Compaction:**

Depending upon the height of the embankment, the type of soil, time available for completing the embankment and other relevant factors, purchaser's Engineer shall decide whether mechanical compaction is to be done for the full or part height of embankment. Suitable method for compaction as decided by purchaser, shall be adopted.

**(c) Excavation:**

All cuttings shall be taken down carefully to the precise level and section as shown in the drawings or as ordered by the purchaser. In case, the bottom of the cutting is taken down deeper than is necessary by oversight or neglect of the contractor, the hollow must be filled up to true depth with selected material and rammed, if approved by purchaser. Cuttings with the formation in rock will be excavated to 15 cm below the true formation and filled upto true level with cutting spoil to ensure that no lumps of solid rock project above formation level.

**(d) Drainage of cuttings:**

In excavating cuttings, special precautions are to be taken to ensure that the excavations drain themselves automatically. To ensure this, the central block of earth or gullet is to be excavated first. This will be done in such a manner that the bottom of the excavation shall where possible, slop downwards from the center of the cutting towards the ends. It will be made in such cuts or steps as may from time to time, be directed. Generally, in deep cuttings the first cut or step will approximately follow the surface of the ground where this will secure the necessary slope for drainage, and will be excavated to such depth not exceeding 3 m as may be ordered, with perpendicular sides leaving pathways for workmen along the sides of the cut parallel to the central line about every 15m. In shallow cuttings, not exceeding 2m in the deepest part, the gullet may be cut out at once to formation level.

**(e) Catch water drains:**

Where required, catch water drains shall be constructed on the up hill side leaving a berm of one metre from the boundary of the railway land. The cross sectional area of the catch water drain shall normally not exceed 0.75 sq.m. The spoil from the catch water drain will be thrown up on the side towards the cutting.

**(f) Berms and spoil banks:**

No spoil shall be deposited within a distance of 6 m from the top edge of the slope of any cutting.

(g) The spoil heap shall be roughly but neatly dressed off to a slope of 1-1/2:1 and shall form a continuous bund along the top of the cutting. In country where there is any cross fall sufficient spoil shall be thrown on the uphill side of the cutting to supplement the catch water drains and assist in keeping drainage out. This work must be done first.

(h) All material excavated from cutting suitable for pitching, ballast, masonry or any other purpose whatever, shall be the property of the Railway, and shall be stacked, as also disposed of, as directed by the Purchaser.

**(i) Springs or Inflow:**

Should springs or inflow of water appear in cuttings, or should they be flooded the contractor must arrange for bailing, pumping or drainage of water, without obstruction to adjacent works.

(j) **Blasting:**

If any blasting operations are necessary, they shall be carried out in accordance with para 1.2.43 of Chapter II, Part-I of this tender document.

**2.8.3 FOUNDATIONS :**

(a) Foundations shall be designed by the contractor in accordance with Chapter II, Part II of this tender document. The contractor shall get the relevant drawings approved by the purchaser. The foundation work may involve wet excavation also, for which all due precautions by way of pumping and other operations, preventing blowing are to be adopted.

**(b) Plinth filling:**

Plinth filling shall be done with earth in 15 cm layers, duly consolidated, watered & rammed unless otherwise specified. In black cotton soil, the soil shall be removed for a depth of 60 cm and top 30 cm filling shall be done with sand.

(c) Wherever it is necessary in case of deep trenches, shoring or timbering for such trenches shall have to be provided to avoid collapsing of earth.

**(d) Apron:**

For protection of plinth, an apron as specified in drawing **No.RE/Civil/BS-11/95** (Latest version) shall be provided.

**2.8.4 REINFORCED CEMENT CONCRETE WORK :**

(a) R.C.C. of the switching station shall be cast on the controlled concrete technology for M-20 grade conforming to IS:456 (Latest version as indicated in Annexure-1). The design of all R.C.C. work shall be prepared by the contractor and got approved from purchaser well in time.

Test concrete specimen shall be casted at the site of work and tested in accordance with the relevant specification.

(b) If unavoidable due to site conditions, concrete may have to be laid in water as per laid down procedure.

(c) All RCC works shall be finished smooth.

**2.8.5 SUPER STRUCTURES :**

(a) Brick work

Besides following relevant specification, well burnt bricks shall only be used. The brick work shall be laid in ENGLISH BOND. The brick work below plinth shall be done in Cement mortar of ratio 1:4 (1 cement, 4 sand). The brick work above plinth shall be done in cement mortar of ratio 1:6. Curing of the brick work shall be done for a minimum period of fourteen days.

(b) Plastering on inside and outside surface shall be done in Cement mortar of ratio 1:3 and shall have a thickness of 10 mm.

(c) All external surface shall be treated with snowcem over two coats of cement primer of approved quality and all internal surfaces of wall and ceiling shall be white washed with three coats.

**2.8.6 FLOORING:**

(a) Following pattern of the flooring shall be adopted:

(i) **Base concrete** - 100 mm thick cement concrete of ratio 1:4:8 with under layer of 100 mm thick sand filling over well compacted earth.

(ii) **Top layer** - 40 mm thick cement concrete of ratio 1:2:4, laid in panels with glass dividing strips of 25 mm x 3 mm.

Top surface of the flooring shall be finished smooth.

(b) Suitable anti termite treatment, pre and post treatment as approved by the purchaser, shall be provided.

**2.8.7 ROOFING :**

R.C.C. roof, complete in all respects in accordance with RDSO drawing No.ETI/C/0067(Latest version as indicated in Annexure-1) shall be provided. Water proofing of roof shall be responsibility of the contractor. Type of water proofing treatment if required, will be got approved from the purchaser. The contractor shall ensure at the time of handing over of the building that roofs are leak proof and water tight. The contractor shall also provide C.I. rain water pipes of specified size.

**2.8.8 DOORS, WINDOWS, VENTILATORS :**

Pressed steel doors, windows, ventilators and grills etc. shall be provided in accordance with the drawing No.RE/Civil/S-129/2001(Latest Mod). All steel work shall be painted with two coats of ready mixed paint of approved quality and shade with Red Oxide primer coat.

**2.8.9 BUILDING MATERIALS:**

Building materials if not already specified above, shall be used in accordance with Chapter II, Part-II of this tender document.

**2.8.10 WIRING:**

(a) The contractor shall follow recessed conduit wiring system for internal wiring of the switching station buildings. Stove enameled, jet black, steel seamless conduit pipes of standard diameter, conforming to IS:9537(Part-2)/(Latest version as indicated in Annexure-1) with latest amendments shall be used. No conduit pipes having a diameter of less than 19 mm shall be used. All conduit accessories like bends, inspection boxes, elbows, draw boxes, junction boxes shall be of threaded type and shall conform to **IS:3837** (Latest version as indicated in Annexure-1) with latest amendments. The conduits shall be recessed in the wall/ceiling.

The conduit of each circuit or section shall be complete before conductors are drawn in. The entire system of conduit after erection shall be tested for mechanical and electrical continuity throughout and permanently connected to earth by means of a special approved type of earthing clamp efficiently fastened to conduit pipe. A G.I. wire of 6/8 SWG and conforming to IS:4826(Latest version as indicated in Annexure-1) shall be provided alongwith laying of recessed conduit to facilitate drawing of wires in the conduit.

(b) The wiring shall include circuit wiring and point wiring. The circuit wiring shall include wiring from distribution board upto first switch board along the run of wiring. The point wiring shall include complete wiring of a switch circuit from tapping point on the distribution circuit to the following via the switch.

- (a) Connector in case of exhaust fan point.
- (b) Ceiling rose.
- (c) Socket outlet.
- (d) Lamp holder.

Looping system shall be used for the wiring. Phase or live conductors shall be looped at switch box and neutral conductor can be looped from the light, fan or socket outlet. All switches shall be placed in the live conductor of the circuit. Power/heating wiring shall be kept separate and distinct from lighting and fan wiring. Light and fan circuit shall not have more than ten points of light, fan & 5 Amp socket outlets or a load of 800 watts which ever is less. A power circuit shall be designed for a maximum of two outlets of a load of 1000 watts each. The contractor shall prepare a wiring diagram, indicating clearly in plan, main & distribution board, position of all points with their classification and controls and get it approved from the purchaser.

(c) PVC insulated, single core, multi stranded Aluminum conductor, 660/1100 Volt grade cables conforming to IS:694(Latest version as indicated in Annexure-1) shall be used for the wiring. The standard sizes shall be as follows.

- (i) 2.5 sq.mm for light/fan point wiring.
- (ii) 4 sq.mm for Power point wiring.
- (iii) 6 sq.mm for connection between main switch and distribution board.

(d) Electrical fittings, plug points and appliances as indicated in following table shall be provided in a switching station. The contractor shall get the locations of the electrical fittings/appliances approved from purchaser.

**TABLE**

SNO	DESCRIPTION OF ITEM	QUANTITY
1.	5 Amp. 3 pin flush type socket outlet with switch	1 No.
2.	15 Amp. 3 pin flush type socket outlet with switch	2 No.
3.	Fluorescent fitting complete with choke, starter, PF improving capacitor inside the reflector cover and a fluorescent tube	1 No inside the building
4.	Outdoor luminaire fitting suitable for 150 Watt HPSV lamp with all accessories including a 150 Watt HPSV lamp	1 No outside the building
5.	230 AC, 300 mm, 940 RPM exhaust fan.	1 No. in battery room

**2.8.11 MAIN SWITCHGEAR AND SWITCH BOARD :Main Board**

(a) Main board consisting of main switch and distribution board shall be situated as near as practicable to the termination of service line and shall be easily accessible without use of external aid. Switch boards of adequate sizes as approved by the purchaser shall be made of mild steel and recessed in the wall. Front of the boards shall be fitted with 3 mm thick phenolic-laminated sheet similar to Hylem one. All the metal switchgears and switch boards shall be painted, prior to erection with two coats of approved enamel paint, as required on all sides accessible.

**(b) Main Switch**

Main switch shall be 230 Volt, 32 Amp, metal clad, composite switch fuse unit, single pole with rewirable type fuses and neutral link. It shall conform to IS: 13947 (Part.3)(Latest version as indicated in Annexure-1). It shall have cable entry holes, cover handle interlocking, sealing arrangements and weather proof enclosures.

**(c) Distribution Board**

Distribution board shall be 230 V, 16 Amp. metal clad boards conforming to IS:2675(Latest version as indicated in Annexure-1) with latest amendments with hinged type metallic cover, cable entry holes and weather proof enclosures. It shall have reusable type fuse units.

(d) Switches shall be 230 V, 5/15 Amp, one way flush type, piano type switches, conforming to **IS:3854**(Latest version as indicated in Annexure-1) with latest amendments and shall be ISI marked.

Three pin socket outlets shall be 230 Volt, 5/15 Amp, flush type, conforming to **IS:1293**(Latest version as indicated in Annexure-1) with latest amendments and shall be ISI marked.

Ceiling roses shall be 230 V, 5 Amp, 2 pole bakelite ceiling roses, conforming to **IS:371** (Latest version as indicated in Annexure-1) and shall be ISI marked.

**2.8.12 EARTHING:**

Earthing systems including earth electrode in accordance with **IS:3043**(Latest version as indicated in Annexure-1) shall be provided. Loop earthing with G.I. wire of not less than 8 SWG shall be provided for all mountings of the main board and other metal clad switches and distribution boards.

**2.8.13 ELECTRICAL FITTINGS AND APPLIANCES:**

(a) Fluorescent lamp fittings conforming to IS:1777(Latest version as indicated in Annexure-1) with latest amendments and suitable for 1x40 Watt fluorescent tube shall be provided. The fittings shall be complete with copper wound choke, lamp holders, starter with base, power factor improving capacitor, 40 Watt fluorescent tube etc. The fittings shall be mounted on the walls with suitable mounting arrangements.

**(b) EXHAUST FAN**

The contractor shall provide single phase, 230V, 50 Hz, 6 pole, 940 RPM propeller type exhaust/ventilating fans having a size of 300 mm and with a mounting ring but without regulator and louver shutters. The fan shall conform to **IS:2312**(Latest version as indicated in Annexure-1) and shall be ISI marked.

**(c) OUTDOOR LUMINAIRES**

(i) The contractor shall provide weather proof street light/outdoor luminaire fittings of two piece construction, comprising of cast Aluminum control gear housing and deep drawn stove enameled lamp housing with anodised Aluminum side reflectors, clear acrylic bowl, held by antirust, robust toggle.

The luminaire fitting shall be suitable for a 150 watt HPSV lamp and shall be complete with control gear box with ballast, PF improving capacitor, connector block, fuse cutout, earthing terminal and a 150 watt HPSV lamp.

**(ii) INSTALLATION**

The control gear box, mounted on a teakwood board of appropriate size and shall be installed on wall inside the building at an accessible height and connected to the switch board through a ceiling rose.

The luminaire fitting shall be installed on a pre-erected 3 meter long medium class G.I. pipe of 50 mm diameter.

The pipe shall be grouted on the outside wall of the building with the help of M.S. clamps such that height of G.I. pipe above the roof of the buildings is not less than 2.5 meters. The fitting shall be mounted with the help of a 25 mm dia G.I. pipe, given a bend of 120 deg. from horizontal plane and MS clamps. Flexible copper wire of suitable size shall be provided to connect the control gear & the fitting. The control gear box and the fitting shall be properly earthed.

#### **2.8.14 TESTING AND COMMISSIONING:**

On completion, all works including wiring, electrical fittings and appliances shall be tested jointly with the representative of the purchaser in accordance with **IS:732** (Latest version as indicated in Annexure-1) and commissioned.

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**PART - III**  
**PARTICULAR SPECIFICATIONS**

<b>Para No.</b>	<b>Subject</b>
3.1	Introduction
3.2	Location
3.3	Tracks to be wired
3.4	General particulars
3.5	Climatic Conditions
3.6	Rolling stock
3.7	Over dimensional consignments
3.8	Power supply
3.9	L.T. Supply Transformer Stations
3.10	Type of OHE
3.11	Return Conductors
3.12	Pegging plans
3.13	Traction Sub-Stations feeders
3.14	Track circuits
3.15	Labour and materials
3.16	Contractor's office
3.17	Contractor's depot and work trains
3.18	Duration of traffic blocks
3.19	Remote Control Centre
3.20	Addresses
3.21	Quantities
3.22	Technical Data for Design of Protection Scheme

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## PART – III PARTICULAR SPECIFICATION

### 3.1 Introduction

This part of the specification is complementary to Part-II. This work includes –  
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### 3.2 Location \*

Works is to be executed at Akbarpur – Tanda Section & Yard. However, Railway reserves right to change the site of work anywhere in area of the work in Para 1.1.1 (iii) above in the jurisdiction of Lucknow Division under **Sr. Divisional Electrical Engineer (TRD), Northern Railway, Lucknow** and the contractor shall be bound to execute the work without any extra cost.

### 3.3 Tracks to be Equipped

(a) DELETED

(b) **Schematic Diagram**

The tentative schematic electrical sectioning of the tracks to be wired will be supplied to the successful Tenderer, if required.

### 3.4 General Particulars

(a) The section passes through populated localities. The bearing capacity of the soil is likely to vary from 5500 to 22000 Kgf/Sq. m. The actual bearing capacity shall however be determined in accordance tests as provided in PART-II Chapter-II of tender papers.

(b) **Access Road** – Majority of the section is approachable by Road/Rail.

### 3.5 Climatic Data Temperature

(a) For the overhead equipment, which will be in the open space a minimum temperature 4 degree C and a maximum temperature of 65 degree C are to be considered. The mean temperature should be taken as 35 degree C.

(b) **Rain Fall** – Rains occur generally from June to September.

(c) **Humidity** – The maximum relative humidity is nearly 85%.

(d) **Wind pressure** – Basic wind pressure of 112.5 Kg f/Sq m is adopted for OHE design. Any revision in these figures for wind pressure will be advised in due course.

(e) **Thunder Strom** – The region is subject to storm and rain fall during the monsoon from June to September.

### 3.6 Rolling Stock

Steam locomotives with chimney height not exceeding 4.27m (14 ft), electric locomotive with height not exceeding 4.398 m with the pantograph in the locked down position and diesel locomotives 4.42m (14 feet 6 inches) high, would run on this section.  
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\* **This clause will be inoperative till further decision of purchaser.**

### 3.7 Over Dimensional Consignments

The maximum height of over dimensional consignment which apply on this section is 4.8 M (15'-9") at present.No restriction in the height of consignment will be imposed after electrification for movement under power condition.

3.8 **Type Of OHE**

The existing OHE will be of 25 KV Conventional type, regulated Over Head Equipment with presag of 0.8 mm per mtr.

3.9 **Labour & Materials**

Un-skilled labour is available almost all over the section while skilled labour would be available generally at the main towns in the section .

3.10 **Contractor's Office**

It is obligatory on the part of the Contractor to establish an office with land line phone for, planning, designs and for expedition finalization of particular designs & working drawings. The office should be headed by a qualified Engineer whose credentials shall be approved by the purchaser's Engineer.In addition, the Contractor would have to establish field construction office at convenient and approved locations for co-ordination and progressing of Field works.

3.11 **Contractor's Depots**

Suitable space shall be made available for the Contractor to set up one main depot.

3.12 **Duration of Traffic Blocks**

Normally track occupation may be granted at any time during day light or night hours to suit convenience of traffic operation and will ordinarily be granted on one track at a time over a distance covered by one or two consecutive block shadows. Normally the duration of block on any section will be about 2 hours in a day for all the tracks in the section taken together. In special case, track occupation may be granted during night hours. Blocks provided may be utilized for one or more working gang or track lorries or ladder trolleys to suit convenience of work.

If Blocks are granted during night hours, the contractor will make his own arrangements of lighting at his own cost for execution of work. Adequate number of Discharge Rods of approved design & make will be provide by the contractor at site during power block period.

3.13 **Cranes**

One diesel rail crane of adequate capacity including diesel/electric loco required to haul the crane will be provided by the purchaser for erection/ removal of portal booms at different locations free of all charges including pay and allowances of the crew in all running expenditure. In case of damage due to accident/ mis-handling during the period when the crane is in the custody of the contractor, contractor shall carryout all the repairs/rehabilitation exclusively at his own cost. The diesel required for crane will be provided by the contractor. However contractor shall make his own arrangement for loading/unloading of all material at his depot or at work site.

The expenditure for hauling diesel rail crane like arrangement of loco, crew, guard etc. shall be borne by Railway.

3.14 **Tower Wagon**

The tower wagon will be given free of cost by the Railway to the contractor only for adjustment of turnouts, crossovers, section insulators and tower wagon checking with the Division. If Railway administration feels necessity of checking of OHE of existing line with tower wagonafter load transfer,the tower wagon may also be provided for the same by Railway.In case of modification in existing OHE,including shifting of existing OHE to new supports etc, tower wagon may be provided by the Railways for checking of such OHE, if it is considered necessary to make to modified OHE expeditiously available for operation of rail traffic.

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**ANNEXURE - 1**  
**LIST OF STANDARD DRAWINGS AND SPECIFICATIONS**

This Annexure contains reference to drawing numbers, charts, Schedules, Specifications and other data referred to in various paragraphs of this Tender Paper.

