E- TENDER DOCUMENT

FOR

OHE WORK IN CONNECTION OF ISOLATION OF LOOP LINES AT VARIOUS STATIONS OF NEW BHAUPUR - NEW KHURJA SECTION UNDER CGM/DFCCIL/TUNDLA

डेडीकेटेड फ्रेट कोरीडोर

DEDICATED FREIGHT CORRIDOR CORPORATION OF INDIA LIMITED

(A Government of India Undertaking)

MINISTRY OF RAILWAY

CGM/TDL/DFCCIL OFFICE

3/20, KPS Tower, Mayur Complex, 3rd Floor,
Near Tulsi Cinema, NH-02, Nagla Padi, Agra-282002

INDEX

Total Pages: 151 (One Fifty One)

TOP SHEET

Tender No. DFCCIL/EL/TDL/BPUN-KRJN/T-010 **Date 20.09.2021**

Name of work:	OHE WORK IN CONNECTION OF ISOLATION OF LOOP LINES AT VARIOUS STATIONS OF NEW BHAUPUR - NEW KHURJA SECTION UNDER CGM/DFCCIL/TUNDLA
Estimated Cost of work	Rs. 1,42,36,896.00 (Rs. One Crore Forty Two Lakh Thirty Six Thousand Eight Hundred Ninety Six only.)
Earnest Money Deposit	Bid Security Declaration
Completion Period	Total 06 (Six) Months from the date of issue of letter of acceptance.
Date of Opening	21.10.2021 at 15:30 hrs.

Tender Issued to: -

For and on behalf of

CGM/TDL
DFCCIL Office

_____ DFCCIL

TENDER FORM

Place:……..
Date: ……..

Tender No. ……
Name of Work …….

Chief General Manager ,
Dedicated Freight Corridor Corporation of India Limited,
3/20,KPS Tower, Mayur Complex,, 3rd Floor,
Near Tulsi cinema, NH-02, Nagla Padi,
Agra-282002, U.P.

I / We …… have read the various conditions of tender attached hereto and agree to abide by the said conditions. I / We also agree to keep this tender open for your acceptance for a period of **45 days** from the date fixed for opening the same and in default thereof, I/We will be liable for forfeiture of my/our "Earnest Money". I / We offer to do the work for **"OHE WORK IN CONNECTION OF ISOLATION OF LOOP LINES AT VARIOUS STATIONS OF NEW BHAUPUR - NEW KHURJA SECTION UNDER CGM/DFCCIL/TUNDLA"** at the rate quoted in attached schedule and hereby bind myself/ourselves to complete the work in all respects within **06(Six) months from the date of issue of letter of acceptance of the tender**.

2. I / We also hereby agree to abide by the all the DFCCIL/Indian Railway Standard General Conditions of Contract, with all correction slip 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 DFCCIL/Railway in the annexed Special Conditions/Specifications, Schedule of Rates with all correction slip up-to-date for the present contract.

3. A sum of Rs. ……has already been deposited online as Earnest Money. Full value of the Earnest Money shall stand forfeited without prejudice to any other rights or remedies in case my/our Tender is accepted and if:
   a) I / We do not execute the contract document within Seven days after receipt of notice issued by DFCCIL that such documents are ready; and
   b) I / We do not commence the work within fifteen days after receipt of orders to that effect.

4. 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 Witness :
(1)……
(2)…….

Signature of Tenderer(s)
Date……..
Address……..

Dedicated Freight Corridor Corporation of India Limited
(A Government of India Undertaking)
MINISTRY OF DFCCIL

Tender No. DFCCIL/EL/TDL/BPUN-KRJN/T-010 **Date:20.09.2021**

M/s _____
_____
_____

NOTICE INVITING E- TENDER

1 Chief General Manager/TDL, DFCCIL, 3/20, KPS Tower, Mayur Complex,3rd Floor, Near Tulsi cinema, NH-02, Nagla Padi, Agra-282002, U.P., invites **open E - Tenders in single packet system** on prescribed forms from firms/companies meeting qualifying requirements and having requisite experience and financial capacity for the following works: -

Tender No.	**DFCCIL/EL/TDL/BPUN-KRJN/T-010**
Name of Work	**OHE WORK IN CONNECTION OF ISOLATION OF LOOP LINES AT VARIOUS STATIONS OF NEW BHAUPUR - NEW KHURJA SECTION UNDER CGM/DFCCIL/TUNDLA**
Estimated Cost of work	Rs. 1,42,36,896.00 (Rs. One Crore Forty Two Lakh Thirty Six Thousand Eight Hundred Ninety Six only.)
Period of Contract	**Total 06 (Six)) Months**
Earnest Money Deposit/ Bid Security	Bid Security Declaration**.**
Tender Document Cost	Rs.5900.00 (inclusive of all taxes and duties) to be Submitted in DFCCIL account on IREPS Portal.
Date of Sale (Online)	**From Date 20.09.2021**
Issue of Corrigendum, if any	**On or after Date 20.09.2021 (on** www.ireps.gov.in**)**
Date and Time of submission of tender	**On or before Date 21.10.2021 and time 15:00 hrs.**
Date and Time of opening of tender	**Date 21.10.2021 and time 15:30 hrs.**
Defect Liability Period :-	**12 (Twelve) Months.**

2 ELIGIBILITY CRITERIA

Eligibility of the applicants shall be assessed based on the **"Eligibility Criteria", "Essential Qualifying Criteria" and "Other Qualifying Criteria" as given in *Notice Inviting E-Tender*.**

The Tender document can be downloaded from IREPS website www.ireps.gov.in and DFCCIL's websitewww.dfccil.com.Tenderers are advised not to make any corrections, additions or alterations in the downloaded tender documents. In case, any corrections, additions or alterations in the downloaded tender documents are made, such tender shall summarily rejected.

3. The cost of tender documents shall be deposited in DFCCIL account on IREPS portal.

4. DFCCIL may issue addendum(s)/corrigendum(s) to the tender documents. In such case, the addendum(s)/corrigendum(s) shall be issued and placed on IREPS website **before bid** starting date fixed on IREPS. The tenderers who have downloaded the tender documents from website must visit the website and ensure that such addendum(s)/corrigendum(s) (if any) is also downloaded by them. Such addendum(s)/corrigendum(s) (if any) shall also be submitted, duly stamped and signed, along with the submission of the tenders.

5. The tender documents shall be submitted in online mode through website www.ireps.gov.in in single bids only. Single offer viz. containing Technical offer and financial offer along with necessary documents like scanned copy of TDC to be uploaded. Detailed credentials as per the requirement of eligibility criteria in "**Technical offer**" as well as "**Financial offer**" to be submitted through IREPS portal. **Bids are required to be submitted only by online mode and uploaded on the e-tendering web site using Digital Signature for signing the documents**.

6. Tenders shall be opened at **the address given below** at 15:30 hours on the same day in the presence of the tenderer(s) or their authorized representatives intending to attend the opening.

Address of Office of the Chief General Manager/ TDL (for Opening of E-tenders):

Chief General Manager/TDL, DFCCIL, 3/20, KPS Tower, Mayur Complex, 3rd Floor, Near Tulsi cinema, NH-02, Nagla Padi, Agra-282005, U.P.

All the Bids received shall be opened on the date and time mentioned above in the tender notice, through process of e-tendering. The sequence of opening shall be:

i) Bid Security Declaration
ii) Technical offer.
iii) Financial offer.

7. Tender shall be submitted as per "Instructions to Tenderers" as followed on IREPS portal.

8. Any tender received without Bid Security Declaration in the form as specified in tender documents shall not be considered and shall be summarily rejected.

9. DFCCIL reserves the right to cancel the tenders before submission/opening of tenders, postpone the tender submission/opening date and to accept / reject any or all tenders without assigning any reasons thereof. DFCCIL's assessment of suitability as per eligibility criteria shall be final and binding.

10. Tenderers may note that they are liable to be disqualified at any time during tendering process in case any of the information furnished by them is not found to be true. EMD of

such tenderer shall be forfeited. The decision of DFCCIL in this regard shall be final and binding.

11. DFCCIL reserves the right to pre-qualify the bidder(s) provisionally based on the documents submitted by them and open financial bid(s), subject to their final verification. In the event of any document being found false, the provisional qualification shall stand withdrawn, and the next lower bidder shall automatically come to the position of such disqualified bidder. Action against such disqualified tenderers shall be taken as per above Clause No. 10.0 of Notice Inviting Tender.