All references to drawings, charts, schedules, specifications, IS etc. given in this Annexure or elsewhere in the tender document shall be taken to be the latest versions including all amendments up to the date of tender opening.

All other items not covered under the Drawing/Specification shall be referred to as per relevant IS and Railway practice in force.

The Drawing and RDSO specification can be purchased from the office of CEE/CORE, Allahabad or TI Directorate of RDSO, Lucknow on payment basis.

**(A) LIST OF STANDARD DRAWINGS FOR “OHE”**

Sl. No	Brief Description	Drawing		Mod. No.
		Series	Number	
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1.	Extra allowance for setting of structures on curves (1676 mm Broad gauge)	ETI/OHE/G	00111 Sh-1	C
2.	Standard setting of structures in the vicinity of signals (broad gauge)	-do-	00112	D
3.	Typical design of side bearing foundation.	-do-	00131	-
4.	Typical design of cantilever mast.	RE/33/G	00141 Sh.3	-
5.	Standard drilling schedule of OHE masts 9.5 m long RSJ and BFB	ETI/OHE/G	00144 Sh.3	C
6.	Span and stagger chart for (conventional OHE, Cad. Cu catenary & Cu cont. wire) wind pressure 75,112.5 & 150kgf/m <sup>2</sup> .	ETI/OHE/G	00202	-
7.	Employment schedule for Cantilever mast Regulated OHE without return conductor and without Earth wire (WP- 112.5 kgf/m <sup>2</sup> (Cd- 65/Cu, Cont. 107/Cu)	ETI/OHE/G	00153 Sh.1	F
8.	Employment schedule for Cantilever mast Regulated OHE without return conductor and with Earth wire (WP- 112.5 kgf/m <sup>2</sup> (Cd- 65/Cu, Cont. 107/Cu)	ETI/OHE/G	00153 Sh.2	F
9.	Employment schedule for Cantilever masts Regulated OHE with return conductor and without Earth wire (WP- 112.5 kgf/m <sup>2</sup> (Cd- 65/Cu Cont. 107/Cu)	-do-	00153 Sh.3	F
10.	Employment schedule for Cantilever masts Regulated OHE with return conductor and with Earth wire (WP- 112.5 kgf/m <sup>2</sup> (Cd- 65/Cu, Cont. 107/Cu)	-do-	00153 Sh.4	E
11.	Employment schedule for Cantilever masts unregulated OHE without return conductor and without Earth wire (WP- 112.5 kgf/m <sup>2</sup> at 35°C and 28kgf/m <sup>2</sup> at 4°C (Cat- 65/Cu, Cont. 107/Cu)	-do-	00154	D
12.	Employment schedule of bracket tubes Conventional OHE (Cad Cu Caty & Cu contact wire 1000 kgf tension each) WP-75 Kgf/ m <sup>2</sup>	ETI/OHE/G	00158 sh.1 of 3	-

1	2	3	4	5
13.	Employment schedule of bracket tubes Regulated Conventional OHE (Cad. Cu Cat & Cu contact wire 1000 kgf tension in each) WP-112.5 Kgf/ m <sup>2</sup>	ETI/OHE/G	00158 sh.2 of 3	-
14.	Employment schedule of bracket tubes Regulated Conventional OHE (Cad Cu Caty & Cu contact wire 1000 kgf tension in each) WP-150 Kgf/ m <sup>2</sup>	ETI/OHE/G	00158 sh.3 of 3	-
15.	Dropper schedule for uninsulated Overlap spans	-do	00169	A
16.	Dropper schedule for insulated Overlap spans	-do-	00170	A
17.	Dropper schedule for conventional regulated OHE. With Zero presag (1400/1400)	-do-	00177	A
18.	Adjustment chart of Regulating equipment 3-Pulley Type (3:1 ratio)	-do-	00195	A
19.	Schematic arrangement of regulated OHE	-do-	02101	A
20.	Schematic arrangement of uninsulated overlap (3 & 4 span overlaps)	-do-	02121 Sh.4	A
21.	Schematic arrangement of insulated overlap	ETI/OHE/G	02131 Sh.3	A
22.	Standard termination of tramway type OHE (Regulated) with Pulley type regulating equipment (3:1 ratio).	ETI/OHE/G	04212	B
23.	General distribution of droppers	ETI/OHE/G	00161	-
24.	Outline of Pantograph (Broad gauge and metre gauge).	RE/33/G	00181	A
25.	General formation of single track in Embankments and cutting (Broad gauge.)	RE/33/G	01101 Sh.1	A
26.	General formation of double track in embankments and cutting (Broad gauge).	-do-	01102 Sh.1	A
27.	General formation of multiple tracks (1676 mm gauge).	-do-	01103 Sh.1	A
28.	Standard anchor arrangement	-do-	01401	E
29.	Anchor arrangement with dwarf mast.	ETI/OHE/G	01402	B
30.	Schedule of anchor block for B.G. track.	-do-	01403 Sh.1	E
31.	Schedule of anchor block for B.G. track.	-do-	01403 Sh.2	D
32.	Schedule of anchor block for B.G. track (Black cotton soil)	-do-	01403 Sh.3	D
33.	Standard guide tube arrangement on a mast and structures.	ETI/OHE/G	01505	-
34.	Trapezoidal counter weight arrangement on OHE structures.	ETI/OHE/G	01502	-
35.	Arrangement of 3KV & 25 KV Pedestal Insulator supports on OHE masts and portals.	-do-	01601	-
36.	Standard arrangements for mounting of number plate on OHE Structures.	ETI/OHE/G	01701	A
37.	Schematic arrangement of regulated overhead equipment.	-do-	02101	A
38.	Typical arrangements of OHE on cantilever masts for double track section.	-do-	02102	-
39.	Typical arrangement for fixing of bracket assembly on 9.5 m mast and Structure to suit raising of tracks (in future)	-do-	02102 Sh.3	-
40.	Mast on platforms (Metre Gauge)	RE/33/G	02104 Sh.2	A
41.	Details of bracket arrangement on tangent and curved tracks	ETI/OHE/G	02106 Sh.1	A

1	2	3	4	5
42.	Details of bracket arrangement for OHE	-do-	02106 Sh.3	C
43.	Single bracket assembly on Structures and dropped arms.	RE/33/G	02107	D
44.	Box type cantilever Arrangement.	ETI/OHE/G	02108	A
45.	Arrangement at anticreep.	TI/DRG/OH E/GENL/RD SO/	00001/12/0	0
46.	Standard cantilever arrangement for boom anchor anticreep location.	ETI/OHE/G	02113	-
47.	Schematic arrangement of uninsulated over Lap (type-I) (3 & 4 Span overlaps)	RE/33/G	02121 Sh.1	F
48.	Schematic arrangement of insulated overlap.	ETI/OHE/G	02131 Sh.1	
49.	General arrangement of regulated OHE at turn-outs (overlap & crossed type).	ETI/OHE/G	02141	C
50.	General arrangement of regulated OHE at cross over(overlap & crossed type).	-do-	02151	-
51.	Arrangement of neutral section	-do-	02161 Sh.1	C
52.	Arrangement of neutral section assembly (PTFE Type) at SWS.	-do-	02162	-
53.	Arrangement of short neutral section.	-do-	02161 Sh.2	-
54.	Schematic arrangement of unregulated overhead equipment.	-do-	03101	-
55.	Standard termination of OHE (Regulated & un-regulated).	ETI/OHE/G	03121 Pt 1 of 3	E
56.	-do-	-do-	03121 Pt 2 of 3	E
57.	-do-	-do-	03121 Pt 3 of 3	E
58.	General arrangement of Unregulated OHE at turnouts (crossed & overlap type).	-do-	03151	-
59.	General arrangement of unregulated OHE at crossovers and diamond crossings (overlap and crossed type).	-do-	03152 Sh.1	-
60.	General arrangement of unregulated OHE at diamond crossing.	-do-	03152 Sh.2	-
61.	General arrangement of pull off	-do-	03301	A
62.	General arrangement of Head span	-do-	03201	-
63.	In span jumper connection between catenary & contact wire.	-do-	05101	-
64.	Continuity jumper connection at un-insulated overlap turnouts and cross overs	-do-	05102	C
65.	Anti- theft jumper	-do-	05107	A
66.	Connections at turnouts	-do-	05103	B
67.	Potential equalizer connection at insulated overlap and neutral section	-do-	05104	-
68.	Connections at diamond crossing.	-do-	05106	A
69.	General arrangement of connections to OHE by copper cross feeder (150).	-do-	05121 Sh.1	C
70.	General arrangement of connections at switching station on double track section by copper cross feeder	ETI/OHE/G	05122 Sh.1	C
71.	General arrangement of connections at switching station on multiple track section by copper cross feeder	-do-	05123 Sh.1	C

72.	Suspension of 25kV feeder(Spider)on 25KV OHE masts	ETI/OHE/G	05143	B
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1	2	3	4	5
73.	Termination of feeder, return conductor & return feeder(copper & aluminum).	ETI/OHE/G	05145-1	A
74.	Arrangement of suspension of double spider 25 KV feeder and return feeder between sub-station and feeding station	RE/33/G	05152	C
75.	Assembly of section insulators	RE/33/G	05181	C
76.	General arrangement of earth wire on OHE mast	ETI/OHE/G	05201	A
77.	General arrangement of earth wire on OHE mast	ETI/OHE/G	05201-1	-
78.	Arrangement of transverse bonds	ETI/OHE/G	05251	A
79.	Connection of return conductor to track	-do-	05306	F
80.	Suspension arrangement of aluminum return conductor (spider) on traction Structures	-do-	05307	B
81.	Suspension of return conductor (spider) from boom of Structures (with clevis type disc insulators)	-do-	05312	A
82.	Connections between OHE and aluminum return conductor at booster stations	ETI/OHE/G	05413	B
83.	Mounting of 25kv Isolators on OHE Structures (General arrangement)	ETI/OHE/G	05513 Sh.1	A
84.	Details of small part steel work for supporting 25kv Isolator on new T.T.C. boom	-do-	05513 Sh.2	A
85.	Connection from Isolator to OHE	-do-	05516	A
86.	Characteristics of conductors/ bus-bar for 25kv AC traction	-do-	05600	A
87.	Mounting arrangement of Auxiliary Transformer on OHE masts	ETI/OHE/G	05522	-
88.	Employment Schedule for Cantilever Mast regulated OHE without return conductor & without earthwire (WP- 75 kgf/ m <sup>2</sup> .) (Cat. 65/Cu & Cont. 107/Cu)	ETI/C	0702 (Sh.1)	B
89.	Employment Schedule for Cantilever Mast regulated OHE with earth wire but without return conductor (WP- 75 kgf/ m <sup>2</sup> ) (Caty. 65/Cu & Cont. 107/Cu)	-do-	0702 (Sh.2)	B
90.	Employment Schedule for Cantilever Mast regulated OHE with return conductor but without earth wire (WP- 75 kgf/ m <sup>2</sup> ) (Caty. 65/Cu & Cont. 107/Cu)	-do-	0702 (Sh.3)	B
91.	Employment Schedule for Cantilever Mast regulated OHE with return conductor with earth wire (WP- 75 kgf/ m <sup>2</sup> ) (Caty. 65/Cu & Cont. 107/Cu)	-do-	0702 (Sh.4)	B
92.	Employment Schedule for Tramway type regulated OHE RC & EW (WP- 75 kgf/m <sup>2</sup> )	-do-	0704	B
93.	Employment Schedule for 8"x 8"x35 lbs BFB (9.5 M. long)(WP-112.5 kgf/m <sup>2</sup> Caty. 65/Cu & Cont. 107/Cu.	-do-	0708	B
94.	Employment Schedule for OHE mast (9.5m) overlap central location with 3.0 m implantation WP-75 kgf/m <sup>2</sup> Caty. 65/Cu & Cont. 107/Cu.	-do-	0709	A
95.	Employment schedule for OHE mast (9.5M) overlap central with 3.0 M implantation WP-	ETI/C	0710	A

	112.5 kgf/m <sup>2</sup> (Caty 65/cu and Cont.107/Cu)			
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1	2	3	4	5
96	Employment Schedule for OHE mast (9.5m) overlap inter with 3.0 m implantation. WP-75 kgf/ m <sup>2</sup> Caty. 65/Cu & Cont. 107/Cu.	-do-	0711	A
97	Employment schedule for OHE mast (9.5M) overlap inter with 3.0 M implantations. WP-112.5kgf/m <sup>2</sup> Caty.65/Cu and cont.107/Cu	-do-	0712	A
98	Employment Schedule for 9.5 m 200x200x49.9 kg mast WP-75 kgf/m <sup>2</sup> (Caty. 65/Cu & Cont. 107/Cu.)	-do-	0713	B
99.	Employment schedule for 9.5 m long 200x200x49.9 kg mast WP-112.5 Kgf/ m <sup>2</sup> (Caty. 65/Cu and Cont.107/Cu)	-do-	0714	B
100	Employment Schedule for OHE mast (9.5m) WP-75 kgf/ m <sup>2</sup> overlap Anchor location with 3.0 m implantation (Copper OHE)	-do-	0715	A
101	Employment schedule for OHE mast (9.5M) WP 112.5 kgf/ m <sup>2</sup> overlap anchor location with 3.0 M implantations. (Copper OHE)	-do-	0716	A
102	Employment Schedule for pre-stressed span concrete mast (PC 42) - 9.5 M long conventional OHE, normal location (WP-150),112.5 &75kgf/ m <sup>2</sup> )	ETI/C	0725	A
103	STD portals (N,O,P,R,G & Double BFB types)	-do-	0064	-
104	Volume chart and equivalent chart of foundations (Side bearing, Side gravity and W.B.C.)	TI/DRG/CIV/ FND/RDSO	00001/04/0 SH-1	B
105	Volume chart and equivalent chart of foundations (Side bearing, Side gravity and W.B.C.)	TI/CIV/FND/ RDSO	00001/12/0 SH-1	A
106	Volume chart and equivalent chart of foundations (NG type)	TI/DRG/CIV/ FND/RDSO/	00001/04/0 SH-2	B
107	Volume chart and equivalent chart of foundations (NG type)	TI/CIV/FND/ RDSO	00001/12/0 SH-2	A
108	Volume and equivalent chart of foundations for Dry black cotton soil (NBC type) (For 16500 & 11000kgf/ m <sup>2</sup> )	TI/DRG/CIV/ FND/RDSO/	00001/04/0 SH-3	B
109	Volume and equivalent chart of foundations for Dry black cotton soil (NBC type) (For 16500 & 11000kgf/ m <sup>2</sup> )	TI/CIV/FND/ RDSO	00001/12/0 SH-3	A
110	Volume chart and equivalent chart of New pure gravity foundations (500 mm exposed)	TI/DRG/CIV/ FND/RDSO/	00001/04/0 SH-4	B
111	Volume chart and equivalent chart of New pure gravity foundations (500 mm exposed)	TI/CIV/FND/ RDSO	00001/12/0 SH-4	A
112	Volume and equivalent chart of New foundations for Dry black cotton soil only (8000 kg/m <sup>2</sup> )(NBC type) 2.5 M depth	TI/DRG/CIV/ FND/RDSO/	00001/04/0 SH-5	B
113	Volume and equivalent chart of foundations for Dry black cotton soil only (8000 kg/m <sup>2</sup> ) NBC type 2.5 m depth	TI/CIV/FND/ RDSO	00001/12/0 SH-5	A

114	Volume and equivalent chart of foundations (For 8000 kg/m <sup>2</sup> Direct load )	ETI/C	0058 Sh.6	B
115	Special BFB portal for 5 tracks (General arrangement)	-do-	0026 Sh.1	C
116	Protective screen of foot-over bridge and road over-bridge.	-do-	0068	H

1	2	3	4	5
117	Chart for portal foundation	-do-	0005/68	
118	Muff for OHE structures	-do-	0007/68	E
119	Structures muff for sand cored foundations	-do-	0012/69	E
120	9.5 m Standard traction mast (fabricated 'K' series)	-do-	0018-2	D
121	Remote Control Cubicle at Stn, Foundation, RCC slab, Building plant & Steel door	-do-	0067	B
122	9.5 m long standard traction mast (fabricated with bottom plates 'B' series)	ETI/C	0071	E
123 (a)	Details of OHE foundation in soft rock (Bearing capacity 45,000 Kgf/m <sup>2</sup> ).	ETI/C	0059	C
123 (b)	Details of OHE foundation in Hard rock (Bearing capacity 90,000 Kgf/m <sup>2</sup> ).	ETI/C	0060	D
124	Details of foundation for fencing upright	-do-	0032	B
125	Employment schedule for switching and booster station main masts	ETI/C	0185	B
126	Drilling schedule for S-1 mast	ETI/C	0030	F
127	Drilling schedule for S-2 mast	-do-	0031	D
128	Drilling schedule for S-3 mast (length 11. 4 m)	-do-	0180	C
129	Drilling schedule for 8" x 6" x 35 lbs. RSJ mast 8.0 m long for booster transformer station Type S-4	-do-	0036	E
130	Drilling schedule for S-5 mast (11.4m long)	-do-	0042	E
131	Drilling schedule for S-6 mast (length 12.4m)	-do-	0181	C
132	Drilling schedule for S-7 mast (length 12.4m)	-do-	0182	C
133	Drilling schedule for S-8 mast (length 12.4m)	-do-	0183	C
134	Drilling schedule for S-9 mast (length 12.4m)	-do-	0184	C
135	General arrangement & details of fencing panels & gate for switching station	-do-	0186 Sh.1	E
136	Details of fencing uprights and anti-climbing device for switching station	-do-	0186 Sh.2	E
137	S-100 fabricated mast for mounting LT supply transformer and drop out fuse switch at switching station	-do-	0043	B
138	S-101 details of mast for supporting Isolator inside switching station	ETI/C	0044	A
139	Details of anchor beam or SP, SSP, & FP	-do-	0033	D
140	Details of small part steel for switching station	ETI/C	0034 Sh.1	K
141	Details of bracing for switching & B.T. masts	ETI/C	0034 Sh.2	B
142	Details of small parts steel of out rigger for switching stations and booster transformer stations	ETI/C	0037	C
143	Details of small parts steel for booster transformer stations	ETI/C	0040	E
144	Details of pre-cast cable trench for switching station	-do-	0038	E
145	Standard 'R' type portal rod laced general arrangement	-do-	0011/69 Sh.1	C
146	'G' type portal special upright and end piece	-do-	0056	C
147	Short bored pile foundation for traction mast (permissible BM & volume)	-do-	0062	B