12. The validity of the offer shall be 45 days.

13. The transfer of tender documents purchased by one intending tenderer to another tenderer is not admissible. Tenderer can submit tenders only on the documents purchased/downloaded from website mentioned above.

We look forward for your active participation.

For and on behalf of **DFCCIL**

Chief General Manager/TDL

ANNEXURE – I

1.0 ELIGIBILTY CRITERIA

The tenderer shall satisfy the following eligibility criteria to qualify for this tender:

I. Essential Qualifying Criteria

A. Firms/companies

(i) The tenderer should have a registered office anywhere in India.

*The documentary proof regarding **A**. above should be submitted as part of the tender document.*

Note: For the purpose of documentary proof of "registered office" asmentioned in (i) above any address of office as mentioned in any of the following documents submitted along with the original offer by tenderer(s) may be considered as registered office of the tenderer(s).

1. Address mentioned in the article of association of company duly registered under Companies Act, 1956.
2. Address mentioned in Partnership Deed
3. Address mentioned in Trade License obtained by the individual from Govt. body.
4. Address mentioned in any tax departments.
5. Address mentioned in P.F. Registration documents.

B. Technical capability:

1. In support of their credentials, the Tenderer(s) should have to submit documents as stipulated in tender document along with their tenders.
2. THE TENDERER(S) SHOULD SATISFY THE FOLLOWING MINIMUM ELIGIBILITY CRITERIA AS UNDER –

Firm must have satisfactorily completed in the last three previous financial years and the current financial year upto the date of opening of the tender, one similar single work for a minimum of 35% advertised value of the tender.

Work executed with Central/State Govt./Semi-Govt. organizations/Authorities, PSUs, Govt. of India undertakings shall only be considered to qualify above eligibility. Certificates from the private Individuals/ Organizations shall not be considered.

The Tenderer(s) will produce/attach the certificate of Work completion with the Tender Document as per above and such certificate should clearly supported by following details:-

a) Name of Agency issuing a certificate.
b) Date of issue of certificate.
c) The name of Work.
d) The Acceptance letter no.
e) The date of issue of Acceptance letter.
f) Agreement no.
g) Date of execution of Agreement.
h) Date of original Completion of Work as per Acceptance Letter.
i) Date of Actual completion of Work.
j) The Amount of Work done as per Agreement (in Rupees).
k) The Final Amount of Work at the time of Completion of Work (in Rupees).
l) Whether the Work is completed satisfactory or not satisfactory.

Notes:

Following will be considered as similar work:

Similar nature of work of this tender is**:-**

"Satisfactory execution of work of Railway Electrification at 2x25 kV or 25 kV single phase A.C. involving preparation of design and drawing for OHE, casting of foundation, erection of masts, Bracket fabrication & erection, wiring and other related works with experience of working in power and/or traffic blocks anywhere in the Railways"**.**

C. Financial capability

The contractual payments received by the Firm or the arithmetic sum of contractual payments received by Firm in the previous three financial years and current financial year upto the date of opening of tender shall be at least 150% of the estimated value of the work as mentioned in the tender.

Certified true copy of audited annual account are to be submitted as a proof along with bid documents. In case the annual accounts are not audited, the contract sum received for the required period should be duly certified by the chartered Accountant."

Each tenderer has to satisfy the eligibility criteria for technical capability, competence as well as for financial capacity and organizational resources as specified in the tender documents to qualify for consideration of bid submitted by tenderer(s).

There should not be any unsatisfactory performance Report of the Contractor from any source.

Tenderer(s) may please note that their offers will be evaluated as per the credentials/ documents attached by the tenderer(s) along with the tender/offer.

D. JVs SHALL NOT BE CONSIDERED.

II. <u>System of verification of Tenderer's credentials</u> : -

Railway board letter no. 2017/Trans/01/Policy dated 08.02.2018, accordingly following changes have been approved by Railway board.

For the works tenders, it has been decided to adopt the affidavit-based system of credential verification. The tenderer shall submit along with the tender document, documents in support of his/their claim to fulfill the eligibility criteria as mentioned in the tender document. Each page of the copy of documents/certificates in support of credentials, submitted by the tenderer, shall be self-attested/digitally signed by the tenderer or authorized representative of the tendering firm. Self-attestation shall include signature, stamp and date (on each page). Only those documents which are declared explicitly by the tenderer as " documents supporting the claim of qualifying the laid down eligibility criteria", will be considered for evaluating his/their tender. The system shall be applicable once it is made operational in IREPS. This system is already being followed by some of Railway/DFCCIL PSUs.

1. In all works tender documents, followings para may be added in the section describing the qualification and eligibility criteria.

"The tenderers shall submit a notarized affidavit on a non judicial stamp 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 affidavit to be submitted by the bidder is enclosed as Annexure-V. Non submission of an affidavit by the bidder shall result in summary rejection of his/their bid. And 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. It will not be obligatory on the part of Tender Committee to scrutinize beyond the submitted document of tenderer as far as his qualification for the tender is concerned".

With the submission of the affidavit as mentioned above, the practice of verification of tenderer(s) documents by the Railway/DFCCIL may be dispensed with.

a) The Railway/DFCCIL 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/DFCCIL, make available such information, evidence and documents as may be necessary for such verification. Any verification or lack of such verification, by the Railway/DFCCIL shall not relieve the bidder of its obligations or liabilities hereunder nor will it affect any right of the Railway/DFCCIL thereafter.
b) In case any wrong information submitted by the tenderer, the contract shall be terminated, Earnest Money Deposit (EMD), Performance Guarantee (PG) and Security Deposit (SD) of contract forfeited and agency barred for doing business on entire Indian Railway/DFCCILs for 5 (five) years.
c) With such a system of self certification of credentials, tender finalization should also be speed up. It has accordingly been decided that the tender validity period should be reduced to 45 days for single packet and 60 days for two packet system of tendering (

in place of the present limits of 90 days and 120 days) for tenderers having affidavit based system of credential verification.

2. The tenderers shall provide satisfactory documentary evidences acceptable to Railway/DFCCIL along with the tender to show that:

2.1 They have an established technically competent and adequate staffs organization to ensure that the services required under this tender can do satisfactorily.

2.2 They have sufficient equipments; plants and machinery to meet the obligations under the contract and to complete the work contract all within the stipulated time schedule and accepted by him.

3 The tenderer should submit the details of similar works done in the past.

4 The tenderer should submit the attested copies of the certificates obtained from the agencies wherever the works have completed successfully. These certificates should indicate the details of installation and successful commissioning of the similar type of equipments executed by the tenderer.

5 The tenderer will submit, along with offer list of work in hand indicating description of work, contract value, approximate value of balance work yet to be done and date of award of work.

6 They have adequate financial resources to meet the obligations under the contract. They have also required to submit the report from recognized bank of financial institutions.

FORMAT-I

DETAILS OF SIMILAR WORKS COMPLETED IN LAST THREE YEARS

S. N.	Description of the work	Contract No. and date	Date of award of work	Stipulated date of completion	Date of actual completion	Value of completed work (In Lakhs of Rs)	Reasons of delays, if any	Penality. If any, imposed for delay	Any other relevant information	Remarks
1										
2										
3										
4										
5										

Note:

1. **Please attach copies of the certificates issued by the client.**
2. **Only those works shall be considered for evaluation for which copies of the Certificates issued by the client are attached.**

FORMAT - II

ANNUAL TURNOVERS FOR THE LAST 3 YEARS

S.N.	YEAR	Turnover from similar nature of works (In lacks of Rs)	Turnover from all sources (In lacs of Rs)	Remarks
1				
2				
3				
4				
5				

Note:

1. **Please attach certified/attested copies in support of which the attested certificate from Employer/Client, TDS certificate/Audited Balance Sheet/P&L Account duly certified by Chartered Accountant etc.**

FORMAT-III

DETAILS OF ONGOING WORKS

S. N.	Description of the work	Name and address of Employer	Contract No. and date	Date of award of work	Stipulated date of completion	Value of work as per order (In Lakhs of Rs)	Value of work completed so far (In Lakhs of Rs)	Anticipated date of completion of work	Any other relevant information	Remarks
1										
2										
3										
4										
5										
6										
7										
8										
9										

Note: 1. ***JVs shall not be considered***.

PART – I

CHAPTER –I

Instructions to Tenderer and Conditions of Tendering

1.1.1 General (for on line tendering system)

Submission of Online Bids is mandatory for this Notice Inviting Tender. E-Tendering is a new methodology for conducting Public Procurement in a transparent and secured manner. Suppliers/ Vendors will be the biggest beneficiaries of this new system of procurement. For conducting electronic tendering, DFCCIL, Delhi has decided to use the portal (https://www.ireps.gov.in) of a Government of India. Benefits to Suppliers/service providers are outlined on the Home-page of the portal.

1.1.2 Instructions

a. Online E-Bidding Methodology:

Online E- Bid System – Financial bids and Technical bids shall be submitted by the bidder at the same time in single Packet

b. Broad outline of activities from Bidders perspective:

i. Procure a Digital Signing Certificate (DSC)
ii. Register on Electronic Tendering System (ETS)
iii. Create Users and assign roles on ETS
iv. View Notice Inviting Tender (NIT) on ETS
v. Download Official Copy of Tender Documents from ETS
vi. Clarification to Tender Documents on ETS – Query to DFCCIL (Optional) - view response to queries posted by DFCCIL, through addenda.
vii. Bid-Submission on ETS: Prepare and arrange all document/paper for submission of bid online and tender fees and EMD deposit on offline.
viii. Attend Public Online Tender Opening Event (TOE) on ETS
ix. Post-TOE Clarification on ETS (Optional)-Respond to DFCCILL‟s Post-TOE queries
x. Attend Public Online Tender Opening Event (TOE) on ETS

For participating in this tender online, the following instructions are to be read carefully. These instructions are supplemented with more detailed guidelines on the relevant screens of the ETS.

Note 1: It is advised that all the documents to be submitted are kept scanned and converted to PDF format in a separate folder on your computer before starting online submission. Fin. Offer tab brings up the Financial Offer Page where the bidder can submit his rates against the schedule items included in the tender.

Note 2: While uploading the documents, it should be ensured that the file nameshould be the name of the document itself.

c. Digital Certificates

For integrity of data and its authenticity/non-repudiation of electronic records and to be compliant with IT Act 2000, it is necessary for each user to have a Digital Certificate (DC), also referred to as Digital Signature Certificate (DSC), of Class-III issued by a Certifying Authority (CA) licensed by Controller of Certifying Authorities (CCA) [refer http://www.cca.gov.in].

d. Registration

The Tender document can be downloaded from the website www.ireps.gov.inandto be submitted in the e-format. Cost of theTender Document (in the form of DD) and Bid Security (in the form of DD - in original) have to be submitted to concern DFCCIL office as per address given in bid document or online through IREPS portal before the scheduled date and time of submission of the tender otherwise the Bid will not be considered. Amendments, if any, to the tender document will be notified in the above website as and when such amendments are notified. It is the responsibility of the bidders who have downloaded the tender document from the website to keep themselves abreast of such amendments before submitting the tender document.

Intending bidders are requested to register themselves with www.ireps.gov.infor obtaining user-id, Digital Signature etc. by paying Vendor registration fee and processing fee for participating in the above mentioned tender.

e. DFCCIL, has decided to use process of e-tendering for inviting this tender and thus the physical copy of the tender would not be sold.

1.1.3 **General (for tender)**

1.1.3.1 **Name of the Work**:

OHE WORK IN CONNECTION OF ISOLATION OF LOOP LINES AT VARIOUS STATIONS OF NEW BHAUPUR - NEW KHURJA SECTION UNDER CGM/DFCCIL/TUNDLA

1.1.3.2 "A bidder in the capacity of Individual or Sole Proprietor, Partnership Firm, or Company can participate in the tender and the bidder must forward attested copies of the constitution of its firm such as partnership deed, Memorandum and Articles of Association, etc. along with original Power of Attorney of authorized signatory".

1.1.3.3 The work is proposed to be executed under the following relationship.

A) Employer: DFCCIL address - CGM/TDL, DFCCIL,3/20, KPS Tower, Mayur Complex ,3rd Floor, Near Tulsi Cinema , NH-2 Nagla Padi Agra-282002

B) Contractor: The successful tenderer to whom the work is awarded shall become the contractor for the execution of this work.

1.1.3.4 Throughout these bidding documents, the terms "bid" and "tender" and their derivatives ("bidder"/"tenderer"), "bid/tendered", "bidding"/"tendering", etc.) are synonymous. Day means calendar day. Singular also means plural.

1.1.3.5 Scope of Work -

OHE WORK IN CONNECTION OF ISOLATION OF LOOP LINES AT VARIOUS STATIONS OF NEW BHAUPUR - NEW KHURJA SECTION UNDER CGM/DFCCIL/TUNDLA

The scope given above is only indicative. The detailed scope has been described in the tender documents.

1.1.3.6 Estimated cost of the work: Rs. 1,42,36,896.00 (Rs. One Crore Forty Two Lakh Thirty Six Thousand Eight Hundred Ninety Six only.)

1.1.3.7 Tenderer(s) may carefully note that they are liable to be disqualified at any time during tendering process in case any of the information furnished by them is not found to be true and he decision of Employer in this respect shall be final and binding.

1.1.3.8 A bidder shall submit only one bid in the capacity of an Individual or Sole Proprietor, Partnership firm or Company. Violation of this condition is liable to disqualify the tenders in which such bidder has participated and EMD of all such tenderer(s) shall stand forfeited.

1.1.4 Cost of Bidding

1.1.4.1 The bidder shall bear all costs associated with the preparation and submission of the bid and the Employer will in no case be responsible or liable for these costs regardless of the conduct or the outcome of the bidding process.

B. The Bidding Documents

1.1.5 Content of bidding documents submitted through online mode only

1.1.5.1 The bidding documents include the following:

1. Notice Inviting Tender
2. Instructions to tenderer(s)
3. Tender Form
4. Special Conditions of Contract
5. General Terms and Conditions of Contract
6. Financial bid and Bill of Quantities

1.1.5.2 The bidder is expected to examine all instructions, terms, conditions, forms, specifications and other information in the bidding documents. Failure to furnish all information required by the bidding documents or submission of a bid not substantially responsive to the bidding documents in every respect will be at the bidders‟ risk and may result in rejection of his bid.

1.1.6 Understanding and Amendment of Tender Documents

1.1.6.1 The bidder must obtain for itself on its own responsibility and its own cost all the information including risks, contingencies and other circumstances in execution of the work. It shall also carefully read and understand all its obligations and liabilities given in tender documents.

1.1.6.2 The bidder is advised to visit and examine the site where the work is to be executed and its surroundings or other areas as deemed fit by the bidder and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and execution of the contract. The cost of visiting the site and collecting relevant data shall be at the bidder's own expenses. It is a condition of the tender that the tenderer is deemed to have visited the site and satisfied himself with all the conditions prevailing including any difficulties for executing the work.

1.1.6.3 At any time prior to the deadline for submission of bids, Employer may for any reason whether at its own initiative or in response to any request by any prospective bidder amend the bidding documents by issuing Corrigendum, which shall be part of the Tender documents.

1.1.6.4 Employer may at its discretion extend the deadline for submission of the bids at any time before the time of submission of the bids.

C. Preparation of the Bids

1.1.7 Language of Bid

1.1.7.1The bid prepared by the bidder and all documents related to the bid shall be written in English.

1.1.8 Signing of All Bid papers and Completing Bill of Quantities

1.1.8.1 All the pages of the tender documents and credentials submitted by tenderer shall be digitally signed by the tenderer or his representative holding the Power of Attorney.

1.1.8.2 The tenderer must fill and submit the prices as per instructions given in schedule of rates. He shall not make any addition or alteration in the tender documents. The requisite details should be filled in by the tenderer wherever required in the documents. Incomplete tender or tender not submitted as per instructions is liable to be rejected. If a tenderer does not quote a price/rate as per instructions, his tender shall be summarily rejected.

1.1.8.3 The tenderer must ensure that tender documents shall be submitted on line through class 3 Digital Signature only. To participate in the E-Bid submission, it is mandatory for the bidders to have user ID and password in www.ireps.gov.in through IREPS portal.

1.1.9 Deviations

The tenderer should clearly read and understand all the terms and conditions, specifications, etc. mentioned in the original tender documents. If the tenderer has any observations, the same may be indicated in his forwarding letter along with the

tender. Tenderers are advised not to make any corrections, additions or alterations in the in his own entries the same shall be initialed and stamped by him. If this condition is not complied with, tender is liable to be rejected.