148	Chart for portal foundations in dry black cotton soil safe bearing capacity 16500 Kg/ M <sup>2</sup>	-do-	0063	B
149	Dwarf mast foundation on wet & dry black cotton soil	CORE/ALD/OHE/SK/C	02	-
150	Typical design of new pure gravity foundation.	ETI/SK/C	131	A
151	Typical design of side gravity foundation (Soil pressure=8,000 Kg/ M <sup>2</sup> )	-do-	142	A
152	Rock Anchor for B.G. Track. –	ETI/SK/C	208	-
153	Bracket fitting for PSC Mast (cap 4200 Kgm) general arrangement and SPS details	ETI/SK/C	214 Sh.1 of 2	E
154	SPS details for Earth wire clamp on PSC mast	ETI/SK/C	214 Sh. 2 of 2	A
155	Special arrangement of OHE under over line structure	ETI/OHE/SK	529	--
156	Earthing and bonding of PSC mast.	ETI/OHE/SK	537 Sh.1 of 2	D
157	Typical Earthing arrangement in SPUN PSC Mast with 18mm dia rod.	-do-	537 Sh.2 of 2	B
158	Arrangement of overlap	ETI/OHE/SK	566	-
159	Catenary dropper assembly	ETI/OHE/P	1190	B
160	Parallel clamp (20/20)	ETI/OHE/P	1550	E
161	Standard guide tube assembly.	ETI/OHE/P	5060-2	C
161 A	Counter weight assembly for Regulating Equipment (3:1 Ratio)	ETI/OHE/P	5090-5	E
161 B	Trapezoidal weight assembly for Regulating Equipment (3:1 Ratio)	TI/DRG/OHE/ATD/RDSO/	00004/00/2	-
161 C	Trapezoidal weight assembly	ETI/OHE/P/	5090-1	G
161 D	Counter weight assembly	ETI/OHE/P/	5090	F
162	Standard anti-wind clamp	-do-	2550-1/2	L
163	Multiple cantilever cross arm assembly.	RE/33/P	3120	H
164	Anchor fitting assembly on rolled sections	ETI/OHE/P	3230	C
165	Anchor fitting assembly on 'K' series, TCC masts and 'P' type portal upright.	-do-	3240	D
166	Anchor assembly on 'N' and 'O' type portal upright	-do-	3250	D
167	Structure bonds	-do-	7000	F
168	Earthing station	-do-	7020	B
169	Longitudinal rail bond	-do-	7030	F
170	Short super mast assembly	ETI/C/P	8010	G
171	Long super mast assembly	-do-	8020	C
172	Bracket attachment assembly on portal upright (N,O,R,P,G &BFB Type)	-do-	8030	B
173	Super mast assembly on portals	-do-	8050	C
174	Medium super mast assembly	ETI/OHE/P	8060	C
175	Compensating plate	-do-	5191-1/2	D
176	Suspension clamp	RE/33/P	1160	J
177	Double suspension clamp	-do-	1170	K
178	Double suspension lock plate.	-do-	1172	C
179	Catenary splice (65)	ETI/OHE/P	1090	-
180	Typical location & schematic connection diagram for a three interrupter switching station	ETI/PSI	003	C



181	Typical general arrangement of a three interrupter switching station	-do-	004	F
182	Typical location plan & general arrangement for sectioning & paralleling station	-do-	005	F
183	Typical location plan and general arrangement for a feeding station	-do-	006	E
184	Typical general arrangement at a Booster transformer station (with 4 cross feeder) Type III	-do-	013	B
185	General arrangement of 280 KVA Booster Transformer station Type III (with 4 cross feeder)	-do-	018	A
186	Typical general arrangement at a booster transformer station (without cross feeder) Type-I	ETI/PSI	011	C
187	Typical number plate for Auxiliary Transformer	ETI/PSI/P	7525	-
188	Typical fencing and anti-climbing arrangement at switching stations	ETI/PSI	104	E
189	Typical earthing layout of sub-sectioning and paralleling station	-do-	201	B
190	Typical earthing layout of a sectioning and paralleling station	-do-	202	B
191	Typical earthing layout of a feeding station	-do-	203	B
192	Earthing details for interrupter L.T. supply transformer 25 KV Lightning Arrestors P.T. Type-I (S-100 masts, S-101 mast, fencing upright and main mast)	-do-	204	C
193	Typical earthing layout at a booster transformer stations	-do-	211-1	A
194	Typical cable run layout of a sub-sectioning & paralleling station	-do-	301	C
195	Typical cable run layout of a sectioning and paralleling station	-do-	302	C
196	Typical cable run layout of a feeding station	-do-	303	B
197	Typical earthing layout at a booster transformer station (with 4 cross feeder for Type III,IV and V	ETI/PSI	212	B
198	Typical drawing for a terminal board	-do-	501	C
199	36 mm Aluminum Bus terminal for 25kv Isolator (Rigid type)	ETI/PSI/P	6480	C
200	36 mm Aluminum Bus splices	-do-	6490	B
201	36 mm Aluminum Bus Tee connector	-do-	6500	C
202	36 mm Aluminum Bus Tee terminal	-do-	6510	D
203	36/15 mm Top connector	-do-	6520	B
204	36mm Aluminum flexible bus splice	-do-	6550	B
205	36 mm Aluminum bus splice cum tee connector	-do-	6560	B
206	Typical number plate for interrupter and double pole isolator	-do-	7520	B
207	Typical number plate for potential transformer Type	-do-	7521	B
208	Typical number plate for booster transformer	-do-	7522	B
209	Caution plate 25 KV AC	ETI/OHE/P	7531	C
210	General Caution notice at entrance to railway Station (Hindi & English)	RE/33/P	7551	C
211	Typical details of pressed steel door, window and ventilator	RE/Civil/S	129/ 2001	R2
212	Bolted base connection for portals located in drains	ETI/C	0010	C

213	Details of base plate for mast on drains in station yards	-do-	0002/68	A
214	Height gauge for level crossings (for clear span upto 7.3 mtr) details of structure and foundation	TI/DRG/CIV / HGAUGE/R DSO	00001/05/0	--
215	Height gauge for level crossings (for clear span above 7.3 mtr up to 12.2 mtr) details of structure and foundation	TI/DRG/CIV / HGAUGE/R DSO	00002/05/0	--
216	Standard plan details of Height gauge for span 7.3 M to 10.0 M with rail Type	RE/CIVIL/S	146/2008	R3
217	Arrangement for false catenary under over line structure	ETI/OHE/S K	446	--
218	Typical arrangement of OHE with insulated copper catenary under over line structure	ETI/OHE/S K	570	--
218 A	Anti Climbing Arrangement	TI/SK/OHE/ANTIMON/R DSO	00001/08/0	--
218 B	Anti Climbing Arrangement	TI/SK/OHE/ANTIMON/R DSO	00001/09/0	--
218 C	GSSW Assembly	TI/DRG/OH E/GSSW	0002/09/0	--
218 D	18 mm Lug (Forged) (Compression type)	TI/DRG/OH E/GTBLUG/RDSO	00001/04/0	--

**(B) LIST OF STANDARD DRAWINGS FOR TRAMWAY TYPE OHE (REGULATED)**

1	2	3	4	5
219	Span and stagger chart for Tramway type OHE (Regulated)	ETI/OHE/G	04201	-
220	Drilling schedule of OHE mast 8.5m & 9m ling RSJ and BFB for Tramway OHE (Regulated) respectively.	ETI/OHE/G	04202 Sh.1 Sh.2	C C
221	Schematic arrangement of tramway type OHE (regulated).	-do-	04203	C
222	Arrangement of bracket assembly for Tramway Type OHE (regulated)	-do-	04204	B
223	Arrangement of anti-creep for Tramway Type OHE (Regulated)	ETI/OHE/G	04205	B
224	Arrangement of anticreep (alternative arrangement) for Tramway OHE (Regulated)	-do-	04206	B
225	Arrangement of section Insulator for Tramway Type OHE (Regulated)	-do-	04207 Sh.1	B
226	Small parts steel for supporting section insulator assembly for (regulated Tramway Type OHE)	-do-	04207 Sh.2	B
227	General arrangement of turnouts for Tramway type OHE (Regulated)	ETI/OHE/G	04208	-
228	Adjustment chart for Tramway type OHE (Regulated)	ETI/OHE/G	04209	-
229	Bridle wire clamp (6 mm) with two bolts	ETI/OHE/P	1070-1	B
230	Large suspension clamp 20mm (with Armour rod)	ETI/OHE/P	1580 Sh-2	-
231	Hook Bracket	ETI/OHE/P	2380	C
232	BFB Steady arm assembly for Tramway OHE (Regulated)	ETI/OHE/P	2540-1	-
233	Anti wind clamp for tramway OHE	-do-	2550-3	E

	(Regulated)			
234	Counter weight assembly (light)	ETI/OHE/P	5090-3	I
235	Counter weight assembly	-do-	5090-6	D
236	Employment schedule for tramway type regulated OHE without R.C. and E.W. (W.P.112.5 kgf/sq.m)	ETI/C	0705	B
237	Protective screen at FOB/ROBs	ETI/C	0068	H

**(C) STANDARD TYPICAL AND PARTICULAR DRAWINGS FOR TSS AND SHUNT CAPACITOR BANKS.**

1	2	3	4	5
238	Typical layout of Remote Control cubicle at a switching station	ETI/PSI	0010	E
239	Typical layout of 132 /27kv Traction sub-station (Type-I)	TI/DRG/PSI/TS SLO/RDSO/	00001/01	0
240	Typical layout of 132 /27kv Traction sub-station (Type-II)	TI/DRG/PSI/TS SLO/RDSO/	00002/01 /0	-
241	Typical layout of 132 /27kv Traction sub-station (Type-III)	TI/DRG/PSI/TS SLO/RDSO/	00003/02	0
242	Typical layout of 132/27kv Traction Sub-station (Type IV) (with outgoing feeders and metering Facilities)	TI/DRG/PSI/TS SLO/RDSO/	00004/02	0
243	Typical layout of 132/27kv Traction Sub-station (Type V)	TI/DRG/PSI/TS SLO/RDSO/	00005/02	0
244	Typical layout of 132/27kV traction sub-station (Type VI)	TI/DRG/PSI/TS SLO/RDSO/	00006/02	0
245	Typical layout of 132/27kV traction sub-station (Type VII)	TI/DRG/PSI/TS SLO/RDSO/	00007/02	0
246	Typical layout of 132/27kV traction sub-station (Type-VIII)	TI/DRG/PSI/TS SLO/RDSO/	000008/0 2	-
247	Typical layout of 132/27kV traction sub station with single transformer (Type -IX)	TI/DRG/PSI/TS SLO/RDSO/	00009/02	0
248	Typical layout of 132/27kv Traction Sub-station with 132kv Switching Station (Type x)	TI/DRG/PSI/TS SLO/RDSO/	00010/02	0
249	Typical layout of Control Room at traction sub-station.	TI/DRG/PSI/C PROOM/RDSO/	00001/01	0
250	Standard plan of control room at traction sub-station (General arrangement and RCC details)	RE/Civil/	S-144/06	0
251	Typical return current connection to buried rail at 132/25kv Traction sub-station	ETI/PSI	0212-1	Nil
252	Typical general arrangement of earth screen wire termination at Traction substation	ETI/PSI	0225	C
253	Typical termination arrangement for strung bus "Spider" (AAC) conductor at TSS.	ETI/PSI	0226	B
254	General arrangement & terminal connection for 25kV PT Type-II at TSS	ETI/PSI	0227	A
255	General arrangement and terminal connection for 25kV Potential Transformer at TSS (220kV)	ETI/PSI	0227-1	Nil
256	Typical layout of 220/27kV traction sub station (Type -I)	ETI/PSI	0240-1	Nil
257	Typical return current connection to buried rail at 220/25kV TSS.	ETI/PSI	0242	A
258	Typical termination arrangement for strung bus (ZEBRA ACSR) conductor at TSS (220kV)	ETI/PSI	0243	A
259	Typical general arrangement of earth screen wire termination at 220/25kV traction sub-station.	ETI/PSI	0244	Nil
260	Mounting arrangement of 100KVA 25kv/240V LT supply transformer at TSS	ETI/PSI	0312	B
261	25kv D.O. Fuse switch assembly	ETI/PSI	032	D
262	Typical fencing layout at traction Sub-station	ETI/PSI	121	F

	(Details of fencing panel, door, anticlimbing device etc.)			
263	Typical arrangement of an earth electrode	ETI/PSI	222-1	Nil
264	Typical earthing, cable trench & foundation layout of 132/25kv TSS	ETI/PSI	224	E
265	Typical earthing arrangement for equipment/structure at TSS	ETI/PSI	228	A
266	Typical earthing cable trench and foundation layout of 132/25kV traction sub-station with Shunt Capacitor bay	ETI/PSI	229	Nil
267	Typical details of cable run at a two transformer TSS	ETI/PSI	323	E
268	Part Plan for Details of position of feeder Bus coupling interrupter at TSS	ETI/PSI/SK	272	Nil
269	Terminal connector for 220kV equipments (Typical drawing)	ETI/PSI/SK	324	Nil
270	Typical schematic diagram of protection for double Transformer traction sub station	ETI/PSI	024-1	Nil
271	Typical layout for 25kv Shunt capacitor with series reactor to be installed at 132/25kv TSS	ETI/PSI	0223	E
272	High speed auto reclosing scheme for feeder circuit breaker at 25kV A.C TSS	ETI/PSI	0231-1	A
273	Typical details of cable run at a two transformer TSS with Shunt Capacitor	ETI/PSI	325	Nil
274	Typical details of cable run at two transformers Traction Sub-station with Shunt capacitor (220kV)	ETI/PSI	326	Nil
275	General Scheme of supply for 25kV, 50 Hz single phase traction system	ETI/PSI	702-1	D
276	Standard Post Insulator for clean area (Creepage path 850mm min)	ETI/OHE/P	6090-1	C
277	Typical number plate for circuit breaker	ETI/PSI/P	7523	Nil
278	Typical number plate for Auxiliary Transformer	ETI/PSI/P	7525	Nil
279	Typical number plate for Power transformer at TSS	ETI/PSI/P	7526	Nil
280	Typical number plate for PT at TSS	ETI/PSI/P	7527	A
281	Typical number plate for CT at TSS	ETI/PSI/P	7528	A
282	Typical number plate for Isolators at TSS	ETI/PSI/P	7529	A
283	Bimetallic terminal connector to suit 'ZEBRA' ACSR conductor and 30 dia Cu stud of CT/CB/traction power transformer.	ETI/PSI/P	11010	C
284	220kV system bimetallic terminal connector to suit 'ZEBRA' (28.58 Dia ) ACSR conductor & Al./Cu. pad of Isolator /CT/CB.	ETI/PSI/P	11030	C
285	220kV system tee connector to suit 'ZEBRA' (28.58 dia) ACSR conductor on both ways.	ETI/PSI/P	11040	C
286	220kV system rigid connector on SI to suit ZEBRA (28.58 dia) ACSR conductor	ETI/PSI/P	11050	C
287	Details of expansion type terminal connector to suit 50 dia Al. tubular busbar to terminal pad of 25kv CT/ Isolator/ CB and Interrupter	ETI/PSI/P	11060 Sh.2 of 2	E
288	Detail of rigid type bimetallic terminal connector suitable for 50 dia Al. tubular busbar to 30 dia Cu. Stud of 25kV CT.	ETI/PSI/P	11070	B
289	Rigid bimetallic terminal connector suitable for 50 dia Al. tubular busbar to terminal pad of 25kv Isolator/ CT	ETI/PSI/P	11090	C
290	Rigid through connector to suit 50 dia Al. Tubular bus bar and 'SPIDER' AAC conductor for 25kv PT Type-II	ETI/PSI/P	11110	C
291	Details of Rigid terminal connector suitable for	ETI/PSI/P	11120	C

	20 dia Al. Conductor to terminal pad of 25kv PT Type I & II			
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1	2	3	4	5
292	25kv system tee connector to suit 50 O/D Al. Tube and 'SPIDER' 'AAC' conductor	ETI/PSI/P	11140	B
293	25 K.V system Tee connector to suit 50. O/D AL. tubular busbar to 50. O/D AL. tubular busbar	ETI/PSI/P	11150	B
294	25Kv System Rigid bus splice connector to suit 50 O/D Al. tube on both ways	ETI/PSI/P	11180	B
295	25 kV System Sliding clamp for 50mm O/D Aluminum Bus bar	ETI/PSI/P	11190	C
296	25Kv System Rigid connector on S.I to suit 50 mm O/D Al. Bus bar	ETI/PSI/P	11200	C
297	25kv system expansion bus coupler on SI to suit 50 O/D Al. tube.	ETI/PSI/P	11210	D
298	Typical fencing , door and anticlimbing device details of traction sub-station	CORE/ALD/PSI	01	D
299	Structural layout of 132/25 KV traction sub-stations	ETI/C	0200, SH.No.-1	H
300	Structural layouts of 132/25kv traction sub-stations	ETI/C	0200, SH.No.-2	D
301	Details of Beam B/1 for 132/25 KV TSS	ETI/C	0201	D
302	Details of Tower T 1 for 132/25 KV TSS	ETI/C	0202	H
303	Details of Tower T 2 for 132/25 KV TSS	ETI/C	0203	G
304	Details of beam B/2 and column C/1 for 132/25kv traction sub-station.	ETI/C	0208	E
305	Typical cable trench and foundation lay out of 132/25kv TSS	ETI/C	0210	F
306	Details of baffle wall at TSS(WP-112.5kg/sq.m) and WP (75kg/sq.m)	ETI/C	0213	D
307	Details of RCC baffle Wall at TSS(WP-150kg/sq.m)	ETI/C	0214	B
308	Transformer oil drainage arrangement at sub-stations	ETI/C	0216	B
309	Line Diagram of Structural layouts of 220/25kv Traction sub-station	ETI/C	0222	Nil
310	Structural layout of 220/27kv traction sub-station (Type-I)	ETI/C	0222-1	Nil
311	Control Room for Traction substation	ETI/C	0225 Sheet-1	Nil
312	Control Room for Traction Sub-station(RCC details)	ETI/C	0225 Sheet-2	Nil
313	Details of structure for 132kv double pole Isolator	ETI/C	0310	G
314	Details of structure for 132kv support insulators	ETI/C	0320	E
315	Details of structure for 132kv Current transformer	ETI/C	0330	F
316	Details of structure for 120kv Lightning Arrestor	ETI/C	0340	F
317	Details of structure for 25kv Current transformer	ETI/C	0360	F
318	Details of structure for 42kv ,10KA LA & 25kv	ETI/C	0370	J

	support insulator		Sheet-1	
319	Black Weight of Structure for 42kv,10KA LA & 25kv support insulator.	ETI/C	0370 Sheet-2	Nil
320	Details of structure for 25kv Single Pole isolator	ETI/C	0380	F

1	2	3	4	5
321	Details of structure for 25kv Potential transformer	ETI/C	0390	E
322	S-100 Fabricated Mast for mounting LT supply transformer and DO fuse switch at switching station	ETI/C	0043	B
323	Details of structure and foundation for 25kV DP Isolator at TSS	ETI/SK/C	0180	C
324	Gillsans Letters and Figures	RE/33	527	A
325	Typical schematic diagram of protection for single transformer traction sub-station	ETI/PSI	0228-1	Nil
326	25 kV drop out fuse switch details	ETI/PSI	038	C
327	Operating pole for 25kV drop out fuse switch	ETI/PSI	039	B
328	Typical schematic diagram for TSS, FP, SSP and SP with 21.6 MVA or 30 MVA transformer for three lines.	TI/DRG/PSI/3L-TSS/RDSO	00001/07	1
329	Scheme of locking /Interlocking arrangement of 132 kV Isolator at Traction Sub-Station.	ETI/PSI	5212	B
330	Typical return current connection to buried rail at 132 kV/25 kV Traction Sub-Station.	ETI/PSI	0212-1	Nil
331	Typical arrangement of an earth electrode.	ETI/PSI	222-1	Nil
332	Flexible connector for 25 kV circuit breaker 25kV Interrupter & 25 kV side of 13.5/20 MVA traction transformer.	ETI/PSI/P	6570	F
333	Scheme of Interlocking arrangement for 25kV circuit breakers at Traction Sub-Station	ETI/PSI	5214	B
334	Expansion type terminal connector for 25 kV, 60mm dia terminal for traction power transformer.	ETI/PSI/P	11220	D

**(D) STANDARD TYPICAL AND PARTICULAR DRAWINGS FOR SCADA WORKS**

The annexure contains reference to standard, typical and particular drawings & specification referred to in various paragraph of tender specification (Pt.II) and particular specification.