1.1.10 Earnest Money (Bid Security)

Bid Security Declaration: I/We, M/s (Name of bidder) am/are aware that I/We have been exempted from submission of Bid Security/Earnest Money Deposit in lieu of this Bid Security Declaration. I/We understand and accept that if I/We withdraw my/our bid within bid validity period or if awarded the tender and on being called upon to submit the Performance Guarantee/Performance Security fail to submit the same within the stipulatedtime period mentioned in tender documents or on being called upon to sign the contract agreement fail to sign the same within stipulated period mentioned in tender documents, I/We i.e., the bidder shall be banned from submission of bids in any Works / Service Tender issued by Indian Railways/DFCCIL for a period of 12 months from the date of such banning done on e-platform IREPS.

1.1.11 Period of validity of the tender:

1.1.11.1 The tender shall remain valid for the period 45 days after the date of the opening of the tender. If the Tenderer gives validity period less than that fixed/prescribed by Employer, the tender shall be liable to be rejected.

1.1.11.2 Notwithstanding the above clause, Employer may solicit the tenderer's consent to an extension of the validity period of the tender. The request and the response shall be made in writing.

Submission of Bids

1.1.12 Deadline for submission of tender

1.1.12.1 The tender documents shall be submitted in online mode through website www.ireps.gov.in in single bids only. Single offer viz. containing Technical offer and financial offer along with necessary documents like scanned copy of EMD and scanned copy of TDC to be uploaded. Detailed credentials as per the requirement of eligibility criteria in "**Technical offer**" as well as in "**Financial offer**are to be uploaded". **Bids are required to be submitted only by online mode through e-tendering web site (IREPS portal) using Digital Signature class 3 for signing the documents**.

1.1.12.2 A tender received without on line to Employer is liable to be rejected.

1.1.12.3 Original EMD and tender document fees received after opening of the tender shall be rejected.

1.1.13 Withdrawal of tender

No tender can be withdrawn after submission and during tender validity period.

1.1.13.1 Submission of a tender by a tenderer implies that he had read all the tender documents including amendments if any, visited the site and has made himself aware of the scope and specifications of the work to be done, local conditions and other factors having any bearing on the execution of the work.

1.1.14 Submission of tender/bid:-

1.1.14.1 The tenders shall be submitted on or before the due date and time with all the relevant documents as mentioned -

a) Forwarding letter of the tenderer.

b) Documents to be submitted as per checklist of documents

c) Scanned copy of Earnest Money Deposit and tender document fees.

d) The Bill of Quantities with prices quoted as mentioned.

1.1.14.2 Earnest Money and tender document fees shall be deposited in DFCCIL account and proof of transition along with transaction ID to be scanned and uploaded along with Tender document.

1.1.15 Bid opening and Evaluation

1.1.15.1 **Opening of the Tender** :- Tenders will be opened on line at the address mentioned in "Notice Inviting Tender" in presence of tenderer(s) or authorized representatives of tenderer(s) who wish to attend the opening of tenders.

The sequence of opening shall be:

i) Bid Security Declaration
ii) Technical offer.
iii) Financial offer.

1.1.15.2 Tenderer(s) or their authorized representatives who are present shall sign register in evidence of their attendance.

1.1.15.3 Tenderer's name, presence or absence of requisite Earnest Money, total cost of work quoted or any other details as Employer may consider appropriate will be announced and recorded at the time of bid opening.

1.1.16 Clarification of the tenders

1.1.16.1 To assist the examination, evaluation and comparison of the tenders, Employer may at his discretion ask the tenderers for any clarifications as considered essential. All such correspondence shall be in writing and no change in price or substance of the tender shall be sought or permitted. The above clarification for submission of the details shall form part of the tender and shall be binding on tenderer.

1.1.17 Preliminary examination of bids

1.1.17.1 The Employer shall examine the bids to determine whether they are complete, whether any computational errors have been made, whether the documents have been properly signed and whether the bids are generally in order.

1.1.17.2 Arithmetical errors shall be rectified on the following basis if found. If there is a discrepancy between the unit price and the total price, which is obtained by multiplying the unit price and quantity, or between subtotals and the total price, the unit or subtotal price shall prevail, and the total price shall be corrected. If there is a discrepancy between words and figures, the rate in words shall prevail.

1.1.17.3 Prior to the detailed evaluation, Employer shall determine whether each bid is of acceptable quality, is generally complete and is substantially responsive to the bidding documents. For purposes of this determination, a substantially responsive

bid is one that conforms to all the terms, conditions and specifications of the bidding documents without material deviations, objections, conditionality or reservation. A material deviation, objections, conditionality or reservation is one:

i) That affects in any substantial way the scope, quality or performance of the contract.

ii) That limits in any substantial way, inconsistent with the bidding documents, the Employers‟ rights or the successful Bidder's obligations under the contracts; or

iii) Whose rectification would unfairly affect the competitive position of other Bidders who are presenting substantially responsive bids.

1.1.17.4 If a bid is not substantially responsive, it shall be rejected by the Employer.

1.1.17.5 In case of tenders containing any conditions or deviations or reservations about contents of tender document, Employer may ask for withdrawal of such conditions/deviations/reservations. If the tenderer does not withdraw such conditions/deviations/ reservations, the tender shall be treated as non-responsive. Employer's decision regarding responsiveness or non-responsiveness of a tendershall be final and binding.

1.1.18 Evaluation and comparison of tenders

1.1.18.1 In case of open tenders, bids, which are determined as substantially responsive, shall be evaluated based on criteria as given in **"Eligibility Criteria".** The tenderer must submit all necessary authentic data with necessary supporting certificates of the various items of evaluation criteria failing which his tender is liable to be rejected.

1.1.18.2 The Employer reserves the right to negotiate the offer submitted by the tenderer to withdraw certain conditions or to bring down the rates to a reasonable level. The tenderer must note that during negotiations of rates of items of BOQ can only be reduced and not increased by the tenderer. In case the tenderer introduces any new condition or increases rates of any item of BOQ, his negotiated offer is liable to be rejected and the original offer shall remain valid and binding on him.

1.1.19. Canvassing

No tenderer is permitted to canvass to Employer on any matter relating to this tender. Any tenderer found doing so may be disqualified and his bid may be rejected.

1.1.20. Right to accept any tender or reject all tenders

Employer reserves the right to accept, split, divide, negotiate, cancel or reject any tender or to annul and reject all tenders at any time prior to the award of the contract without incurring any liability to the affected tenderers or any obligation to inform affected tenderer, the grounds of such action.

1.1.21. If the tenderer, as individual or as a partner of partnership firm, expires after the submission of his tender but before award of work, the Employer shall deem such tender as invalid.

1.1.22 Award of Contract

1.1.22.1 Employer shall notify the successful tenderer in writing by a Registered Letter /Courier /Speed Post/email or per bearer that his tender has been accepted.

1.1.22.2 Letter of Acceptance after it is signed by the Contractor in token of his acceptance shall constitute a legal and binding contract between Employer and the contractor till such time the contract agreement is signed.

1.1.23 Help desk for E-Tendering

1.1.23.1 For any difficulty in downloading and submission of tender document visit at website www.ireps.gov.in.Users can send their queries to the Help desk through E-Mail. E-Mail ID of Help Desk is mentioned on the Help desk page (helpdesk.eps@cris.org.in). The reply to the query will be sent to the E-Mail ID of the user.

1.1.23.2 Bidder manual and system requirement is available on web site www.ireps.gov.in for Necessary help.

PART-I
CHAPTER -II

SPECIAL CONDITIONS OF CONTRACT

1.2.1 INTRODUCTION

Dedicated Freight Corporation of India (DFCCIL) is a Public Sector Undertaking under the administrative control of Government of India (Ministry of DFCCILs) for construction, maintenance and operation of the Dedicated Rail Freight Corridors. At present the company is undertaking construction of Eastern and Western corridors and has its corporate office at New Delhi and Field Units at various cities associated with CGM unit.

CGM/Tundla unit have jurisdiction from New Bhaupur to New Khurja with it's CGM/ Tundla unit at Agra.

1.2.2 Definitions

1.2.2.1 In the Conditions of Contract, the following terms shall have the meanings assigned here under except where the context otherwise requires:

i) "Railway/DFCCIL" shall mean the President of the Republic of India or the Administrative Officers of the DFCCIL/Railway/DFCCIL or of the successor. DFCCIL authorized or any other officer of DFCCIL authorized to deal with any matters which these presents are concerned on his behalf.

ii) "CHIEF GENERAL MANAGER" shall mean the officer in administrative in-charge of the project in charge of APL-1 section (Bhaupur –Khurja) and shall mean and include their successors, of the successor DFCCIL.

iii) "DEPUTY CHIEF PROJECT MANAGER " shall mean the officer in charge of lotwise or department /SandT/Electrical/Finance wise (Engineering department) of the DFCCIL include their successors of and shall mean and the successor DFCCIL.

iv) PROJECT MANAGER/ DEPUTY PROJECT MANAGER/ASSISTANT PROJECT MANAGER shall mean the officer department wise (Engineering /SandT/ Electrical/ Finance Department) of the DFCCIL and shall mean and include their successors of the success of DFCCIL.

v) "TENDER or BID" means the offer (Technical and/or Financial) made by individual, firm, Company, corporation, or Consortium for the execution of the works.

vi) "TENDERER" shall mean the person/ the firm or company whether incorporated ornot who tenders for the work with a view to execute the works on contract with DFCCIL and shall include their personal representatives, successors and permitted assigns.

vii) "WORKS" shall mean the works contemplated in scope and schedules set forth in the tender forms and required to be executed according to terms and condition mentioned.

viii) "Bill of Quantities (B.O.Q.)"/ "Schedule of Rates" means list of items of work, their

quantities and rates as accepted and forming part of contract agreement.

ix) "EMPLOYER" means the Dedicated Freight Corridor Corporation of India Limited, A Govt. of India Undertaking (DFCCIL in abbreviation) acting through its Managing Director or any other authorized officer and shall include their legal successors in title and permitted assignees.

xi) "CONTRACT" shall mean and include the Agreement or Letter of Acceptance, the accepted Bill of Quantities and Rates, the General Conditions of Contract, Special Conditions of Contract, Appendix to Tender, Tender Form, and Instructions to the Tenders and other Tender Documents.

xii) "CONTRACTOR" shall mean the person or firm, company, corporation, whether incorporated or not who enters into the contract with DFCCIL and shall include legal representatives of such individual or persons comprising such firm or company or successors of such firm or company as the case may be such individual, or firm or company.

xiii) "ENGINEER OR ENGINEER IN CHARGE" means the Chief General Manager of DFCCIL/ Tundla(Employer), or any other officer authorized by the Employer to act on his behalf and for the purpose of operating the contract. "Engineers Representative" shall mean officer authorized by DFCCIL in direct charge of works.

xv) "ACCEPTING AUTHORITY" shall mean the Chief General Manager/Tundla of DFCCIL or any other officer authorized for dealing with the works for the purpose of this tender/Contract.

xvi) Definitions mentioned in these tender documents elsewherewillbefollowed. In Case there is an ambiguity in any definition, the decision of CHIEF GENERALMANAGER /Tundla / DFCCIL regarding the interpretation shall be final and binding.

1.2.3 GENERAL DESCRIPTION OF SITE AREA,CLIMATIC CONDITIONS AND SYSTEM PARTICULARS

1.2.3.1The tenderer/s are requested to visit the area of work and ascertain himself/themselves with the proposed works / services, surroundings and prevailing law and order conditions.

1.2.3.2 The location of workis located in the state of Uttar Pradesh.

1.2.4 SCOPE OF WORK:-

OHE WORK IN CONNECTION OF ISOLATION OF LOOP LINES AT VARIOUS STATIONS OF NEW BHAUPUR - NEW KHURJA SECTION UNDER CGM/DFCCIL/TUNDLA

1.2.4.1 ***The brief scope of work covers "OHE WORK IN CONNECTION OF ISOLATION OF LOOP LINES AT VARIOUS STATIONS OF NEW BHAUPUR - NEW KHURJA SECTION UNDER CGM/DFCCIL/TUNDLA ".***

1.2.4.2 **Place of work-** In the jurisdiction of DFCCIL, New Bhaupur – New Khurja section under CGM Tundla, there are 10 nos. of stations namely New Bhaupur, Nhe kanchausi, New Achalda, New Ekdil, New Bhadan, New Makhanpur, New Tundla, New Hathras, New Daudkhan, New Khurja and OCC at Allahabad. The work shall be executed under supervision of authorized representative of CGM/TDL, GM/EL/TDL or PM/EL/TDL .If required by DFCCIL any other station/Site may be included under Schedule of work and no additional charges shall be given for this.

1.2.4.3 Quantities in schedule annexed to Contract- The quantities set out in the accepted schedule of rates with item of work quantified are the estimated quantities of the works and they shall not be taken as the actual and correct quantities of the works to be executed by the Contractor in fulfillment of his obligations under the contract. The actual/final quantity shall be executed as per approved design and drawing which is to be prepared by contractor if required. All the design calculations, if any, shall be done by contractor before execution of work. The contractor shall be responsible for any wastage of material due to mistake in design calculations.

1.2.4.4 New item of work – If during execution of the work, the contractor is called upon to carry out any new item of work not included in schedule of prices, the contractor shall execute such work at such prices as may be mutually agreed with the purchaser before commencement.

If required by DFCCIL, the contractor have to execute some portion of work as per/under the tender schedule at new location (at the same rate/ Price) over Uttar Pradesh.

1.2.5 LOCAL CONDITIONS :

1.2.5.1 It will be imperative on each tenderer to fully acquaint himself with all the local conditions and factors which would have any effect on the performance of the contract and cost of the stores. The DFCCILs shall not entertain any request for clarifications from the tenderer regarding such local conditions. No request for the change of price, or time schedule of completion of work on account of any local condition or factor shall be entertained after the offer is accepted.

1.2.5.2 The intending 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 papers are adequate and all inclusive, for the completion of works to the entire satisfaction of the DFCCILs.

1.2.5.3 In the event of the intending tenderer desiring to have a field survey before furnishing his tender/quotations, he may apply to DFCCILs for permission in this regard. The DFCCILs will give such permission in writing but all the expenses in this regard will be borne by the tenderers.

1.2.5.4 The intending tenderer is advised to study the tender papers carefully, any submission of a bid by the tenderers shall be deemed to have been done after a careful study and examination of these documents with full understanding of the implication thereof. These conditions and specifications shall be deemed to have been accepted unless otherwise,

specifically commented upon by the Tenderer in his offer. Failure to adhere to anyone of these instructions may render his offer liable to be ignored without any references.

1.2.6 INTEGRATION WITH EXISTING WORKS:

1.2.6.1 The tenderer should keep in mind, visit the location of works, take due note and give proper consideration of integrating the new works (sometimes on replacement account) with the existing system.

1.2.7 ELECTRIC SUPPLY:

The contractor shall make his own arrangements for electricity required by him for the purpose of execution of the contract. However, the DFCCIL shall arrange the required power supply for testing and commissioning of the works completed by the contractor.

1.2.8 SCHEME OF WORK AND PROGRESS REPORT:

1.2.8.1 The Contractor shall within fifteen (15) days of the date of award of the contract submit a BAR/PERT CHART and scheme for the execution. The contractor shall indicate in the form of notes of the assumptions and the basis adopted for the preparation of this BAR/PERT CHART.

1.2.8.2 The contractor shall submit a monthly progress report detailing the actual progress made in all activities as compared to the above BAR/PERT CHART. The monthly progress report shall indicate the reasons for the variations if any between the schedule quantities and actual progress, the action proposed and corrective measures required wherever necessary.

1.2.9 INDIRECT TAXATION

In the event of any new indirect taxation being imposed after the date of opening of tender and of being of such a nature that the contractor has to bear additional cost of material directly on account of such additional taxation the purchaser shall reimburse the contractor for such additional costs on receiving satisfactory proof that such taxation was legally leviable and that the contractor has actually incurred the additional costs.