1	2	3	4	5
335	General scheme of supply for 25 kV 50 Hz Single Phase AC	ETI/PSI	702-1	D
336	Typical layout of control room at TSS	TI/DRG/PSI/CPRO OM/RDSO	00001/01	0
337	Typical layout of remote control cubicle at switching stations.	ETI/PSI	0010	E
338	Schematic inter connection diagram for remote control of power gear & supervision equipments at TSS.	ETI/PSI	644	C
339	Schematic inter connection diagram for remote control of power gear and supervision equipments at controlled station (SP & SSP)	ETI/PSI	645	C
340	High speed Auto reclosing Scheme for feeder Circuit Breaker at 25 kV A.C. Traction Sub-station.	ETI/PSI	0231-I	A
341	Control desk arrangement for 2 work stations of SCADA system.	ETI/PSI/SK	337	Nil
342	Setting up earthing station at switching posts (SSP & SP) with conventional earthing as per Special Maintenance No. TI/SMI/0032 Rev-1	-	-	-

**(E) (a)LIST OF STANDARD DRAWING FOR HIGH RISE OHE**

S.N.	Brief Description	Drawing		Mod No.
		Series	Number	
343	Design handout for Overhead equipment for running double stack containers under electrified routes (High Rise OHE) with speed potential of 140 Km/h based on revised wind zone.	TI/DESIGNS/OHE /2013/00001 (July'13)	-	-
344	Terms of reference for consultancy contract for high speed OHE and high rise OHE.	RDSO Letter No. TI/Traction policy/2013 dated 25.04.2013	-	-
345	OHE span in view of changes in wind zones in country.	RDSO Letter No. TI/OHE/GA/2013 dated 25/30.04.2013	-	-
346	SPECIAL BFB PORTAL FOR 5 TRACKS (GENERAL ARRANGEMENT)	TI/DRG/CIV/BFB-POTAL	00001/13 /0	Sh No. 1
347	SPECIAL BFB PORTAL DETAILS OF UPRIGHT	TI/DRG/CIV/BFB-PORTAL	00001/13 /0	Sh No. 2
348	G-TYPE PORTAL DETAILS SPECIAL UPRIGHT AND END PIECE	TI/DRG/CIV/G-PORTAL	00001/13 /0	-
349	HIGH RISE OHE Employment Schedule Mast (11.4 m) (Wind Pressure 178 kgf/m <sup>2</sup> ) (Basic Wind Speed 50 m/s) (Without Return Conductor and Without Earth Wire)	TI/DRG/CIV/ES/	00001/13 /0	SHEET-1
350	HIGH RISE OHE Employment Schedule Mast (11.4 m) (Wind Pressure 155 kgf/m <sup>2</sup> ) (Basic Wind Speed 47 m/s) (Without Return Conductor and Without Earth Wire)	TI/DRG/CIV/ES/	00001/13 /0	SHEET-2
351	HIGH RISE OHE Employment Schedule Mast (11.4 m) (Wind Pressure 136 kgf/m <sup>2</sup> ) (Basic Wind Speed 44 m/s) (Without Return Conductor and Without Earth Wire)	TI/DRG/CIV/ES/	00001/13 /0	SHEET-3
352	HIGH RISE OHE Employment Schedule Mast (11.4 m) (Wind Pressure 105 kgf/m <sup>2</sup> ) (Basic Wind Speed 39 m/s) (Without Return Conductor and Without Earth Wire)	TI/DRG/CIV/ES/	00001/13 /0	SHEET-4
353	HIGH RISE OHE Employment Schedule Mast (11.4 m) (Wind Pressure 73 kgf/m <sup>2</sup> ) (Basic Wind Speed 33 m/s) (Without Return Conductor and Without Earth Wire)	TI/DRG/CIV/ES/	00001/13 /0	SHEET-5
354	TWO TRACK CANTILEVER STRUCTURE (TTC) GENERAL ARRANGEMENT	TI/DRG/CIV/TTC/	00001/13 /0	SHEET-1
355	TWO TRACK CANTILEVER STRUCTURE (TTC) DETAILS OF UPRIGHT	TI/DRG/CIV/TTC/	00001/13 /0	SHEET-2
356	11.4 M Long Standard Traction Mast "B" Series (B-150, B-175, B-200, B-225 & B-250 type Fabricated with Batten Plates)	TI/DRG/CIV/B-Mast/	00001/13 /0	-
357	Volume Charts & Equivalent Charts of Foundations (Side Bearing, Side Gravity & WBC)	TI/DRG/CIV/FND /	00001/13 /0	Sheet- 1
358	Volume Charts & Equivalent Charts of Foundations (NG Type)	TI/DRG/CIV/FND /	00001/13 /0	Sheet- 2



360	Volume Charts & Equivalent Charts of New Pure Gravity Foundations (500 mm exposed)	TI/DRG/CIV/FND /	00001/13 /0	Sheet- 4
361	Volume Charts & Equivalent Charts of Foundations for Dry Black Cotton Soil (NBC Type, 2.5 metre Depth)	TI/DRG/CIV/FND /	00001/13 /0	Sheet- 5
362	Employment Schedule OHE Mast (11.4 metre) Wind Pressure 155 kgf/m <sup>2</sup>	TI/DRG/CIV/ES/	00001/13 /0	Sheet- 1
363	Employment Schedule OHE Mast (11.4 metre) Wind Pressure 136 kgf/m <sup>2</sup>	TI/DRG/CIV/ES/	00001/13 /0	Sheet- 2
364	Employment Schedule OHE Mast (11.4 metre) Wind Pressure 105 kgf/m <sup>2</sup>	TI/DRG/CIV/ES/	00001/13 /0	Sheet- 3
365	Schedule Anchor Blocks for BG Tracks	TI/DRG/OHE/GU YHR/	00001/13 /0	Sheet- 1
366	Double Guy Rod Arrangement with Anchor Block for BG Tracks	TI/DRG/OHE/GU YHR/	00001/13 /0	Sheet- 2
367	Schedule Anchor Blocks for BG Track Black Cotton Soil	TI/DRG/OHE/GU YHR/	00001/13 /0	Sheet- 3
368	Guy Rod Ø 25 mm	TI/DRG/OHE/GU YHR/	00001/13 /0	Sheet- 4
368 A	Dropper Schedule Encumbrance 1.4m/1.4m (For 25 kV AC Regulated OHE) (65 and 107 SQ. MM)	TI/DRG/OHE/DR OP/	00001/10 /1	Rev-1
368 B	Dropper Schedule Encumbrance 1.4m/0.9m (For 25 kV AC Regulated OHE) (65 and 107 SQ. MM)	TI/DRG/OHE/DR OP/	00002/10 /1	Rev-1
368 C	Dropper Schedule Encumbrance 1.4m/0.75m (For 25 kV AC Regulated OHE) (65 and 107 SQ. MM)	TI/DRG/OHE/DR OP/	00003/10 /1	Rev-1
368 D	Arrangement of mounting of 25kV/240V, 50kVA LT Supply Transformer for High Rise OHE (On separate mast)	ETI/OHE/HR/AT/ G/	05522 Sheet-2	-
368 E	Mounting Arrangement of Auxiliary Transformer on High Rise OHE mast	ETI/OHE/HR/AT/ G/	05522 Sheet-1	-
368 F	Anchor Arrangement with Dwarf Mast for conventional and High Rise OHE	ETI/OHE/HR/ G/	01402	-
368 G	Standard Arrangement of Drop Arm for supporting Cantilevers on the Booms of Portals and TTC (For Normal as well as High Rise OHE)	ETI/C/HR/	0076	-
368 H	Drilling schedule for S-6H mast (length 13.0 m) (for High Rise OHE)	ETI/C/HR/	0181	-
368 J	Drilling schedule for S-7H mast (length 13.0 m) (for High Rise OHE)	ETI/C/HR/	0182	-
368 K	Drilling schedule for S-8H mast (length 13.0 m) (for High Rise OHE)	ETI/C/HR/	0183	-
368 L	'P' Type Portal General Arrangement and details of upright & End Pieces (High Rise OHE)	TI/DRG/CIV/P- Portal/	00001/13 /0	-

**(E) (b) LIST OF STANDARD DRAWING AS PER NEW WIND ZONES**

369	Normal OHE Employment Schedule Mast (9.5 m) (Wind Pressure 178 kgf/m <sup>2</sup> ) (Basic Wind Speed 50 m/s) (Without Return Conductor and Without Earth Wire)	ETI/C/	0758 Sheet-1	A
370	Normal OHE Employment Schedule Mast (9.5 m) (Wind Pressure 155 kgf/m <sup>2</sup> ) (Basic Wind Speed 47 m/s) (Without Return Conductor and Without Earth Wire)	ETI/C/	0758 Sheet-2	A

371	Normal OHE Employment Schedule Mast (9.5 m) (Wind Pressure 136 kgf/m <sup>2</sup> ) (Basic Wind Speed 44 m/s) (Without Return Conductor and Without Earth Wire)	ETI/C/	0758 Sheet-3	A
372	Normal OHE Employment Schedule Mast (9.5 m) (Wind Pressure 105 kgf/m <sup>2</sup> ) (Basic Wind Speed 39 m/s) (Without Return Conductor and Without Earth Wire)	ETI/C/	0758 Sheet-4	B
373	Normal OHE Employment Schedule Mast (9.5 m) (Wind Pressure 73 kgf/m <sup>2</sup> ) (Basic Wind Speed 33 m/s) (Without Return Conductor and Without Earth Wire)	ETI/C/	0758 Sheet-5	A

Note: New wind pressures/speeds as per RDSO letter No TI/CIV/MS/14 dated 14.07.2014 & IS: 875 Part-III, 1987, Reaffirmed during 1997 are:

Sl No.	Design Wind Pressure (Kg/m <sup>2</sup> )	Basic Wind Speed	
		metre / second	Km / hour
i	178	50	180.0
ii	155	47	169.2
iii	136	44	158.4
iv	105	39	140.4
v	73	33	118.8

**(F) LIST OF STANDARD RDSO's SPECIFICATIONS FOR OHE, TSS AND SCADA**

Sl.NO.	TITLE OF SPECIFICATION	SPECIFICATION NO
1	2	3
1.	Annealed stranded copper conductor for jumper wire.	ETI/OHE/3(2/94) with A&C slip No.1 of (4/95)
2.	Copper busbar	RE/30/OHE/5 (11/60)
3.	Structural Steel tubes.	ETI/OHE/11 (5/89)
4.	Hot dip zinc galvanisation of steel masts (Rolled and Fabricated) tube and fittings used on 25 KV AC OHE.	ETI/OHE/13(4/84) with A&C slip No. 1 of (5/86), 2 of (4/90) & 3 of (4/90)
5.	Stainless steel wire ropes	TI/SPC/OHE/WR/1060 with A&C slip No 1 of (11/06) & 2 of (05/07)
6.	Solid core porcelain insulators for 25 KV 50 Hz single phase over head lines	TI/SPC/OHE/INS/0070 (04/2007)
7.	25 KV single and double pole isolators.	ETI/OHE/16(1/94) with A&C slip No.1 of (06/2000) & 2 of (3/2004)
8.	Steel fasteners & Stainless Steel fasteners	TI/SPC/OHE/Fasteners/0120
9.	Aluminum alloy section and tubes	ETI/OHE/21(9/74)
10.	Standard for drawings for Traction Overhead equipment	ETI/OHE/25(3/66)
11.	Light Weight Section Insulators assembly. OR Section Insulator assembly without sectioning insulator.	TI/SPC/OHE/LWTSI/0060 (8/2006) OR ETI/OHE/27(8/84) with A&C slip No.1 of (10/92)
12.	Enameled steel plates	ETI/OHE/33(8/85)
	Retro-reflective Structure Number Plates & Caution/Warning Boards	ETI/OHE/33A(12/97) Rev-8 (11/12)
13.	Galvanised steel wire	ETI/OHE/36(12/73) with A&C Slip No.1 of (5/98)
14.	3 pulley Type Regulating Equipment	TI/SPC/OHE/ATD/0060 (8/2006) with A&C Slip No1 of (10/2006), 2 of (5/2007) & 3 of (01/13)
15.	Fitting for 25 kV 50 Hz AC Overhead equipment.	TI/SPC/OHE/Fitting/0130(10/13) {Old ETI/OHE/49 (9/95) with A&C}

16.	Cadmium copper conductor for overhead Railway Traction	ETI/OHE/50 (6/97) with A&C slip No.1 to 3 (04/09).
17.	Principles of OHE layout plans and sectioning diagrams for 25 KV AC traction.	ETI/OHE/53(6/88) with A&C slip no.1 of (12/88), 2 of (8/89), 3 of (6/90), 4 of (8/92) & 5 of (11/2006)
18.	19/2.79mm All Aluminum alloy stranded catenary wire.	ETI/OHE/54(2/85) with A&C slip No. 1 of (11/89) & 2 of (10/92)
19.	Bimetallic (Al-cu) strip	ETI/OHE/55(4/90)
20.	Short Neutral Section Assembly (Phase Break)	TI/SPC/OHE/SNS/0000 of (2/2000) with A&C slip No. 1
21.	Code for bonding and earthing for 25 KV, AC single phase, 50 Hz traction system.	ETI/OHE/71(11/90) with A&C slip no. 1 of (8/91) & 2 of (3/93)
22.	Insulated Cadmium copper catenary 19/2.10 mm dia for provision under overline structures in the 25 KV AC Electric Traction.	TI/SPC/OHE/INSCAT/0000 of (4/2000)
23.	Battery charger for 110 V battery, 40 AH.	ETI/PSI/1(6/81)
24.	Lightning arrestor- 7.5 KV	ETI/PSI/3(8/75) with A&C slip No.1 of (2/91)
25.	220 KV or 132 KV or 110 KV or 66 KV or 25 kV Potential transformers	TI/SPC/PSI/PTs/0990 with A&C slip No.1 to 5 (01/09)
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 of (4/87)
27.	25 kV/240 V, 5 kVA,10 kVA, 25 kVA & 50 kVA, 50 Hz single phase oil filled Auxiliary Transformers.	ETI/PSI/15(8/03)
28.	Low maintenance Lead Acid 40AH & 200 AH cells.	RDSO/PE/SPEC/TL/0040-2003(Rev-0) with A&C slip no 1 of (9/2005)
29.	150 KVA, 25 KV, single phase, 50 Hz. Dry type Cast resin Booster Transformers	ETI/PSI/97(6/87) with A&C slip No.1 of (9/88)
30.	100 KVA & 150 KVA, 25 KV, single phase, 50 Hz, oil filled Booster Transformers	ETI/PSI/98(8/92) with A&C slip No.1 of (9/92), 2 of (1/94) & 3 of (6/94)
31(a)	25 KV AC Single Pole, Double Pole mounted, Out Door Vacuum Circuit Breaker (VCB) and Vacuum Interrupter (BM).	TI/SPC/PSI/LVCBIN/0120 (December'2013) Revision-0)
31(b)	220 kV/132 kV/110 kV/100 kV/66 kV Double Pole, Triple Pole, Out Door SF6 Circuit Breakers.	TI/SPC/PSI/HVCB/0120 (June'2014) with A&C slip No.1(March-16)
32	Hard drawn grooved copper Contact wire	ETI/OHE/76(6/97) with A&C slip No.1 of (4/01), 3 of (03/05) , 4 of (12/06), 5 of (7/09), 6 of (5/12) & 7 of (12/13)
33	Metal Oxide Gapless type Lightning Arrestor for use on 25kV side of Rly. traction sub stations & switching stations	TI/SPC/PSI/MOGTLA/0100(07/10)
34	Technical Specification for Silicon Composite Insulators for 25 kV A.C. 50 Hz single phase over head traction lines.	TI/SPC/OHE/INSCOM/1070 (01/07) OR TI/SPC/OHE/INSCOM/1071 (04/13)
35	Specification for solid core porcelain cylindrical post insulator for systems with nominal voltage of 66kV, 110kV, 132kV & 220kV.	TI/SPC/OHE/POST/0100(01/2010)
36	25kv/240V L.T. supply Transformer, 100 KVA	ETI/PSI/15 A (7/82) with A&C Slip No.1(9/89)
37	Battery charger for 110V Battery, 200	ETI/PSI/24(6/81)

	AH	
38	Low tension Distribution panels for Rly. A.C traction sub-stations	ETI/PSI/29 (12/79)With A&C Slip No.1 ( 2/93)
39	Standard for drawings for power supply Installations.	ETI/PSI/31 (5/76)
40	Low tension distribution panels.	ETI/PSI/63(7/82)
41	Technical specification for control and relay panel for 25kV ac TSS including specification for numerical type protection relays for traction transformer, 25kV shunt capacitor bank and transmission line for 25kV ac TSS on Indian Railways.	TI/SPC/PSI/PROTCT/6071
42	Technical specification for shunt capacitor & series reactor equipment for traction sub-station	TI/SPC/PSI/FC&SR/0100(01/10)
43	Technical specification for 25kV ac, 50 Hz, single phase, oil filled, current transformer with CT ratio of I-1000-500/5A (for general purpose), II-1500-750/5A (for heavy haul duties) for Railway ac traction sub station.	ETI/PSI/90 (6/95) with A&C Slip No.1, 2,3,4,5,6,7 (08/2007) & 8 (April 2009).