1.2.10 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, hospitality acts of the public enemy, civil commotion, sabotage, fires, floods, explosions, epidemics/pandemic, quarantine restriction, strikes, lockouts, any stature, statuary rules, regulations order or requisitions issued by any Government department or competent authority or acts of God (hereinafter referred to as "Event") then provided notice of the happening of any such event is given by either party to the other within twenty one days from the date of occurrence thereof neither party shall have any claim for damages against the other in respect of such non-performance or delay in performances and obligations under the contract and shall be resumed as soon as practicable after such event has come to end or ceased to exist provided further that if the performance in whole or part of any obligation under this contract is prevented or delayed by reason of any such event beyond a period as mutually agreed to by the purchaser and the contractor after any event or 60 days in the absence of such an agreement whichever is more either party may at its option terminate under this clause, the purchaser may at the time of such termination take over from the contractor, at prices as provided for in the contract all erected equipment or equipments under erection, as also all or any portion of unused, under-aged and acceptable equipment whether storage or in the course of manufacturing.

1.2.11 AGREEMENT:

The successful tenderer shall within 14 (fourteen) days after having been called upon by notice to do so be bound to execute an agreement based on accepted rates and lodge the same with purchaser together with the conditions of contract, specification and schedule of prices referred to therein duly completed.

1.2.12 A)EXPENSES OF CONTRACTOR DRAWINGS ETC.:

Any calculation, designs, drawings, schedules information, progress charts etc required by the purchaser's Engineers in connection with the contract, shall be furnished by the contractor at his own expenses.

B) CONTRACTOR'S DRAWINGS:

If required, before execution of the work the contractor shall submit to the purchaser for approval, three copies of all required drawings, work schedule programme which are necessary to ensure correct/ satisfactory performance as detailed in tender papers.

1.2.13 SUB CONTRACTORS

The contractor shall not sublet any part of the work under this contract for the purpose of this. However contractor may enter into contract with supplier for supply of the material for the purpose of this work. However such suppliers should be approved sources of RDSO for materials for which RDSO approved sources are available.

1.2.14 DEFAULT AND DELAY

1.2.14.1 The contractor shall execute the work with due diligence and expedition keeping to the approved time schedule. Should he refuse or neglect to comply with any reasonable orders given to him in writing by the Engineer's representative in connection with the work or contrivance the provision of the contract or the progress of work lags persistently behind the time schedule due to his neglect, the purchaser shall be at liberty to give seven (7) days notice in writing to the contractor requiring him to make good the neglect or contravention complained and should the contractor fail to comply with requisition made in the notice within seven days from the receipt thereof, it shall be lawful for the purchaser to take the work wholly or in part, out of the contractor's hands without any further reference and get the work or any part thereof as the case may be completed by other agencies at expense of the contractor without prejudice to any other right or remedy of the purchaser.

1.2.14.2 LOSS SUSTAINED DUE TO DEFAULT AND DELAY:

In the event of any loss to the purchaser on account of execution and/or completion of the work or any parts thereof by agencies other than the contractor, the contractor shall be liable to reimburse the loss to the purchaser without prejudice to any other right and remedies of the purchaser, and as the case may be met at the option, of the purchaser, from out of all or any of the following sources viz.

i) Any amount due and payable to the purchaser on any account whatsoever.

ii) The contractor's security deposit with the purchaser so far as available and

iii) Any other assets whatsoever belonging to contractor.

1.2.15 CONTRACTOR'S RESPONSIBILITY FOR DISCREPANCY:

a) All designs and drawings submitted by the contractor shall be based on thorough study and shall be such that the contractor is satisfied about their suitability. The purchaser's approval will be based on these considerations. Notwithstanding approval communicated by the purchaser, during the progress of the contract for designs and drawings, proto type samples of material after inspection of materials after erection and adjustments to installations the ultimate responsibility for correct designs and execution of work shall rest with the contractor.

b) The contractor shall be responsible for and bear and pay the costs for any alteration of works arising from any discrepancies errors or omissions in the design and drawings supplied by him, whether such designs and drawings have been approved by the purchaser or not.

1.2.16 Provision of Efficient and Competent Staff at Work Sites by the Contractor:

1.2.16.1 The Contractor shall place and keep on the works at all times efficient and competent staff to give the necessary directions to his workmen and to see that they execute their work in sound and proper manner and shall employ only such supervisors, workmen andlabourers in or about the execution of any of these works as are careful and skilled in the various trades.

1.2.16.2 The Contractor shall at once remove from the works any agents, permitted sub-contractor, supervisor, workman or labourer who shall be objected to by the Engineer and if and whenever required by the Engineer, he shall submit a correct return showing the names of all staff and workmen employed by him.

1.2.16.3 In the event of the Engineer being of the opinion that the Contractor is not employing on the works a sufficient number of staff and workmen as is necessary for proper completion of the works within the time prescribed, the Contractor shall forthwith on receiving intimation to this effect deploy the additional number of staff and labour as specified by the Engineer within seven days of being so required and failure on the part of the Contractor to comply with such instructions will entitle the Railway/DFCCIL to rescind the contract under Clause 62 of these conditions.

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

1.2.17.1 The Contractor shall also employ qualified Graduate Engineer(s) or equivalent, or qualified Diploma Engineer(s).

1.2.17.2 In case the Contractor fails to employ the Engineer, as aforesaid in Para 4.23.1, he shall be liable to pay liquidated damages at the rates, as prescribed in the tender documents.

1.2.18 WORKS BY OTHER AGENCIES:

Any other works undertaken at the same time by the purchaser or the DFCCIL direct or through some other agency at the same site where the contractor is carrying out his work will not entitle the contractor to prefer any claim, regarding any delays or hindrance he may have to face on this account. The contractor shall comply with any instructions which may be given to him by the purchaser in order to permit

simultaneous execution of his own works and of those undertaken by other contractors or the DFCCIL without being entitled on this account to any extra charge.

1.2.19 **ACCESS TO WORK SITE:**

a) The purchaser shall afford access to the site for the purpose of this contract to the contractor at all reasonable times. In the execution of the work, no person other than the contractor or his only appointed representatives or approved sub contractor and bona-fide workman shall have access to site. Access to the site of work at all times shall be allowed by contractor to officials or approved representative of the purchaser or to DFCCIL staff for purpose of maintenance.

b) The purchaser or his authorized representative shall have the right to refuse admission to the work site to any. Person employed by the contractor to whom the purchaser or his engineer may consider undesirable.

c) The engineer or his representative shall be at liberty to object to the presence of any representative or other person employed by the contractor in or about the works on the ground of misconduct, incompetence or negligence, the contractor on receipt of notices of such objection in writing, shall forthwith remove the person so objected to and provide in his place another competent person and shall not allow such person to enter the site of work subsequently. The purchaser will not be able to pay any cost or damage on this account.

1.2.20 **INSURANCE:**

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

1.2.21 **PENALTY FOR DELAY IN COMPLETION:**

a) If the contractor fails to execute and complete the work within time specified in the agreement or within the period of extension granted except in so far that the delay is on the purchaser's account; the contractor shall accept reduction in the total amount payable to him by the purchaser at the rate of ½% (half percent) per week of the contract value for the actual delay occurred and until the work shall have been completed under the contract and such reduction shall be accepted by the purchaser in full satisfaction of the contractor's liability arising from delay only. The Engineer shall at his sole discretion, specify a time limit within which the unfinished portion of the work shall be completed. In the event of failure of the contractor, the purchaser shall be at liberty to take action in accordance with provision inGeneral Conditions of Contract July 2014(Part-II) of Indian Railway, along with latest correction slips and amendments.

b) Extension of time- If aforesaid shall have arisen from any cause which the purchaser may admit as being a responsible ground for extension of time the purchaser shall allow such additional time as he may in his absolute discretion consider to be reasonably justified by the circumstances of the case.

c) The contractor in the presence of the purchaser or his representative shall carry out tests as required under the specification as soon as possible after commissioning. The contractor at his own expense shall carry out any other additional test that the purchaser may prescribe for testing the satisfactory operation of the plants. Necessary electrical power required in C/W the test will be supplied free of any charges by the purchaser. The contractor shall submit six copies of the results to the purchaser for acceptance. The contractor shall also submit 6 copies of the manufacturer's test certificates for equipments such as motor, cable etc

d) Should the result of the test not be satisfactory, an extension of one month will be granted to the contractor to make good the defects and or any deficiencies pointed out by the purchaser a fresh test will then be carried out after the contractor has attended to the defects and deficiencies. If these do not yield satisfactory results, the purchaser may proceed at the contractor's expense, by all means as deemed expedient to have installation made satisfactory until they comply with the specification, approved drawings and designs.

e) In such a case or in a case of delay in completion of the work under this contract within the time limit, the purchaser reserves the right to get the work completed by contractor as per provisions of contract. The purchaser will give to the contractor for this purpose 7 days previous notice. The contractor shall then take at his own expense all necessary steps to complete the works in accordance with the provision of the contract. In case it becomes impossible to proceed with the above mentioned taking over tests, for reason other than for which the contractor is responsible, the "Provisional Acceptance Certificate" shall be issued at or within a mutually agreed reasonable period not exceeding 6 months after completion of the work.

f) Imposition of token penalty for delay in the completion of work- Competent authority while granting extension to the currency of contract under clause 17 (B) of GCC may also consider levy of token penalty as deemed fit based on the merit of the case.