44	Technical specification for two zone static relay for distance protection for 25kV ac single phase 50 Hz traction overhead equipment.	ETI/PSI/101 (8/87) with A&C Slip No.1 (09/87)
45	Technical specification for current transformers. I. 220kV. 200-100/5A, II. 132kV. 400-200/5A, III. 110kV. 400-200/5A, IV. 66kV. 800-400/5A for Railway A.C traction substations.	ETI/PSI/117 (7/88) with A&C Slip No.1 (11/88), 2 (3/89), 3 (12/89), 4 (4/90), 5 (6/90), 6 (9/92), 7 (8/05), 8 (08/2007) & 9 (July 2008).
46	Specification for 21.6 MVA single phase, 50 Hz. i) 220/27kV ii) 132/27kV iii) 110/27kV, iv), 66/27kV traction power transformer for Railway A.C traction sub-station.	ETI/PSI/118 (10/93) with A&C Slip No.1 to 9 & A&C slip No.10 (08/12) or latest
47	Code of practice for earthing of power supply installations for 25kV A.C., 50 Hz, single phase traction system.	ETI/PSI/120 (2/91) with A&C Slip No1 (10/93)
48	Technical specification for i) 245 kV, (ii) 145 kV, (iii) 123 kV, (iv) 72.5 kV double pole & triple pole Isolator for Railway traction sub stations.	ETI/PSI/122 (3/89) with A&C Slip No.1(4/90)
49	Specification for Metal Oxide gapless type lightning arrestors (combined) for use on 220/132/110/66 kV side of Railway A.C. traction sub station.	ETI/PSI/137 (8/89) with A&C Slip No.1,2,3 (Embodying) A&C slip No. 4(8/94) 5(04/01), 6 (9/05) & 7(07/2007)
50	Technical specification for 220 kV or 132 kV or 110 kV or 66kV or 25 kV potential transformer.	TI/SPC/PSI/PTs/0990 with A&C Slip No.1,2,3,4,& 5 (April 09)
51	Delta I type High resistive fault selective Relay for 25 kV AC Single phase 50 Hz traction system.	TI/SPC/PSI/PROTCT/1982(12/2003) with A&C slip No.1(10/13)
52	Panto flashover protection relay for 25 kV A.C. single phase 50 Hz traction system.	TI/SPC/PSI/PROTCT/2983 (09/2001)
53	Technical Specification of SCADA system for 25kV, AC Single phase Traction supply on Indian Railway.	TI/SPC/RCC/SCADA/0130(04/2014)
54	Technical Specification for Galvanised Steel Stranded Wire for Traction Masts	TI/SPC/OHE/GSSW/0090 (10/2009)

55	Technical specification for galvanized steel stranded wire for traction bonds	TI/SPC/OHE/GALSTB/0040(09/04) Rev. 1 (08/05)
56	Setting up Earthing Station at switching posts (SSP & SP) with conventional Earthing.	Special Maintenance Instruction No. TI/SMI/0032 Rev-1
57	Design handout for Overhead equipment for running double stack containers under electrified routes (High Rise OHE) with speed potential of 140 Kmph based on revised wind zone.	TI/DESIGN/OHE/2013/00001 (July'13)
58	OHE span in view of changes in wind zones in country	TI/OHE/GA/2013 DATED 25/30.04.2013
59	Technical guidelines and Standard Instruction for Railway Electrification Works including OHE,TSS, Transmission Line, SCADA , Electrical General Works, signaling Works, Telecom works & Civil Engineering Works.	CORE/RE TENDER/EPC/2014/STANDARD INSTRUCTIONS AND GUIDELINES

**(G) LIST OF IS SPECIFICATION**

S No.	IS Code No.	Descriptions
1	IS:210-1993	Grey iron castings
2	IS:269-1989	Specification for 33 grade ordinary Portland cement (4 <sup>th</sup> Rev)
3	IS:282-1982	Dropper Wire
4	IS:306-1983	Tin bronze castings
5	IS:335-1993	New Insulating oil (4 <sup>th</sup> Rev) Reaffirmed 2000
6	IS:371-1999	Ceiling rose spec.( 3 <sup>rd</sup> Rev)
7	IS: 383-1970	Specification for coarse & fine aggregates from natural sources for concrete
8	IS:398(Pt.I)-1996	All Aluminum conductor
9	IS:398 Pt.II-1996	Al. conductor for overhead transmission purposes
10	IS:398(Part-III) 1976.	Aluminum conductors 149galvanized steel reinforced
11	IS: 432 Pt.1-1982	Specification for mild steel & medium tensile steel bars and hard drawn steel wires for concrete reinforcement
12	IS: 456-2000	Plain & Reinforced concrete Code of practice (3 <sup>rd</sup> Rev)
13	IS: 516-1959	Method of tests for strength of concrete
14	IS:617-1994	Aluminum castings
15	IS:694:1990	Al. Jumper wire
16	IS:702-1988	Specification for industrial bitumen (2 <sup>nd</sup> Rev) reaffirmed 1999
17	IS:731-1971	Porcelain Insulator for overhead power lines with a nominal voltage greater than 1000V
18	IS:732-1989	Code of practice for electrical wiring installation (3 <sup>rd</sup> Rev)
19	IS:800-1984	Code of practice for general construction in steel (2 <sup>nd</sup> Rev)
20	IS:808-1989	Dimensions for hot rolled steel beam, column, channel & angle sections
21	IS:816-1969	Welding
22	IS:875 (Part-3) 1987 (Reaffirmed)	Code of practice for design loads (other than earthquakes) for building and structures – Part 3: Wind loads second revision.
23	IS:1293-2005	Plugs & socket outlets of rated voltage upto and including 250V and rated current up to 16 Amp(3 <sup>rd</sup> Rev)
24	IS:1387-1993	General requirements for the supply of metals and metal products
25	IS: 1489 Pt. I 1991	Specification for Portland-Pozzalana cement Pt .I Fly ash based (3 <sup>rd</sup> Rev)
26	IS:1554(Part-I) 1988	PVC insulated cables
27	IS:1608-1995	Mechanical testing of metal- tensile testing
28	IS:1731-1971	Dimensions for steel flats for structural & general engineering purpose
29	IS:1777-1978	Industrial Luminaries with metal reflectors (1 <sup>st</sup> Rev)

30	IS:1786-1985	Specification for high strength deformed steel bars and wires for concrete reinforcement
31	IS:1897-1983	Copper strip for formed fittings
32	IS:2004-1991	Carbon steel forgings for general engineering purpose
33	IS:2062-2011	Steel for general structural purpose
34	IS: 2074-1992	Ready mix Paint, air drying, Red oxide, Zinc chrome
35	IS:2121-1981	Aluminum and steel cored Aluminum conductors for (Part I & II) overhead power lines.
36	IS:2141-2000	Galvanised stay strand
37	IS:2312-1967	Propeller type AC ventilating fans (1 <sup>st</sup> Rev)
38	IS: 2386 Pt.III-1963	Method of tests for aggregates for concrete Pt. III Specific gravity, density voids, absorption & buckling
39	IS:2673-2002	Dimensions for Aluminum Tubular Busbar.
40	IS:2675-1983	Enclosed distribution fuse boards ad cut-outs for voltage not exceeding 1000V AC & 1200V DC (2 <sup>nd</sup> Rev)
41	IS:3043-1987	Code of practice for earthing (1 <sup>st</sup> Rev)
42	IS:3091-1999	Aluminum bronze castings

<b>S No.</b>	<b>IS Code No.</b>	<b>Descriptions</b>
43	IS:3188-1980	Characteristics of string insulator units
44	IS:3837-1976	Accessories for Rigid steel conduit for electrical wiring
45	IS:3854-1997	Switches for domestic & similar purposes(2 <sup>nd</sup> Rev)
46	IS:4826-1979	Specification for hot dipped for galvaished coatings on round steel wires (1 <sup>st</sup> Rev)
47	IS:5082-1998	Material for Aluminum tubular busbar.
48	IS: 6403-1981	Code of practice for determination bearing capacity of shallow foundations (1 <sup>st</sup> Rev)
49	IS:7098 (Part I) 1988	LT XLPE cables
50	IS:7098 (Part II) 1985	HT XLPE cables
51	IS: 8130-1984	Conductor for Insulated electric cables & flexible cords (1 <sup>st</sup> Rev)
52	IS:9537 Pt-I-1980	Conduits for electrical installations
53	IS:9968(Pt.2)-2002	Annealed Copper Jumper Wire
54	IS:13947 Pt. III 1993	Specification for low voltage switchgear & control gear Pt.-3, disconnectors & fuse combination unit
55	IS:14329-1995	Malleable iron castings

**SCHEDULE OF QUANTITY****(As per IREPS Website)**

**ANNEXURE-3****REQUIREMENT OF SPARES****‘ NIL’**

□□□□□

**ANNEXURE - 4**

LIST OF ITEMS TO BE SUPPLIED BY PURCHASER TO THE CONTRACTOR EQUIPMENTS, FITTINGS AND FINISHED MATERIAL.

**FOR OHE & TSS WORKS**

<b>Sl. No.</b>	<b>Description</b>	<b>Rly. Id. No.</b>	<b>Qty.</b>	<b>Remarks</b>
1.				-

**NOTES:-**

1. The prices against various items of Schedule shall be exclusive of the cost of supply of the above.
2. All the fasteners whether stainless steel or otherwise required for fittings and components shall be supplied by the contractor.
3. Any long lead items/Equipments if unjustified on any reason can be supplied by Railways under Annexure-4.

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**ANNEXURE-5A****LIST OF TOOLS AND PLANTS FOR MAINTENANCE  
FOR OHE****-DELETED-****Annexure-5B****TECHNICAL DATA FOR EQUIPMENTS, COMPONENTS & MATERIALS TO BE SUPPLIED BY  
THE TENDERER FOR TSS**

DELETED

**ANNEXURE-5C****LIST OF TOOLS AND PLANTS REQUIRED FOR MAINTENANCE  
FOR SCADA****-DELETED-**

**ANNEXURE-6****TENDERER'S CREDENTIALS (BID CAPACITY)****Northern RAILWAY**

For tenders having advertised value more than Rs 20 crore wherein eligibility criteria includes bid capacity also, the tenderer will be qualified only if its available bid capacity is equal to or more than the total bid value of the present tender. The available bid capacity shall be calculated as under:

$$\text{Available Bid Capacity} = [A \times N \times 2] - 0.33 \times N \times B$$

Where,

A = Maximum value of construction works executed and payment received in any one of the previous three financial years or the current financial year (up to date of inviting tender), taking into account the completed as well as works in progress.

N= Number of years prescribed for completion of work for which bids has been invited.

B = Existing commitments and balance amount of ongoing works with tenderer as per the prescribed proforma of Railway for statement of all works in progress and also the works which are awarded to tenderer but yet not started upto the date of inviting of tender.

Note:

- (a) The Tenderer(s) shall furnish the details of -
  - (i) Maximum value of construction works executed and payment received in any one of the previous three financial years or the current financial year (up to date of inviting tender) for calculating A, and
  - (ii) Existing commitments and balance amount of ongoing works with tenderer as per the prescribed proforma of Railway for statement of all works in progress and also the works which are awarded to tenderer but yet not started upto the date of inviting of tender for calculating B. In case of no works in hand, a 'NIL' statement should be furnished.

The submitted details for (i) and (ii) above should be duly verified by Chartered Accountant.

- (b) In case if a bidder is JV, the tenderer(s) must furnish the details of
  - (i) Maximum value of construction works executed and payment received in any one of the previous three financial years or the current financial year (up to date of inviting tender) by each member of JV for calculating A, and
  - (ii) Existing commitments and balance amount of ongoing works with each member of JV either in individual capacity or as a member of other JV as per the prescribed proforma of Railway for statement of all works in progress and also the works which are awarded to each member of JV either in individual capacity or as a member of other JV but yet not started upto the date of inviting of tender for calculating B. In case of no works in hand, a 'NIL' statement should be furnished.

The submitted details for (i) and (ii) above should be duly verified by Chartered Accountant.

- (c) Value of a completed work/work in progress/work awarded but yet not started for a Member in an earlier JV shall be reckoned only to the extent of the concerned

member's share in that JV for the purpose of satisfying his/her compliance to the above mentioned bid capacity in the tender under consideration.

- (d) The arithmetic sum of individual "bid capacity" of all the members shall be taken as JV's "bid capacity".
- (e) In case, the tenderer/s failed to submit the above statement along with offer, their/his offer shall be considered as incomplete and will be rejected **summarily**.
- (f) The available bid capacity of tenderer shall be assessed based on the details submitted by the tenderer. In case, the available bid capacity is lesser than estimated cost of work put to tender, his offer shall not be considered even if he has been found eligible in other eligibility criteria/tender requirement.

**ANNEXURE-7**

Name of the Bank: -----  
 President of India,  
 Acting through Sr.Divisional Finance Manager,  
 Northern Railway, Lucknow

**Bank Guarantee Bond No.:**

**Date:-----**

**PERFORMANCE GUARANTEE BOND**

In consideration of the President of India acting through----- (Designation & address of Contract Signing Authority), Northern Railway, ....., Lucknow (hereinafter called "The Government") having agreed under the terms and conditions of agreement/Contract Acceptance letter No.-----dt..... made between..... (Designation & address of contract signing Authority) and ..... (here in after called "the said contractor(s)" for the work..... (here in after called "the said agreement") having agreed for submission of a irrevocable Bank Guarantee Bond for Rs..... ( Rs.....only) as a performance security Guarantee Bond from the contractor (s) for compliance of his obligations in accordance with the terms & conditions in the said agreement.

1. We.....( indicate the name of the Bank) hereinafter referred to as the Bank, undertake to pay to the Government an amount not exceeding Rs..... ( Rs.....only) on demand by the Government.

2. We..... ( indicate the name of the bank, further agree that ( and promise) to pay the amounts due and payable under this guarantee without any demur merely on a demand from the Government through the Sr. Divisional Finance Manager, Northern Railway, Hazratganj, Lucknow-226001, stating that the amount claimed is due by way of loss or damage caused to or would be caused or suffered by the Government by reason of any breach by the said contractor of any of the terms of conditions contained in the said agreement or by reason of the contractor 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..... ( Rupees..... Only).

3. (a) We ..... ( indicate the name of Bank ) further undertake to pay to the Government any money so demanded notwithstanding any dispute or dispute raised by the contractor(s) in any suite or proceeding pending before any court or Tribunal relating to liability under this present being absolute and unequivocal.

(b) The payment so made by us under this bond shall be a valid discharge of our liability for payment there under and the contractor(s) shall have no claim against us for making such payment.

4. We,..... (indicate the name of bank) to further 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 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 by ..... (Designation & Address of contact signing authority) on behalf of the Government, certify 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.

5 (a) Not withstanding anything to the contrary contained herein the liability of the bank under this guarantee will remain in force and effect until such time as this guarantee is discharged in writing by the Government or until (date of validity/ extended validity) whichever is earlier and no claim shall be valid under this guarantee unless notice in writing thereof is given by the Government within validity/ extended period of validity of guarantee from the date aforesaid.

(b) Provided always that we..... (indicate the name of the Bank) unconditionally undertakes to renew this guarantee on to extend the period of guarantee form year to year before the expiry of the period or the extended period of the guarantee, as the case may be on being called upon to do so by the Government. If the guarantee is not renewed or the period extended on demand, we ..... (indicate the name of the Bank) shall pay the Government the full amount of guarantee on demand and without demur.

6. We, ..... (indicate the 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 of obligations hereunder to vary any of the terms and conditions of the said contract from time to time or to postpone for any time or from time to time any to the powers exercisable by the Government against the said contractor (s) and to forbear or enforce any of the terms and

conditions of 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 for any bearance act or omission on the part of the Government or any indulgence by the Government to the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties for the said reservation would relive us from the liability.

7. This guarantee will not be discharged by any change in the constitution of the Bank or the Contractor(s).

8. We, (indicate the name of the 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 of Completion plus 60 days). Unless extended on demand by Government. Notwithstanding anything to the contrary contained herein before, our liability under this guarantee is restricted to Rs..... ( Rs.....only) unless a demand under this guarantee is made on us in writing on or before..... we shall be discharged from our liabilities under this guarantee thereafter.

Dated: the      day of      for  
(indicate the name of bank)

Signature of Banks Authorised official  
( Name )-----  
Designation with Code No.-----  
Full Address-----

Witness

1.....  
2.....

**ANNEXURE-8****FINAL SUPPLEMENTARY AGREEMENT**

1. Articles of agreement made this day \_\_\_\_\_ in the year \_\_\_\_\_ between the President of India, acting through the \_\_\_\_\_ Railway Administration having his office at \_\_\_\_\_ herein after called the Railway of the one part and \_\_\_\_\_ of the second part.
2. Whereas the party hereto of the second part executed an agreement with the party hereto of the first part being agreement Number \_\_\_\_\_ dated \_\_\_\_ for the performance \_\_\_\_\_ herein after called the 'Principal Agreement'.
3. And whereas it was agreed by and between the parties hereto that the works would be completed by the party hereto of the second part on \_\_\_\_\_ date last extended and whereas the party hereto of the second part has executed the work to the entire satisfaction of the party hereto of the first part.
4. And whereas the party hereto of the first part already made payment to the party hereto of the second part diverse sums from time to time aggregating to ₹ \_\_\_\_\_ including the Final Bill bearing voucher No. \_\_\_\_\_ dated \_\_\_\_\_ of value \_\_\_\_\_ duly adjusted as per price variation clause, if applicable (the receipt of which is hereby acknowledged by the party hereto of the second part in full and final settlement of all his /its claims under the principal agreement.

And whereas the party hereto of the second part have received sum of ₹ \_\_\_\_\_ through the Final Bill bearing voucher No. \_\_\_\_\_ dated \_\_\_\_\_ duly adjusted as per price variation clause (PVC), if applicable (the receipt of which is hereby acknowledged by the party thereto of the second part) from the party hereto of the first part in full and final settlement of all his/its disputed claims under principal agreement.

Now, it is hereby agreed by and between the parties in the consideration of sums already paid by the party hereto of the first part to the party hereto of the second part against all outstanding dues and claims for all works done under the aforesaid principal agreement excluding the security deposit, the party hereto of the second part have no further dues of claims against the party hereto of the first part under the said Principal Agreement. It is further agreed by and between the parties that the party hereto of the second part has accepted the said sums mentioned above in full and final satisfaction of all its dues and claims under the said Principal Agreement.

(Applicable in case Final Supplementary Agreement is signed after release of Final Payment)

**Or**

*And whereas the party hereto of the first part already made payment to the party hereto of the second part diverse sums from time to time aggregating to ₹ \_\_\_\_\_ through various On Account Bills (the receipt of which is hereby acknowledged by the party hereto of the second part).*

*And whereas the party hereto of the second part have received sum of ₹ \_\_\_\_\_ through various On Account Bills (the receipt of which is hereby acknowledged by the party thereto of the second part) from the party hereto of the first part and party hereto of the second part have accepted final measurements recorded on Page No..... to Page No.... of Measurement Book No.....and corresponding Final Bill duly adjusted as per price variation clause (PVC), if applicable, for full and final settlement of all his/its disputed claims under principal agreement.*

*Now, it is hereby agreed by and between the parties in the consideration of sums already paid through various On Account Bills and sums to be paid through Final Bill*

*duly adjusted as per price variation clause (PVC), if applicable, based on accepted final measurements including the security deposit by the party hereto of the first part to the party hereto of the second part against all outstanding dues and claims for all works done under the aforesaid principal agreement, the party hereto of the second part have no further dues of claims against the party hereto of the first part under the said Principal Agreement.*

*(Applicable in case Final Supplementary Agreement is signed before release of Final Payment)*

5. It is further agreed and understood by and between the parties that the arbitration clause contained in the said principal agreement shall cease to have any effect and/or shall be deemed to be non-existent for all purposes.

Signature of the Contractor/s

for and on behalf of the President of India

Witnesses

\_\_\_\_\_  
ADDRESS: \_\_\_\_\_

**ANNEXURE – 9**

P R O F O R M A  
D E C L A R A T I O N

I/We hereby solemnly declare that I/We visited the site of the work (as on top sheet) personally and have made myself/ourselves fully conversant of the conditions therein and particular the following:-

- 1.Topography of area.
- 2.Soil strata at site of work.
- 3.Sources and availability of construction materials.
- 4.Rates for construction of material, water, electricity including all local taxes, royalties, octrois etc.
- 5.Availability of local labour (both skilled and unskilled) and relevant labour rates and labour laws.
- 6.The existing roads and approaches to the site of work and requirements for further service roads/approaches to be constructed by me/us
- 7.The availability and rates of private land etc. that shall be required by me/us for various purposes.
- 8.Climatic conditions and availability of working days.

I/We have quoted my/our rates for various items in the schedule of items, quantities and rates taking into account all the above factors also.

Signatures of the Tenderer/s



**Annexure-10****Constitution of Firm**

1	Constitution of the firm/ concern. (Tick as applicable)	Sole Prop./ Partnership Firm/ Company/ JV/ Society
2	Full name of them/ Company/JV/Society.	
3	Year of formation/ incorporation	
4	PAN No.	
5	GSTIN No.	
6	Registered Office Address	
7	Address on which correspondence regarding this tender should be done	
8	Names of the proprietor/ partners/ JV members etc	

**Undertaking:**

We have uploaded along with the tender, all the requisite documents pertaining to the constitution of the firm/ concern / company. etc., as specified in clause 1.1.4 of "Preamble & General Instructions to Tenderers",. I/we understand that in the absence of these documents, our tender shall be treated as having been submitted by the individual who has signed the tender documents.

Signature of Tenderer

**ANNEXURE – 11****Details of Plant and Machinery already available with the firm.**

S.No.	Particulars of equipment	No. of Unit.	Kind & make	Capacity	Date by which the plant would be available for use on this work	Age & condition	Work on which it is being used.
1	2	3	4	5	6	7	8

Signature of the Tenderer/s

**ANNEXURE -12**

LIST OF ENGINEERS/PERSONNEL ALREADY AVAILABLE/ PROPOSED TO BE EMPLOYED FOR DEPLOYMENT ON THIS WORK:

S.No.	Name & Designation	Qualification	Professional experience	Organization with whom working	Date by which personnel will be available for this work.
1	2	3	4	5	6

Signatures of Tenderer/s

**ANNEXURE-13****STATEMENT OF WORKS EXECUTED / COMPLETED BY THE CONTRACTORS DURING LAST SEVEN YEARS**

S. No.	Name and place of work	Authority / agency for which work was carried out	Date of award & agreement No. & Date
1	2	3	4

Date of completion (original /actual )	Agreemental cost /completion cost.	Principal /Technical features work in brief	S.No. at which relevant certificate /documents are attached.
5	6	7	8

Signature of the Tenderer/s

**ANNEXURE – 14**

Statement of works being executed/in hand by the contractor/s

S.No.	Name and place of work	Authority/agency for whom the work is being carried out	Date of award & agreement No. & Date	Date of completion (Original/ actual)
1	2	3	4	5

Agreemental cost of work cost/likely cost	Principal/ Technical features work in brief	S.No. at which relevant certificate/Documents are attached	Payment taken till.
6	7	8	9

Signatures of the Tenderer/s

**ANNEXURE - 15**

Reference -Para 10.2 & 17.15.2 of Tender Form (Second Sheet) of Annexure I of ITT of GCC-2022

**Each Bidder or each member of a JV must fill in this form separately:**

**NAME OF BIDDER/JV PARTNER:**

<b>Annual Contractual Turnover Data for the Previous 3/4 Years (Contractual Payment only)</b>			
<b>Year</b>	<b>Amount Currency</b>	<b>Exchange Rate</b>	<b>Indian National Rupees Equivalent</b>
<b>Average Annual Contractual Turnover for last 3 years</b>			

1. The average annual contractual turnover shall be calculated as an average of “total contractual payments” in the previous three financial years. However, in case balance sheet of the previous year is yet to be prepared/ audited, the audited balance sheet of the fourth previous year shall be considered for calculating average annual contractual turnover.
2. The information supplied shall be substantiated by data in the audited balance sheets and profit and loss accounts for the relevant years in respect of the bidder or all members constituting the bidder.
3. Contents of this form should be certified by a Chartered Accountant duly supported by Audited Balance Sheet duly certified by the Chartered Accountant.

***SEAL AND SIGNATURE OF THE BIDDER***

Certified that all figures and facts submitted in this form have been furnished after full consideration of all observations/notes in Auditor’s reports.\_\_\_\_\_

***(Signature of Chartered Accountant)***

**Name of CA:**\_\_\_\_\_

**Registration No:** \_\_\_\_\_

***(Seal)***

**ANNEXURE-16****FORMS**

FORM NO.E-5

Appendex-VIII

Real Time Gross Settlement (RTGS)/National Electronic Fund Transfer (NEFT)

Model Mandate Form

(Investor/customer's option to receive payments through RTGS/NEFT)

1. Investor/customer's name
2. Particulars of Bank Account:
  - A) Name of the Bank:
  - B) Name of the Branch.  
Address  
Telephone No.
  - C) RTGS/NEFT IFS Code.
  - D) Type of the account (S.B. Current or Cash Credit)  
With code (10/11/13).
  - E) Ledger and Ledger folio number.
  - F) Account number (as appearing on the Cheque book) in lieu of the bank certificate to be obtained as under,

Please attach a blank cancelled cheque or a photocopy of a cheque or front page of your savings bank pass book issued by your bank for verification of the above particulars)

## 3. Date of effect

I hereby declare that the particulars given above are correct and complete. If the transaction is delayed or not effected at all for reasons of incomplete or incorrect information, I would not hold the user institution responsible. I have read the option invitation letter and agree to discharge the responsibility expected of me as a participant under the scheme.

(.....)

Signature of the Investor/ Customer

Date

Certified that the particulars furnished above are correct as per our records.

Bank's Stamp

**FORM-K1****Annexure-17****GUIDELINES' FOR PARTICIPATION OF JOINT VENTURE (JV) FIRMS**

**(THE JV firms are allowed to participate only in the tenders of value more than Rs.10 crores).**

**17. Participation of Joint Venture (JV) in Works Tender:** This para shall be applicable for works tenders wherein tender documents provide for the same.

**17.1** Separate identity/name shall be given to the Joint Venture.

**17.2** Number of members in a JV shall not be more than three, if the work involves only one department (say Civil or S&T or Electrical or Mechanical) and shall not be more than five, if the work involves more than one Department. One of the members of the JV shall be its Lead Member who shall have a majority (at least 51%) share of interest in the JV. The other members shall have a share of not less than 20% each in case of JV with upto three members and not less than 10% each in case of JV with more than three members. In case of JV with foreign member(s), the Lead Member has to be an Indian firm/company with a minimum share of 51%.

**17.3** A member of JV shall not be permitted to participate either in individual capacity or as a member of another JV in the same tender.

**17.4** The tender form shall be purchased and submitted only in the name of the JV and not in the name of any constituent member. The tender form can however be submitted by JV or any of its constituent member or any person authorized by JV through Power of Attorney to submit tender.

**17.5** Bid Security shall be submitted by JV or authorized person of JV either as :

- (i) Cash through e-payment gateway or as mentioned in tender document, or
- (ii) Bank Guarantee bond either in the name of JV, or in the name of all members of JV as per MOU irrespective of their share in the JV if the JV has not been constituted legally till the date of submission of tender.

**17.6** A copy of Memorandum of Understanding (MoU) duly executed by the JV members on a stamp paper, shall be submitted by the JV alongwith the tender. The complete details of the members of the JV, their share and responsibility in the JV etc. particularly with reference to financial, technical and other obligations shall be furnished in the MoU.

**17.7** Once the tender is submitted, the MoU shall not normally be modified / altered / terminated during the validity of the tender. In case the tenderer fails to observe/comply with this stipulation, the full Bid Security shall be liable to be forfeited.

**17.8** Approval for change of constitution of JV shall be at the sole discretion of the Railway. The constitution of the JV shall not normally be allowed to be modified after submission of the bid by the JV, except when modification becomes inevitable due to succession laws etc., provided further that there is no change in qualification of minimum eligibility criteria by JV after change of composition. However, the Lead Member shall continue to be the Lead Member of the JV. Failure to observe this requirement would render the offer invalid.

**17.9** Similarly, after the contract is awarded, the constitution of JV shall not be normally allowed to be altered during the currency of contract except when modification become inevitable due to succession laws etc. and minimum eligibility criteria should not get vitiated. Failure to observe this stipulation shall be deemed to be breach of contract with all



consequential penal action as per contract conditions.

**17.10** On award of contract to a JV, a single Performance Guarantee shall be submitted by the JV as per tender conditions. All the Guarantees like Performance Guarantee, Bank Guarantee for Mobilization Advance, Machinery Advance etc. shall be accepted only in the name of the JV and no splitting of guarantees amongst the members of the JV shall be permitted.

**17.11** On issue of LOA (Letter of Acceptance), the JV entity to whom the work has been awarded, with the same shareholding pattern as was declared in the MOU/JV Agreement submitted alongwith the tender, shall be got registered before the Registrar of the Companies under 'The Companies Act -2013' (in case JV entity is to be registered as Company) or before the Registrar/Sub-Registrar under the 'The Indian Partnership Act, 1932' (in case JV entity is to be registered as Partnership Firm) or under 'The LLP Act 2008' (in case JV entity is to be registered as LLP). A separate PAN shall be obtained for this entity. The documents pertaining to this entity including its PAN shall be furnished to the Railways before signing the contract agreement for the work. In case the tenderer fails to observe/comply with this stipulation within 60 days of issue of LOA, contract is liable to be terminated. In case contract is terminated railway shall be entitled to forfeit the full amount of the Bid Security and other dues payable to the Contractor under this contract. The entity so registered, in the registered documents, shall have, inter-alia, following Clauses:

**17.11.1** Joint and Several Liability - Members of the entity to which the contract is awarded, shall be jointly and severally liable to the Railway for execution of the project in accordance with General and Special Conditions of Contract. The members of the entity shall also be liable jointly and severally for the loss, damages caused to the Railways during the course of execution of the contract or due to non-execution of the contract or part thereof.

**17.11.2** Duration of the Registered Entity - It shall be valid during the entire currency of the contract including the period of extension, if any and the maintenance period after the work is completed.

**17.11.3** Governing Laws - The Registered Entity shall in all respect be governed by and interpreted in accordance with Indian Laws.

**17.12** Authorized Member - Joint Venture members in the JV MoU shall authorize Lead member on behalf of the Joint Venture to deal with the Contract, sign the agreement or enter into contract in respect of the said tender, to receive payment, to witness joint measurement of work done, to sign measurement books and similar such action in respect of the said tender/contract. All notices/correspondences with respect to the contract would be sent only to this authorized member of the JV.

**17.13** No member of the Joint Venture shall have the right to assign or transfer the interest right or liability in the contract without the written consent of the other members and that of the Railway in respect of the said tender/contract.

**17.14** Documents to be enclosed by the JV alongwith the tender:

**17.14.1** In case one or more of the members of the JV is/are partnership firm(s), following documents shall be submitted:

- (ii) A notarized copy of the Partnership Deed or a copy of the Partnership deed registered with the Registrar.
- (iii) A copy of consent of all the partners or individual authorized by partnership firm, to enter into the Joint Venture Agreement on a stamp paper,

- (iv) A notarized or registered copy of Power of Attorney in favour of the individual to sign the MOU/JV Agreement on behalf of the partnership firm and create liability against the firm.
- (v) An undertaking by all partners of the partnership firm that they are not blacklisted or debarred by Railways or any other Ministry / Department of the Govt. of India from participation in tenders / contracts as on the date of submission of bids, either in their individual capacity or in any firm/LLP in which they were / are partners/members. Any Concealment / wrong information in regard to above shall make the bid ineligible or the contract shall be determined under Clause 62 of the Standard General Conditions of Contract.

**17.14.2** In case one or more members is/are Proprietary Firm or HUF, the following documents shall be enclosed:

- (i) A copy of notarized affidavit on Stamp Paper declaring that his Concern is a proprietary Concern and he is sole proprietor of the Concern OR he who is signing the affidavit on behalf of HUF is in the position of 'Karta' of Hindu Undivided Family (HUF) and he has the authority, power and consent given by other members to act on behalf of HUF.

**17.14.3** In case one or more members of the JV is/are companies, the following documents shall be submitted:

- (i) A copy of resolutions of the Directors of the Company, permitting the company to enter into a JV agreement,
- (ii) The copies of MOA (Memorandum of Association) / AOA (Articles of Association) of the company
- (iii) A copy of Certificate of Incorporation
- (iv) A copy of Authorization / copy of Power of Attorney issued by the Company (backed by the resolution of Board of Directors) in favour of the individual, to sign the tender, sign MOU/JV Agreement on behalf of the company and create liability against the company

**17.14.4** In case one or more members of the JV is/are LLP firm/s, the following documents shall be submitted:

- (i) A copy of LLP Agreement
- (ii) A copy of Certificate of Incorporation of LLP
- (iii) A copy of resolution passed by partners of LLP firm, permitting the Firm to enter into a JV agreement
- (iv) A copy of Authorization / copy of Power of Attorney issued by the LLP firm (backed by resolution passed by the Partners) in favour of the individual, to sign the tender and/or sign the MOU/ JV agreement on behalf of the LLP and create liability against the LLP.
- (v) An undertaking by all partners of the LLP that they are not blacklisted or debarred by Railways or any other Ministry / Department of the Govt. of India from participation in tenders / contracts as on the date of submission of bids, either in their individual capacity or in any firm/LLP or JV in which they were / are partners/members. Any Concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the Standard General Conditions of Contract.

**17.14.5** In case one or more members of the JV is/are Society/s or Trust/s, the following documents shall be submitted:

- (i) A copy of Certificate of Registration
- (ii) A copy of Memorandum of Association of Society/Trust Deed

- (iii) A copy of Rules & Regulations of the Society
- (iv) A copy of Power of Attorney, in favour of the individual to sign the tender documents and create liability against the Society/Trust.

#### **17.14.6 All other documents in terms of Para 1.1.12 of the Tender Document**

**17.14.7** A Power of Attorney executed and issued overseas, the document will also have to be legalized by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney is being issued. However, the Power of Attorney provided by bidders from countries that have signed the Hauge Legislation Convention 1961 are not required to be legalized by the Indian Embassy if it carries a conforming Appostille certificate.

**17.15** Credentials & Qualifying Criteria: Technical, financial eligibility and Bid capacity of the JV shall be adjudged based on satisfactory fulfillment of the following criteria:

#### **17.15.1** Technical Eligibility Criteria ('a' or 'b' mentioned hereunder):

##### **(a) For Works without composite components**

The technical eligibility for the work as per para 1.1.12 above, shall be satisfied by either the 'JV in its own name & style' or 'Lead member of the JV'.

Each other (non-lead) member(s) of JV, who is/ are not satisfying the technical eligibility for the work as per para 1.1.12 above, shall have technical capacity of minimum 10% of the cost of work i.e., each non-lead member of JV member must have satisfactorily completed or substantially completed during the last 07 (seven) years, ending last day of month previous to the one in which tender is invited, one similar single work for a minimum of 10% of advertised value of the tender.

##### **(b) For works with composite components**

The technical eligibility for major component of work as per para 1.1.12 above, shall be satisfied by either the 'JV in its own name & style' or 'Lead member of the JV' and technical eligibility for other component(s) of work as per para 1.1.12 above, shall be satisfied by either the 'JV in its own name & style' or 'any member of the JV'.

Each other (non-lead) member(s) of JV, who is/ are not satisfying the technical eligibility for any component of the work as per para 1.1.12 above, shall have technical capacity of minimum 10% of the cost of any component of work mentioned in technical eligibility criteria. i.e., each other (non-lead) member of must have satisfactorily completed or substantially completed during the last 07 (seven) years, ending last day of month previous to the one in which tender is invited, one similar single work for a minimum of 10% of cost of any component of work mentioned in technical eligibility criteria.

*Note for Para 17.15.1:*

a) *The Major component of the work for this purpose shall be the component of work having highest value. In cases where value of two or more component of work is same, any one work can be classified as Major component of work.*

b) *Value of a completed work done by a Member in an earlier JV shall be reckoned only to the extent of the concerned member's share in that JV for the purpose of satisfying his/her compliance to the above mentioned technical eligibility criteria in the tender under consideration.*

#### **17.15.2** Financial Eligibility Criteria

The JV shall satisfy the requirement of "Financial Eligibility" mentioned at para 1.1.12. The

“financial capacity” of the lead member of JV shall not be less than 51% of the financial eligibility criteria mentioned at para 1.1.12 above.

The arithmetic sum of individual “financial capacity” of all the members shall be taken as JV’s “financial capacity” to satisfy this requirement.

Note: Contractual payment received by a Member in an earlier JV shall be reckoned only to the extent of the concerned member’s share in that JV for the purpose of satisfying compliance of the above mentioned financial eligibility criteria in the tender under consideration.

**17.15.3 Bid Capacity**

The JV shall satisfy the requirement of “Bid Capacity” requirement mentioned at para 1.1.12.4. The arithmetic sum of individual “Bid capacity” of all the members shall be taken as JV’s “Bid capacity” to satisfy this requirement.

**ANNEXURE-‘17A’****FORMAT FOR JOINT VENTURE MEMORANDUM OF UNDERSTANDING/ AGREEMENT.**

THIS JOINT VENTURE MEMORANDUM OF UNDERSTANDING (MOU) AGREEMENT EXECUTED AT ..... on this .....day of ..... 20 ..... between M/s ..... Registered office at .....as the first party M/s ..... Registered office at..... as the second party M/s ..... Registered office at..... as the Third party (The expression and words of the first and second and third party shall mean and include their heirs successors, assigns, nominees execution, administrators and legal representatives respectively.)

WHEREAS all the parties are engaged mainly in the business of execution of Civil Engineering and General Contracts for various Government Departments and organizations.

WHEREAS the parties herein above mentioned are desirous of entering into a Joint Venture for carrying on Engineering and/or contract works in connection with ..... and other works mentioned in Tender Notice No..... dated ..... of Northern Railway or any other work or works, as mutually decided between the parties to this Joint Venture.

WHEREAS all the parties are desirous of recording the terms and conditions of this Joint Venture to avoid future disputes.

**NOW THIS MOU/AGREEMENT WITNESSTH AS UNDER:**

1. That in and under this Joint Venture agreement the work will be done jointly by the First party and Second party in the name and style of M/s ..... (Joint Venture of M/s ..... M/s..... and M/s ..... )
2. That all the parties shall be legally liable, severally and or jointly responsible for the satisfactory/successful execution/completion of the work in all respects and in accordance with terms and conditions of the contract.
3. That the role of each constituent of the said Joint Venture in details shall be as under:  
 The first party shall be responsible for .....  
 The second party shall be responsible for .....  
 The third party shall be responsible for .....
4. The share of profit and loss of each constituent of the said Joint Venture shall be as under :
5. That all the parties of this Joint Venture shall depute their experienced staff as committed commensurating with their role and responsibility and as required for the successful completion of the works in close consultation with each other.
6. That the investment required for the works under this Joint Venture shall be brought in by the parties as agreed to between them from time to time.
7. That all the Bank Guarantee shall be furnished jointly by the parties in the name of Joint Venture.
8. That the party number ..... to this Joint Venture shall be the prime (lead) contractor and will be responsible for timely completion of work and to co-ordinate with the Railways to receive payments and also to make all correspondence on behalf of this Consortium/ Joint Venture.
9. That all the above noted parties i.e. .... not to make any change

in the agreement without prior wrtitten consent of the Railway.