1.2.22 **FINAL ACCEPTANCE:**

a) The final acceptance of the entire plant shall take effect from the date of expiration of the period of guarantee provided the installations provisionally accepted are still in perfect working order.

b) If on the other hand the installations are not in the perfect working order at the end of the guarantee period the purchaser may either extend the period of guarantee until necessary works are carried out by the contractor, or carry out these works or have them carried out on behalf of the contractor and at his expense. A certificate of final acceptance shall then be issued by the purchaser, which will terminate the contract.

1.2.23 **MATERIAL-** All the RDSO approved materials, components and fittings etc to be supplied by the contractor shall only be procured from RDSO/CORE approved suppliers/ vendors/manufactures.

1.2.24 **Safety Gear**- During execution of the work, contractors shall ensure that all safety precautions are taken by their men to protect themselves and site to prevent any

untoward incident. DFCCIL reserve the right to stop the work in the 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 the contractor. The cost of all the safety gear is deemed to have been included in the rates quoted and nothing extra is payable under this contract.

1.2.25 **TIME SCHEDULE: -**

1.2.25.1 The entire work is required to be completed in all respects within 06 (Six) month from the date of issue of acceptance letter/telegram. Time is the essence of contract. The contractor will be required to maintain steady and regular progress to the satisfaction of the engineer to ensure that the work will be completed in all respects within the stipulated time failing which action may be taken by the DFCCIL Administration in terms of General Conditions of Contract July 2014 (Part-II) of Indian Railway, along with latest correction slips and amendments.

1.2.25.2 The Contractor shall be expected to initiate work immediately after receipt of "**Letter of Acceptance**".

1.2.26 RATES: -

1.2.26.1 The rates quoted and accepted by DFCCIL shall be firm and final during the currency of contract.

1.2.26.2 All statutory taxes and liabilities levied/may be levied in future by the Central and State Government or any other governing authority/agency from time to time shall be borne by the contractor and the rate shall be inclusive of all such liabilities.

1.2.26.3 GST is inclusive for this tender.

1.2.26.4 The Work Provider will, for the purpose, aforesaid continuously monitor the Works being rendered by it to ensure that these are up to the standards required by DFCCIL.

1.2.26.5 The Work Provider shall indemnify and keep DFCCIL indemnified and harmless from and against all disputes, claims, fines, penalties, litigations criminal as well as civil that may be initiated against the DFCCIL on account of and/or arising out of the failure of the Work Provider to adhere to any statutory requirement, or to follow such rules regulations, guidelines or procedures as may be required under any statute or directive.

1.2.27 **QUANTITY VARIATION: -**

Rates quoted in the schedule of items shall be valid for a variation of the quantity up to maximum of (±) 25% for each item. In case of variation in quantities beyond ±25%, the rates for the additional quantities beyond ±25% variation shall be negotiated/decided on mutually acceptable terms, provided the rate so arrived does not exceed the originally accepted rate as per agreement.

(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.
(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 agreement value.

(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;

(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;

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

(v) In case of foundation work, no variation limit shall apply and the work shall be carried out by the Contractor on agreed rates irrespective of any variation.

(vi) As far as SOR items are concerned, the limit of 25% would apply to the value of SOR schedule as a whole and not on individual SOR items. However, in case of NS items, the limit of 25% would apply on the individual items irrespective of the manner of quoting the rate (single percentage rate or individual item rate).

1.2.28 **TERMINATION OF CONTRACT: -**

In case the work of the contractor is not found satisfactory, or there is a breach of any of the terms and conditions of the contract and/or fails/neglects to carry out any instruction issued to it by DFCCIL from time to time the same can be terminated by DFCCIL on giving of the notice as stipulated in GCC.

1.2.29 **IMPLEMENTATION OF INTEGRITY PACT IN DFCCIL :-**

As per office memorandum no F.No DPE/13(12)/11-Fin Dated 09.09.2011 issued by Ministry of Heavy Industries (DPE) all PSU should enter into Integrity pact in the required Performa in their procurement transaction/ Contracts with suitable changes specific to the situation in which the pact is to be used. The pact, entering into which would be a preliminary qualification for any bidder, essentially envisages an agreement between the prospective vendors / bidders and the DFCCIL, committing the persons/ officials on both sides not to resort to any corrupt practices in any aspect / stage of the contract.

The pact has to be implemented through a panel of independent external monitor who will review independently and objectively the compliance of the obligations by both the parties. As these IEM's are to be appointed by the CVC in consultation with the CVO and are being processed separately.

A copy of pre contract integrity pact is enclosed at Annexure X for signature of bidder as acceptance, as and when Independent External monitor is appointed.

1.2.30 **ORDER OF PRIORITY OF CONTRACT DOCUMENTS:-**

The documents forming the Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of the documents shall be in accordance with the following sequence:

i) The Contract Agreement.

ii) Letter of Acceptance.

iii) Tender Form

iv) General Information

v) Notice Inviting Tender (with Annexes)

vi) Instructions to Tenderers

vii) Special Conditions of Contract

viii) Annexures

ix) Bill of Quantities (BOQ)/Schedule of Rate

x) General Terms and Conditions of Contract

1.2.31 JURISDICTION OF COURTS:-

In case of any disputes/differences between contractor and DFCCIL the jurisdiction shall be of Agra Courts only.

1.2.32 In case of any deviation in downloaded copy of the tender documents, the Master Copy kept in the office of Chief General Manager/TDL/ DFCCIL, will prevail and the interpretation of CGM/ TDL will prevail.

1.2.33 **RISK PURCHASE:-** During execution of this Tender, if any delay is observed due to reasons attributable to tenderer other than force majeure conditions which may cause delay in completion of the work, DFCCIL shall be at liberty to cancel the contract, totally or partially, at any point of time without assigning any reason, whatsoever, and take alternative measures at your risk and cost.

1.2.34 Penalties for Safety Lapses: -Any violation in adhering to the terms and conditions stipulated in I.R GCC July-2014 would also attract to penalties payable by you as per IR GCC July-2014 Provisions.

1.2.35 **RETENTION MONEY:**

Retention money for all contracts shall be recovered from on account/ final bills of the Contractor at 10% of gross value of each bill after adjusting EMD amount till the amount so recovered including EMD amount adds up to 5% of the contract value of the work etc. variation and extra work. No interest shall be payable to the Contractor on the amount towards retention money.

1.2.36 **RELEASE OF RETENTION MONEY:**

1.2.36.1 The Retention Money shall be returned to the contractor after the expiry of the Defect Liability Periodafter passing the final bill based on the No Claim

Certificate with the approval of Competent Authority. The competent authority shall normally be the authority who is competent to sign the Contract Before releasing the Retention Money/ Security Deposit, an unconditional and unequivocal 'No Claim Certificate' from the contractor concerned should be obtained.

1.2.36.2 If requested by the Contractor, 50% of the Retention money may be released on deduction of retention money reaching 5% of the contract value against submission of Bank Guarantee for an equivalent amount by the Contractor in the prescribed Performs from any scheduled Bank. This Bank Guarantee shall be kept valid till the period of three months beyond the expiry of Defect Liability Period. Fixed Deposit Receipt (FDR) from a scheduled bank endorsed in favour of the Employer can be submitted by the Contractor in lieu of the Bank Guarantee for release of 50% Retention Money. In case of the requirement, the Bank Guarantee/FDR shall be extended by the contractor, for the period as directed by the Engineer/Employer.