NOW, the parties have joined hands to form this Joint Venture on this .....

Day of ..... two thousand .....with reference to and in confirmation of their discussions and understanding brought on record on .....

IN WITNESS THEREOF, all /both the above named parties have set their respective hands on .....the day ..... and year ..... First above mentioned in the presence of the following witness:

WITNESSES:

1. First party.
2. Second party

**FORM K2****Annexure -17B****Guidelines for submitting tenders by Partnership Firms and their Eligibility Criteria**

18.1 The Partnership Firms participating in the tender should be legally valid under the provisions of the Indian Partnership Act.

18.2 The partnership firm should have been in existence or should have been formed prior to submission of tender. Partnership firm should have either been registered with the Registrar or the partnership deed should have been notarized as per the Indian Partnership Act, prior to submission of tender.

18.3 Separate identity / name should be given to the partnership firm. The partnership firm should have PAN / TAN number in its own name and PAN / TAN number in the name of any of the constituent partners shall not be considered. The valid constituents of the firm shall be called partners.

18.4 Once the tender has been submitted, the constitution of the firm shall not normally be allowed to be modified / altered / terminated during the validity of the tender as well as the currency of the contract except when modification becomes inevitable due to succession laws etc., in which case prior permission should be taken from Railway and in any case the minimum eligibility criteria should not get vitiated. The re-constitution of firm in such cases should be followed by a notary certified Supplementary Deed. The approval for change of constitution of the firm, in any case, shall be at the sole discretion of the Railways and the tenderer shall have no claims what-so-ever. Any change in the constitution of Partnership firm after submission of tender shall be with the consent of all partners and with the signatures of all partners as that in the Partnership Deed. Failure to observe this requirement shall render the offer invalid and full Bid Security shall be forfeited.

If any Partner/s withdraws from the firm after submission of the tender and before the award of the contract, the offer shall be rejected and Bid Security of the tenderer will be forfeited. If any new partner joins the firm after submission of tender but prior to award of contract, his / her credentials shall not qualify for consideration towards eligibility criteria either individually or in proportion to his share in the previous firm. In case the tenderer fails to inform Railway beforehand about any such changes / modification in the constitution which is inevitable due to succession laws etc. and the contract is awarded to such firm, then it will be considered a breach of the contract conditions liable for determination of the contract under Clause 62 of the Standard General Conditions of Contract.

18.5 A partner of the firm shall not be permitted to participate either in his individual capacity or as a partner of any other firm in the same tender.

18.6 The tender form shall be submitted only in the name of partnership firm. The Bid Security shall be submitted by partnership firm. The Bid Security submitted in the name of any individual partner or in the name of authorized partner (s) shall not be considered.

18.7 On issue of Letter of Acceptance (LOA) to the partnership firm, all the guarantees like Performance Guarantee, Guarantee for various Advances to the Contractor shall be submitted only in the name of the partnership firm and no splitting of guarantees among the partners shall be acceptable.

18.8 On issue of Letter of Acceptance (LOA), contract agreement with partnership firm shall be executed in the name of the firm only and not in the name of any individual partner.

18.9 In case the Letter of Acceptance (LOA) is issued to a partnership firm, the following undertakings shall be furnished by all the partners through a notarized affidavit, before signing of contract agreement.

(a) Joint and several liabilities:

The partners of the firm to which the Letter of Acceptance (LOA) is issued, shall be jointly and severally liable to the Railway for execution of the contract in accordance with General and Special Conditions of the Contract. The partners shall also be liable jointly and severally for the loss, damages caused to the Railway during the course of execution of the contract or due to non-execution of the contract or part thereof.

(b) Duration of the partnership deed and partnership firm agreement:

The partnership deed/partnership firm agreement shall normally not be modified/alterd/ terminated during the currency of contract and the maintenance period after the work is completed as contemplated in the conditions of the contract. Any change carried out by partners in the constitution of the firm without permission of Railway, shall constitute a breach of the contract, liable for determination of the contract under Clause 62 of the Standard General Conditions of Contract.

(c) Governing laws: The partnership firm agreement shall in all respect be governed by and interpreted in accordance with the Indian laws.

(d) No partner of the firm shall have the right to assign or transfer the interest right or liability in the contract without the written consent of the other partner/s and that of the Railway.

18.10 The tenderer shall clearly specify that the tender is submitted on behalf of a partnership firm. The following documents shall be submitted by the partnership firm, with the tender:

- (i) A notarized copy of the Partnership Deed or a copy of the Partnership deed registered with the Registrar.
- (ii) A notarized or registered copy of Power of Attorney in favour of the individual to tender for the work, sign the agreement etc. and create liability against the firm.
- (iii) An undertaking by all partners of the partnership firm that they are not blacklisted or debarred by Railways or any other Ministry / Department of the Govt. of India from participation in tenders / contracts as on the date of submission of bids, either in their individual capacity or in any firm/LLP in which they were / are partners/members. Any Concealment / wrong information in regard to above shall make the bid ineligible or the contract shall be determined under Clause 62 of the Standard General Conditions of Contract.
- (iv) All other documents in terms of explanatory notes in para 1.1.12 of PREAMBLE & GENERAL INSTRUCTIONS to TENDERERS.

**18.11 Evaluation of eligibility of a partnership firm:**

Technical and financial eligibility of the firm shall be adjudged based on satisfactory fulfillment of the following conditions:

- i) **Technical eligibility criteria** –The tenderer should satisfy either of the following criteria:-



- a) The partnership firm shall satisfy the full requirement of technical eligibility criteria (defined in “para 1.1.12.2(i) of PREAMBLE & GENERAL INSTRUCTIONS to TENDERERS”) in its own name and style;

**OR**

- b) In case the partnership firm does not fulfill the technical eligibility criteria in its own name and style, but one of its partners has executed a work in the past either as a sole proprietor of a firm or as a partner in a different partnership firm, then such partner of the firm shall satisfy the technical eligibility criteria (defined in “para 1.1.12.2(i) of PREAMBLE & GENERAL INSTRUCTIONS to TENDERERS”) on the basis of his/her proportionate share in that proprietorship/ partnership firm reduced further by his/her percentage share in the tendering firm.

**ii) Financial eligibility criteria–** The tenderer shall satisfy either of the following criteria:-

- a) The partnership firm shall satisfy the full requirements of the financial eligibility criteria (as defined in “para 1.1.12.2(ii) of PREAMBLE & GENERAL INSTRUCTIONS to TENDERERS”) in its own name and style.

**OR**

- b) In case the partnership firm does not fulfill the financial eligibility criteria in its own name and style, but one or more of its partners have executed a work/contract in the past either as sole proprietor or as partner in different firms, then the arithmetic sum of the contractual payments received by all the partners of the tendering firm, derived on the basis of their respective proportionate share in the such firms reduced further by their respective percentage share in the tendering firm, shall satisfy the full requirements of the financial eligibility criteria (as defined in “para 1.1.12.2(ii) of PREAMBLE & GENERAL INSTRUCTIONS to TENDERERS”).

**Example on Evaluation of Technical & Financial Eligibility of Partnership Firm**

A tendering partnership firm “ABCD” has four constituent partners namely “A”, “B”, “C” & “D” with their respective shares as 40%, 30%, 20% & 10%, but this firm has not executed any work in its own name and style. However, the constituent partners have executed the work in earlier partnership firm(s) or as sole proprietor as under:-

- (i) Partnership firm “ABZ” having three partners namely “A”, “B” & “Z” with respective shares of 10%, 20% & 70%, has executed a work of value Rs.10.00 crores earlier.
- (ii) Partnership firm “CYX” having three partners namely “C”, “Y” & “X” with respective shares of 50%, 30%, & 20%, has executed a work of value Rs.5.00 crores earlier.
- (iii) Sole proprietorship firm “P” having “D” as sole proprietor has executed a work of value Rs.2.0 Crores earlier.

The evaluation of technical and financial eligibility of tendering firm “ABCD” shall be done by taking proportionate share of credentials of partners A, B, C and D derived from their earlier partnership firms to be reduced further by their percentage share in the tendering firm as calculated in table below:

Partners	Credentials of “A” & “B” derived from firm “ABZ” which has executed work	Credentials of “C” derived from firm “CYX” which has executed work of Rs.5.0 cr.	Credentials of “D” derived from Proprietorship firm “P” which has executed work of Rs.2.0 cr.	Contribution of “A”, “B”, “C” & “D” to credentials of tendering firm “ABCD”
Partners	Credentials of “A” & “B” derived from firm “ABZ” which has executed work	Credentials of “C” derived from firm “CYX” which has executed work of Rs.5.0 cr.	Credentials of “D” derived from Proprietorship firm “P” which has executed work of Rs.2.0 cr.	Contribution of “A”, “B”, “C” & “D” to credentials of tendering firm “ABCD”

	of Rs.10.0 cr.							
	% share in firm "ABZ"	Proportionate Credentials	% share in firm "CYX"	Proportionate Credentials	% share in firm "P"	Proportionate Credentials	% share in "ABCD"	Proportionate Contribution to "ABCD"
A	10%	10% of 10Cr. = <b>1.0 Cr.</b>	-	-	-	-	40%	40% of 1 Cr = <b>0.4Cr</b>
B	20%	20% of 10 Cr. = 2.0 Cr.	-	-	-	-	30%	30% of 2 Cr. = 0.6 Cr
C	-	-	50%	50% of 5 Cr = 2.5Cr	-	-	20%	20% of 2.5Cr. = 0.5Cr.
D	-	-	-	-	100%	100% of 2Cr = 2.0Cr	10%	10% of 2Cr. = 0.20Cr

#### **Evaluation of Technical Eligibility :-**

Any one of the partners of "ABCD" tendering firm viz A, B, C or D should satisfy the technical eligibility criterion on the basis of his/her proportionate share of credential in the earlier partnership firm reduced further by his percentage share in the tendering firm. As calculated in above table, the contribution of partners A, B, C & D towards the credentials of tendering firm "ABCD" will be taken as Rs. 0.40 cr., Rs. 0.60 cr., Rs. 0.50 cr., 0.20 cr respectively. Thus, in this example the firm "ABCD" is deemed to have executed one single work of maximum value of Rs 0.60 Cr. for the purpose of technical eligibility criteria.

#### **Evaluation of Financial Eligibility :-**

The arithmetic sum of the contribution of all the partners of tendering firm "ABCD" derived on the basis of their respective proportionate share in the earlier partnership firms reduced further by their respective percentage share in the tendering firm, in this example will be taken as Rs. 1.70 Cr. (i.e.  $A + B + C + D = 0.40 + 0.60 + 0.50 + 0.20 = 1.70$  cr.). Thus, in this example, the firm "ABCD" is deemed to have received contractual payments of Rs 1.70 Cr. for the purpose of financial eligibility criteria.

(Signature)

(Designation)

\_\_\_\_\_ Railway

Signature of Tenderer(s)

Date:

**Annexure-18**

NORTHERN RAILWAY  
(Standard Format)  
**COMPLETION CERTIFICATE**

The work of “----- (Full name of the work) -----” has been  
Completed with following details: -

1	Name & complete address of the contractor.	
2	Nature of entity (sole prop/ partnership firm/ company / JV)	
3 (a)	In case of Sole proprietorship, the name of sole proprietor	
(b)	In case of partnership firm/JV, the names & shares of various partners/ members.	
4	Date of Acceptance/LOA	
5	Agreement No. & date	
6 (i)	Original Agreement Cost	
(ii)	Final Agreement Cost	
7	Total payment made along with financial year-wise break-up	
8	Original date of completion (DOC)	
9	(a)Actual date of completion (b)Whether extension to DOC given with penalty or without penalty	
10	Brief description of nature & scope of work	
11	Performance of contractor (Satisfactory/unsatisfactory)	

It is certified that the above work has been completed successfully in accordance with provisions of contract.

(-----)  
Name & Signature  
Issuing authority with seal

Date of issue of certificate:-----

Case File No.:-----

[  
[

**Annexure-19****FORMAT FOR CERTIFICATE TO BE SUBMITTED / UPLOADED BY TENDERER ALONGWITH THE TENDER DOCUMENTS**

I.....(Name and designation)\*\*appointed as the attorney/authorized signatory of the tenderer (including its constituents),

M/s\_\_\_\_\_ (hereinafter called the tenderer) for the purpose of the Tender documents for the work of \_\_\_\_\_ as per the tender No.\_\_\_\_\_ of \_\_\_\_\_(Railway)\*\*, do hereby solemnly affirm and state on the behalf of the tenderer including its constituents as under:

1. I/we the tenderer (s) am/are signing this document after carefully reading the contents.
2. I/We the tenderer(s) also accept all the conditions of the tender and have signed all the pages in confirmation thereof.
3. I/we hereby declare that I/we have downloaded the tender documents from Indian Railway website [www.ireps.gov.in](http://www.ireps.gov.in) . I/we have verified the content of the document from the website and there is no addition, no deletion or no alteration to the content of the tender document. In case of any discrepancy noticed at any stage i.e. evaluation of tenders, execution of work or final payment of the contract, the master copy available with the railway Administration shall be final and binding upon me/us.
4. I/we declare and certify that I/we have not made any misleading or false representation in the forms, statements and attachments in proof of the qualification requirements.
5. **I/We also understand that my/our offer will be evaluated based on the documents/credentials submitted along with the offer and same shall be binding upon me/us.**
6. **I/We declare that the information and documents submitted along with the tender by me/us are correct and I/we are fully responsible for the correctness of the information and documents, submitted by us.**
7. I/we certify that I/we the tenderer(s) is/are not blacklisted or debarred by Railways or any other Ministry / Department of Govt. of India from participation in tender on the date of submission of bids, either in individual capacity or as a HUF/ member of the partnership firm/LLP/JV/Society/Trust.
8. I/we understand that if the contents of the certificate submitted by us are found to be forged/false at any time during process for evaluation of tenders, it shall lead to forfeiture of the Bid Security and may also lead to any other action provided in the contract including banning of business for a period of upto two year. Further, I/we (insert name of the tenderer) \*\*\_\_\_\_\_and all my/our constituents understand that my/our offer shall be summarily rejected.
9. I/we also understand that if the contents of the certificate submitted by us are found to be false/forged at any time after the award of the contract, it will lead to

termination of the contract, along with forfeiture of Bid Security/Security Deposit and Performance guarantee and may also lead to any other action provided in the contract including banning of business for a period of upto two year.

10. I/We have read the clause regarding restriction on procurement from a bidder of a country which shares a land border with India and certify that I am/We are not from such a country or, if from such a country, have been registered with the competent Authority. I/We hereby certify that I/we fulfil all the requirements in this regard and am/are eligible to be considered (evidence of valid registration by the competent authority is enclosed)

SEAL AND SIGNATURE  
OF THE TENDERER

Place:  
Dated:

**\*\*The contents in Italics are only for guidance purpose. Details as appropriate are to be filled in suitably by tenderer.**

**Annexure-19(A)**

**(This certificate is to be given by attorney/authorized signatory/each member of Partnership firm/Joint Venture (JV) / Hindu Undivided Family (HUF) / Limited Liability Partnership (LLP) etc.)**

I/We.....(Name), attorney/authorized signatory of the ..... (constituent firm/ constituent partner), and member/partner of the ..... (tendering firm) hereby solemnly affirm and state as under:

1. I/we certify that ..... (constituent firm /constituent partner) is/are not blacklisted or debarred by Railways or any other Ministry / Department of Govt. of India from participation in tender on the date of submission of bids, either in individual capacity or as a HUF/ member of the partnership firm/LLP/JV/Society/Trust.
2. I/We have read the clause regarding restriction on procurement from a bidder of a country which shares a land border with India and certify that I am/We are not from such a country or, if from such a country, have been registered with the competent Authority. I/We hereby certify that I/we fulfil all the requirements in this regard and am/are eligible to be considered (evidence of valid registration by the competent authority is enclosed),

SEAL AND SIGNATURE  
OF THE CONSTITUENT FIRM/ CONSTITUENT PARTNER

Place:  
Dated:

\*\*\*\*\*

**ANNEXURE- 20****DECLARATION/UNDERTAKING**

I/We .....(Name and Designation of tenderer/Authorized Person of tender) do hereby declare as under :

1. That I/We are an individual/ Partnership firm/Company/ Society/JV and :
  - (a) That I/We are not a retired Engineer of the gazetted rank or any other gazetted officer working before retirement, whether in the executive or administrative capacity or whether holding a pensionable post or not, in the Engineering or any other department of any of the railways owned and administered by the President of India for the time being,
  - (b) That I/We being partnership firm / company / joint venture (JV) / registered society / registered trust etc have none of our partners a retired Engineer or retired gazetted officer as aforesaid.
  - (c) That I/We being an incorporated company have any such retired Engineer or retired officer as one of directors.
  - (d) That I/We do not have have in our employment any retired Engineer or retired gazetted officer retired from government service (at least 1 year prior to the date of submission of the tender)
  - (d) That I/We being an individual contractor, do not have a relative (s) or in the case of partnership firm/ company / joint venture (jv) / registered society / registered trust etc. have one or more of shareholder(s) or relative(s) of the shareholder(s) employed in gazetted capacity in the Engineering or any other department of the railway.

**OR**

- 2 (a) That I am a Retired Engineer of the Gazetted rank participated in the tender in individual capacity as ..... (Name of the firm) with following details :

Name	Date of retirement	Post held, Place and Railway unit from which retired	Details of permission taken if such retired Engineer or Gazetted Officer had not retired from Govt. Office at least 1 year prior to the date of submission of tender

- 2 (b) That I/We are a Partnership firm/Company/Society/JV and have following retired Railway Gazetted Officer as our Partner(s)/ Director(s)/Employee:

S. No.	Name	Position in tendering entity i.e. Partner/Direct or Employee	Date of Retirement, Post held, Place and Railway unit from which retired	Details of permission taken if such Retired Engineer or Gazetted Officer had not retired from Govt. Office at least 1 year prior to the date of submission of tender

- 2 (c) That I/We are an Individual/Partnership firm/Company/Registered Society/Trust/JV and have following Share Holder(s) or Relative(s) of the individual tenders/ Share Holder(s) employed in Gazetted capacity in the Indian Railways:

S. No.	Name of the gazetted railway Officer who is/are	Post held and Place	Railway/ Unit	Details of Share holding or

	Share Holder(s) or Relative(s) of Share Holder(s) of tenderer	of Posting		Relationship with individual/ share holder of the tenderer

**Note :**

- (i) **Strike Off (1) or (2) as applicable.**
- (ii) **In case (1) is applicable and any of the 2(a), (b) or (c) is not applicable NIL may be filled.**

Place:-

( Signatres of Authorized signatory)

Name of the tendering firm

Dated:



**ANNEXURE- 21****(Bid Security)**

Bank Guarantee Bond from any scheduled commercial bank of India  
*(On non-judicial stamp paper, which should be in the name of the Executing Bank).*

**Name of the Bank: -----**

President of India,

Acting through .....,

..... Railway,

Beneficiary: ..... Railway

Date:.....

**Bank Guarantee Bond No.:**

**Date:-----**

In consideration of the President of India acting through----- **(Designation & address of Contract Signing Authority)**, ..... Railway, ....., .... (hereinafter called "The Railway") having invited the bid for\_\_\_\_\_through Notice inviting tender (NIT) No..\_\_\_\_\_, We have been informed that . . . . **[Insert name of the Bidder]**..... **(hereinafter called "the Bidder")** intends to submit its bid (hereinafter called "the Bid") .

WHEREAS, the Bidder is required to furnish Bid Security for the sum of **[Insert required Value of Bid Security]**, in the form of Bank Guarantee, according to conditions of Bid.

**AND**

WHEREAS, .....**[Insert Name of the Bank]**, with its Branch .....**[Insert Address]** having its Headquarters office at..... **[Insert Address]**, hereinafter called the **Bank**, acting through .....**[Insert Name and Designation of the authorised persons of the Bank]**, have, at the request of the Bidder, agreed to give guarantee for Bid Security as hereinafter contained, in favour of the Railway:

1. KNOW ALL MEN that by these present that I/We the undersigned **[Insert name(s) of authorized representatives of the Bank]**, being fully authorized to sign and incur obligations for and on behalf of the Bank, confirm that the Bank, hereby, unconditionally and irrevocably guarantee to pay to the Railway full amount in the sum of **[Insert required Value of Bid Security]** as above stated.
2. The Bank undertakes to immediately pay on presentation of demand by the Railway any amount up to and including aforementioned full amount without any demur, reservation or recourse. Any such demand made by the Railway on the Bank shall be final, conclusive and binding, absolute and unequivocal on the Bank notwithstanding any disputes raised/ pending before any Court, Tribunal, Arbitration or any Authority or any threatened litigation by the Bidder or Bank.
3. The Bank shall pay the amount as demanded immediately on presentation of the demand by Railway without any reference to the Bidder and without the Railway being required to show grounds or give reasons for its demand of the amount so demanded.
4. The guarantee hereinbefore shall not be affected by any change in the constitution of the Bank or in the constitution of the Bidder.
5. The Bank agrees that no change, addition, modifications to the terms of the Bid document or to any documents, which have been or may be made between the Railway and the Bidder, will in any way absolve the Bank from the liability under this guarantee;

and the Bank, hereby, waives any requirement for notice of any such change, addition or modification made by Railway at any time.

6. This guarantee will remain valid and effective from.....***[insert date of issue]***till .....***[insert date, which should be minimum 90 days beyond the expiry of validity of Bid]***. Any demand in respect of this Guarantee should reach the Bank within the validity period of Bid Security.
7. The Bank Guarantee is unconditional and irrevocable.
8. The expressions Bank and Railway herein before used shall include their respective successors and assigns.
9. The Bank hereby undertakes not to revoke the guarantee during its currency, except with the previous consent in writing of the Railway. This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No.758.
10. The Bank hereby confirms that it is on the SFMS (Structured Financial Messaging System) and shall invariably send the advice of this Bank Guarantee to the following bank details –

IFSC CODE	SBIN000RAIL
IFSC TYPE	BRANCH
BANK NAME	STATE BANK OF INDIA
BRANCH NAME	RAIL
CITY NAME	NAVI MUMBAI
ADDRESS	SECTOR-11, CBD BELAPUR, NAVI MUMBAI
DISTRICT	NAVI MUMBAI
STATE	MAHARASHTRA
BG ENABLED	YES

11. The Guarantee shall be valid in addition to and without prejudice to any other security Guarantee(s) of Bidder in favour of the Railway. The Bank, under this Guarantee, shall be deemed as Principal Debtor of the Railway.

Date .....

.....

Place.....

Bank's Seal and authorized signature(s)

*[Name in Block letters]* .....

*[Designation with Code No.]*.....

*[P/Attorney]* No.

Witness:

1 Signature, Name & Address & Seal

2 Signature, Name& address & Seal

Bank's Seal

*[P/Attorney]*No.

**Note:** All italicized text is for guidance on how to prepare this bank guarantee and shall be deleted from the final document.

# PART - V

## FORMS OF TENDERS ETC

### FORM - 1

**Name of Work:** "Strengthening and improvement of Earthing and Bonding system of TRD Assets of Lucknow/NR Division."

S. No.	Schedule no.	Section	Item no.	Description	Unit	Unit Rate	Qty	Amount
1	1	1	17(b)	Extra for special Embedment of Earth Electrode. (Erection)	Each	1310.00	1250	1637500.00
2	1	3	16 (a) (i)	Supply and erection of a structure bond. (Supply)	Each	812.00	10840	8802080.00
3			16 (a) (i)	Supply and erection of a structure bond. (Erection)	Each	424.00	10840	4596160.00
4			16 (b)	Supply and erection of a longitudinal bond (Supply)	Each	477.00	7500	3577500.00
5			16 (b)	Supply and erection of a longitudinal bond. (Erection)	Each	382.00	9900	3781800.00
6			16 (c)	Supply & erection of a transverse and special bond. (Supply)	Each	1041.00	4000	4164000.00
7			16 (c)	Supply & erection of a transverse and special bond. (Erection)	Each	455.00	4000	1820000.00
8			17(a)	Supply & erection of a single Earth Electrode. (OHE) (Supply)	Each	2514.00	1250	3142500.00
9			17(a)	Supply & erection of a single Earth Electrode. (OHE) (Erection)	Each	1718.00	1250	2147500.00
10	1	9	24 (a)	Supply and Erection of earth electrodes. (TSS/SP/SSP) (Supply)	Nos.	3760.00	200	752000.00
11			24 (a)	Supply and Erection of earth electrodes. (TSS/SP/SSP) (Erection)	Nos.	2419.00	200	483800.00
12			24 (b)	Supply and Erection of earth leads 75mm.x8mm mild steel laid in the ground. (Supply)	Mtr	350.00	450	157500.00
13			24 (b)	Supply and Erection of earth leads 75mm.x8mm mild steel laid in the ground. (Erection)	Mtr	138.00	450	62100.00
14			24 (c)	Supply and Erection of earth leads 50mm.x6mm. mild steel laid in the ground. (Supply)	Mtr	172.00	1300	223600.00
15			24 (c)	Supply and Erection of earth leads 50mm.x6mm. mild steel laid in the ground. (Erection)	Mtr	99.00	1300	128700.00
16			24 (d)	Supply and Erection of earth leads 75mm.x8mm. Mild steel laid exposed. (Supply)	Mtr	350.00	450	157500.00
17			24 (d)	Supply and Erection of earth leads 75mm.x8mm. Mild steel laid exposed. (Erection)	Mtr	99.00	450	44550.00
18			24 (e)	Supply and Erection of leads 50mm x 6mm mild steel laid exposed. (Supply)	Mtr	172.00	2000	344000.00
19			24 (e)	Supply and Erection of leads 50mm x 6mm mild steel laid exposed. (Erection)	Mtr	84.00	2000	168000.00

20	1	8	28	Supply and spreading of Ballast/ Gravel in the Switch Yard (Supply)	Cum	1594.00	800	1275200.00
21	1	8	28	Supply and spreading of Ballast/ Gravel in the Switch Yard (Erection)	Cum	17.00	800	13600.00
22	6	6	NS01	Galvanized Steel Stranded wire Traction bonds with lugs duly crimped at both ends for 25KV ac Electric traction system as per latest RDSO specification (Supply)	Mtr	535.85	16000	8573600.00
				<b>TOTAL</b>				<b>46053190.00</b>

**FORM -2**

## MEMORANDUM OF THE TENDERER

**FOR OHE & TSS WORKS  
- DELETED -****FORM - 3**

## DEVIATIONS FROM THE TENDER PAPER

**FORM – 4****ALTERNATIVE PROPOSALS OF THE TENDERERS**

Paper No. the tender papers	Alternative Proposals	Technical advantage and/or financial implication of the Proposal.

**FORM – 5**

S. No.	Schedule no.	Section	Item no.	Description	Unit	Unit Rate	Qty	Amount
1	1	1	17(b)	Extra for special Embedment of Earth Electrode. (Erection)	Each	1310.00	1250	1637500.00
2	1	3	16 (a) (i)	Supply and erection of a structure bond. (Supply)	Each	812.00	10840	8802080.00
3			16 (a) (i)	Supply and erection of a structure bond. (Erection)	Each	424.00	10840	4596160.00
4			16 (b)	Supply and erection of a longitudinal bond (Supply)	Each	477.00	7500	3577500.00
5			16 (b)	Supply and erection of a longitudinal bond. (Erection)	Each	382.00	9900	3781800.00
6			16 (c)	Supply & erection of a transverse and special bond. (Supply)	Each	1041.00	4000	4164000.00
7			16 (c)	Supply & erection of a transverse and special bond. (Erection)	Each	455.00	4000	1820000.00
8			17(a)	Supply & erection of a single Earth Electrode. (OHE) (Supply)	Each	2514.00	1250	3142500.00
9			17(a)	Supply & erection of a single Earth Electrode. (OHE) (Erection)	Each	1718.00	1250	2147500.00
10	1	9	24 (a)	Supply and Erection of earth electrodes. (TSS/SP/SSP) (Supply)	Nos.	3760.00	200	752000.00
11			24 (a)	Supply and Erection of earth electrodes. (TSS/SP/SSP) (Erection)	Nos.	2419.00	200	483800.00
12			24 (b)	Supply and Erection of earth leads 75mm.x8mm mild steel laid in the ground. (Supply)	Mtr	350.00	450	157500.00
13			24 (b)	Supply and Erection of earth leads 75mm.x8mm mild steel laid in the ground. (Erection)	Mtr	138.00	450	62100.00
14			24 (c)	Supply and Erection of earth leads 50mm.x6mm. mild steel laid in the ground. (Supply)	Mtr	172.00	1300	223600.00
15			24 (c)	Supply and Erection of earth leads 50mm.x6mm. mild steel laid in the ground. (Erection)	Mtr	99.00	1300	128700.00
16			24 (d)	Supply and Erection of earth leads 75mm.x8mm. Mild steel laid exposed. (Supply)	Mtr	350.00	450	157500.00
17			24 (d)	Supply and Erection of earth leads 75mm.x8mm. Mild steel laid exposed. (Erection)	Mtr	99.00	450	44550.00
18			24 (e)	Supply and Erection of earth leads 50mm x 6mm mild steel laid exposed. (Supply)	Mtr	172.00	2000	344000.00
19			24 (e)	Supply and Erection of earth leads 50mm x 6mm mild steel laid exposed. (Erection)	Mtr	84.00	2000	168000.00
20	1	8	28	Supply and spreading of Ballast/ Gravel in the Switch Yard (Supply)	Cum	1594.00	800	1275200.00
21	1	8	28	Supply and spreading of Ballast/ Gravel in the Switch Yard (Erection)	Cum	17.00	800	13600.00

22	6	6	NS01	Galvanized Steel Stranded wire Traction bonds with lugs duly crimped at both ends for 25KV ac Electric traction system as per latest RDSO specification (Supply)	Mtr	535.85	16000	8573600.00
				<b>TOTAL</b>				<b>46053190.00</b>

**FORM - 10**  
**SHEET- 3**

**TENDERER'S SCHEME OF WORK AND TIME SCHEDULE**

1.	Submission of location plan for approval.	
2.	Approval of location plans.	
3.	Earth filling and leveling.	
4.	Preparation and submission of general arrangement and other drawings and cross-sections for foundations and drawings etc.	
5.	Building foundation.	
6.	Building roof slab.	
7.	Fixing of doors/windows etc.,	
8.	Flooring and finishing.	
9.	Approval of cross section (Foundation and steel work)	
10.	Allocation of small steel work and fittings.	
11.	Bulk order for materials.	
12.	Detailed ordering of materials.	
13.	Foundation installation.	
14.	Delivery of steel work.	
15.	Steel work erection.	
16.	Delivery of materials.	
17.	Fixing, testing and commissioning of Electrical equipments (General).	
18.	Installation, testing and commissioning of Yard light fittings.	
19.	Erection of equipment.	
20.	Guarantee period.	

Months from the date of issue of Letter of Acceptance of Tender.

0                      3                      6                      9                      12



**FORM - 11(A)****NAME OF MANUFACTURER/S, PLACES OF MANUFACTURE & INSPECTION OF SUPPLIES  
(CORE/RDSO APPROVED SOURCES)**

Item No.	Description of item	Name & address of Manufacturer/s	Place of Manufacture	Place of Inspection
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**Declaration by the Tenderer**

We hereby confirm that all the equipments, components and materials which will be supplied by us would conform to technical and other particulars as detailed in Part-II Chapter-IV. We further confirm that the equipments, components and materials except those listed below would be procured from the approved sources/suppliers approved by CORE/RDSO.

(i)

(ii)

(iii)

Technical details conforming the SOGP of the concerned specifications and the details of manufacturer for the above items are enclosed in FORM-11(B).

**NOTE:-** To be furnished on separate sheet for individual portion of OHE& TSS WORKS.

□□□□□

**FORM - 11(B)****NAME OF MANUFACTURER/S, PLACES OF MANUFACTURE & INSPECTION OF SUPPLIES  
(OTHER THAN CORE/RDSO APPROVED SOURCES)**

Following particulars should be furnished as under :-

1. Item No.
2. Description of item
3. Name and address of manufacturer
4. Place of manufacturer
5. Place of inspection
6. Whether permitted to use ISI Standard mark (Wherever applicable)
7. Approx. turnover of this item in last 3 years (Enclose list of orders executed)

**Declaration by the Tenderer :**

We hereby confirm that -

(i) The design approval/prototype approval of the above items will be obtained from CORE/RDSO. All cost on this account will be borne by us.

(ii) In case of delay in prototype approval, we shall arrange the procurement of above listed items from the CORE/RDSO approved sources.

(iii) We also clearly understand that delay on account of prototype approval shall not be claimed by us as reasonable ground for extension of completion period.

NOTE:- To be furnished on separate sheet for individual portion of OHE& TSS WORKS.

Signature of Tenderer

**FORM - 11(C)**

**COMPLETE TECHNICAL DATA AND PARTICULARS OF THE EQUIPMENTS  
OFFERED AS SPECIFIED IN THE TENDER PAPERS TOGETHER WITH DESCRIPTIVE  
LITERATURE, LEAFLETS ETC.**

S No	Name of Equipment's	System voltage	Manufacturer's name
1			
2			
3			
4			
5			
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9			
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11			
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**Note:** (i) The details of equipment/item having unit cost more than Rs.10,000.00 shall only be detailed in above proforma.

(ii) Necessary literature/ leaflets shall also be enclosed.

**STANDING INDEMNITY BOND FOR "ON ACCOUNT" PAYMENTS****(On paper of requisite stamp value)**

We, M/s \_\_\_\_\_ hereby undertake that we hold at our stores Depot/S at \_\_\_\_\_ for and on behalf of the President of India acting in the premises through the General Manager or his successor \_\_\_\_\_ Railway \_\_\_\_\_ (hereinafter referred to as "The Purchaser") all materials for which "On Account" payments have been made to us against the Contract for supply and erection of (\_\_\_\_\_) on the section/S \_\_\_\_\_ Railway also referred to as Group/s \_\_\_\_\_ vide letter of Acceptance of Tender \_\_\_\_\_ dated \_\_\_\_\_ and material 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 material while in our possession and against disposal of surplus materials. The said materials shall at all times be open to inspection by any officer authorized by the Purchaser / Engineer incharge of work or his successor.

Should any loss, clam age or electrification of materials occur or surplus material disposed off and 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 material as indicated in Part I, Chapter – IV, section I and also compensation for such loss or damage if any long 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 becomes due to us under the said or any other Contract.

Dated this day \_\_\_\_\_ day of \_\_\_\_\_ 200

for and on behalf of

M/s \_\_\_\_\_ (Contractor)

Signature of witness

Name of witness in Block letter.

Address.

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**EXTENSION OF PERIOD OF COMPLETION OF WORK ON  
CONTRACTOR'S ACCOUNT**

Registered A.D

No. \_\_\_\_\_ Dated : \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Sub : (i) \_\_\_\_\_ (name of work).

(ii) Acceptance letter no. \_\_\_\_\_

(iii) Understanding/Agreement no. \_\_\_\_\_

Ref: \_\_\_\_\_ (Quote specific application of Contractor for extension to the date received) \_\_\_\_\_

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').

**2.** Expecting that you may be able to complete the work, if some more time is given, the competent authority, although not bound to do so, hereby extends the time for completion from \_\_\_\_\_ to \_\_\_\_\_.

**3.** Please note that an amount equal to the liquidated damages for delay in the completion of the work after the expiry of \_\_\_\_\_ (give here the stipulated date for completion with/without any penalty fixed earlier) will be recovered from you as mentioned in Clause, 17-B of the Standard General Conditions of Contract of 2020 with all correction slips up-to-date for the extended period, notwithstanding the grant of this extension. You may proceed with the work accordingly.

**4.** 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.

**5.** Please intimate within a week of the receipt of this letter your acceptance of the extension of the conditions stated above.

**6.** 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 upto this extension to complete the work by \_\_\_\_\_ (here mention the extended date), further action will be taken in terms of Clause 62 of the Standard General Conditions of Contract.

Yours faithfully

For and on behalf of the President of India

EXTENSION OF PERIOD OF COMPLETION OF WORK  
(ON PURCHASER ACCOUNT)

Registered A.D

No:

Dated

To

-----  
-----  
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Sub: (i) \_\_\_\_\_ (name of work) \_\_\_\_\_

(ii) Acceptance letter No. \_\_\_\_\_

(iii) Undertaking/Agreement No. \_\_\_\_\_

Ref: \_\_\_\_\_ (Quota specific application of the Contractor for extension to the date, if received).

Dear Sir,

The stipulated date for completion of the work in \_\_\_\_\_ Section under the above Contract was \_\_\_\_\_. In consideration of the Contractor's letter No. \_\_\_\_\_ of \_\_\_\_\_ the General Manager on behalf of the President of India, is pleased to grant extension of the time for completion of works 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 of 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.

**Certification by Arbitrators appointed under Clause 63 & 64 of Indian Railways General  
Conditions of Contract**

1. Name:
2. Contact Details:
3. Prior experience (Including Experience with Arbitrations):
4. **I do not have more than ten on-going Arbitration cases with me.**
5. I hereby certify that I have retired from Railways w.e.f. \_\_\_\_ and empanelled as Railway Arbitrator as per 'The Arbitration and Conciliation Act- 1996'.
6. I have no any past or present relationship in relation to the subject matter in dispute, whether financial, business, professional or other kind.

Or

I have past or present relationship in relation to the subject matter in dispute, whether financial, business, professional or other kind. The list of such interests is as under:

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

Or

I have past or present relationship with or interest in any of the parties whether financial, business, professional or other kind, which is likely to give rise to justifiable doubts as to my independence or impartiality in terms of The Arbitration and Conciliation Act-1996. The details of such relationship or interests are as under:

8. There are no concurrent Circumstances which are likely to affect my ability to devote sufficient time to the arbitration and in particular to finish the entire arbitration within twelve months.

Or

There are Circumstances which are likely to affect my ability to devote sufficient time to the arbitration and in particular to finish the entire arbitration within twelve months. The list of such circumstances is as under:

***END OF TENDER DOCUMENT  
(LAST PAGE)***