1.2.37 **PERFORMANCE BANK GAURENTEE**

The procedure for obtaining Performance Guarantee is outlined below:

(a) The successful bidder shall have to submit a Performance Guarantee (PG) within 30 (Thirty) days from the date of issue of Letter of Acceptance (LOA). Extension of time for submission of PG beyond 30 (Thirty) 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 15% per annum shall be charged for the delay beyond 30 (Thirty) days, i.e. from 31st day after the date of issue of LOA. In case, the Contractor fails to submit the requisite PG even after 60 days from the date of issue of LOA, the contract shall be terminated duly forfeiting Earnest Money Deposit and other dues, if any payable against that contract. 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 3% of the contract value:
   (i) A deposit of Cash;
   (ii) Irrevocable Bank Guarantee;
   (iii) Government Securities including State Loan Bonds at 5% below the market value;
   (iv) Deposit Receipts, Pay Orders, Demand Drafts and Guarantee Bonds. These forms of Performance Guarantee could be either of the State Bank of India or of any of the Nationalized Banks;
   (v) Guarantee Bonds executed or Deposits Receipts tendered by all Scheduled Banks;
   (vi) Deposit in the Post Office Saving Bank;
   (vii) Deposit in the National Savings Certificates;
   (viii) Twelve years National Defence Certificates;
   (ix) Ten years Defence Deposits;
   (x) National Defence Bonds and
   (xi) Unit Trust Certificates at 5% below market value or at the face value whichever is less. Also, FDR in favour of CGM/TDL/DFCCIL/Agra (free from any encumbrance) may be accepted.

(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 will not change for variation upto 25% (either increase or decrease). In case during the course of execution, value of the contract increases by more than 25% of the original contract value, an additional Performance Guarantee amounting to 3% (three percent) for the excess value over the original contract value shall be deposited by the Contractor. On the other hand, if the value of contract decreases by more than 25% of the original contract value, Performance Guarantee amounting to 3% (three percent) of the decrease in the contract value shall be returned to the Contractor. The PG amount in excess of required PG for decreased contract value, available with Railway/DFCCILs, shall be returned to Contractor as per his request duly safeguarding the interest of Railway/DFCCILs

(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.The Security Deposit shall, however, be released only after expiry of the maintenance period and after passing the final bill based on 'No Claim Certificate' from the contractor.

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

(g) The Engineer shall not make a claim under the Performance Guarantee except for amounts to which the DFCCIL 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 DFCCIL any amount due, either as agreed by the Contractor or determined under any of the Clauses/Conditions of the Agreement, within 30 days of the service of notice to this effect by Engineer.

(iii) The Contract being determined or rescinded under provision of the GCC,the Performance Guarantee shall be forfeited in full and shall be absolutely at the disposal of the DFCCIL.

1.2.38 **DEFECT LIABILITY PERIOD :** The period of defect liability for the works shall be 12 (Twelve) Months starting from the date of completion of the work or as certified by the DFCCIL.

1.2.39 ELECTRICAL CONTRACTOR LICENSE:

Contractor must have valid Class-'A', Electrical Contractor License issued from appropriate government authority to execute mentioned works.

GENERAL CONDITIONS OF CONTRACT

The General Conditions of Contract July 2014 (Part-I & II) of the Indian Railway/DFCCILs shall be followed with its latest correction slips and amendments issued from Indian Railway/DFCCILs.

The General Conditions of Contract July 2014 (Part-I & II) of the Indian Railway/DFCCILs, along with its latest correction slips and amendments, will form part of the tender/contract documents.

In case, there is an ambiguity in any definition, the decision of DFCCIL regarding the interpretation shall be final and binding.

Wherever there is conflict in any condition between GCC and special condition mentioned in tender documents. The condition mentioned in special condition of contract will prevail. However, DFCCIL decision in this connection shall be final and binding.

PART -I

CHAPTER -III

PRICES AND PAYMENT

1.3.1 SCOPE:

This chapter deals with prices to be paid to the contractor for completion of various items of work. The contractor shall be paid for completed works in accordance with accepted schedule of prices and rates, as stipulated in the tender document.

1.3.2 SCHEDULE OF PRICES:

(a) UNIT PRICES FOR MATERIALS:

The unit prices of materials as given in Schedule of quantities shall be inclusive of all charges including transport, loading/unloading handling all insurance premium, banker's charges, all Taxes, Duties and levies (including Octroi etc.) applicable on works contracts etc.

(b) FOR ERECTION:

The unit prices given in Schedule of quantities shall include cost of erection, testing, commissioning and cover all cost of administration of the contract, insurance premium, bankers' charges for guarantees, cost of storage, loading, unloading and handling of materials, and for any road transport which the Contractor may use for carriage of materials between his depot and depot/s and site of work etc.

Unit prices quoted shall be FIRM. No price variation shall be allowed, on any account.

1.3.3 QUANTITIES:

The approximate estimated quantities of various items of works are included in Schedule of quantities and rates. However, quantities can be increased/ decreased as stipulated in Special Conditions of Contract.

1.3.4 NEW ITEMS OF WORK:

If during the execution of the work, the Contractor is called upon to carry out any new item of work not included in **Schedule-1, Section-1,** the Contractor shall execute such works at such prices as may be mutually agreed in writing with the Purchaser.

1.3.5 DEDUCTION OF TAXES FROM CONTRACTOR'S BILLS:

Wherever the law makes it statutory for the purchaser to deduct any amount towards Sales Tax/Income tax on works contract, the same will be deducted and deposited with the concerned authority.

The tenderer for carrying out any construction work in Uttar Pradesh must get themselves registered from the Registering Office under Section-7 of the Building and other Construction Workers Act, 1996 and rules made thereto by the Uttar Pradesh Government and submit certificate of Registration issued from the Registering Officer of the Uttar Pradesh Government (Labor Department). For enactment of this Act, the tenderer shall be required to pay cess @1% of cost of construction work to be deducted from each bill. Cost of material shall be outside the purview of cess, when supplied under a separate schedule item.

1.3.6 SUBMISSION OF BILLS:

On award of contract, a procedure order for submission of bills for payment shall be jointly drawn by finance and the purchaser. The contractor will be required to submit the bills as per the joint procedure order.

1.3.7 PAYMENT:

80% of the item price (material cost) shall be paid on receipt of material in Railway custody after inspection. If for any item of work, price of material and erection is not separately available, 80% of the cost of item of work will be considered as material cost.

Further payment of material and erection cost to cover 90% of the cost of item of work shall be made on successful testing and commissioning of the installation.

Final Payment – Balance 10% payment shall be released on issue of completion certificate by the Purchasers Engineer.

1.3.8 RELEASE OF PERFORMANCE GUARANTEE:

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.

1.3.9 RELEASE OF SECURITY DEPOSIT:

Security Deposit shall be returned to the Contractor after the following:

(a) Final Payment of the Contract as per relevant GCC clause and

(b) Signature of Final Supplementary Agreement or Certification by Engineer that DFCCIL has No Claim on Contractor and

(c) Issue of Maintenance Certificate on expiry of the maintenance period as per relevant GCC clause.

Forfeiture of Security Deposit:

Whenever the contract is rescinded as a whole under relevant GCC clause , the Security Deposit already with Railways/DFCCIL under the contract shall be forfeited. However, in case the contract is rescinded in part or parts under relevant GCC clause , the Security Deposit shall not be forfeited.

No interest shall be payable upon the Earnest Money and Security Deposit or amounts payable to the Contractor under the Contract, but Government Securities deposited, will be payable with interest accrued thereon as per relevant GCC –Clause.

1.3.10 RATES FOR ITEMS OF WORKS:

(i) The rates, entered in the accepted Schedule of Rates of the Contract are intended to provide for works duly and properly completed in accordance with the General and Special (if any) Conditions of the Contract and the Specifications and drawings together with such enlargements, extensions, diminutions, reductions, alterations or additions as may be ordered in terms of Clause 42 of these conditions and without prejudice to the generality thereof and shall be deemed to include and cover superintendence and labour, supply, including full freight of materials, stores, patterns, profiles, moulds, fittings, centerings, scaffolding, shoring props, timber, machinery, barracks, tackle, roads, pegs, posts, tools and all apparatus and plant required on the works, except such tools, plant or materials as may be specified in the contract to be supplied to the Contractor by the Railway, the erection, maintenance and removal of all temporary works and buildings, all watching, lighting, bailing, pumping and draining, all prevention of or compensation for trespass, all barriers and arrangements for the safety of the public or of employees during the execution of works, all sanitary and medical arrangements for labour camps as may be prescribed by the Railway/DFCCIL, the setting of all work and of the construction, repair and upkeep of all centre lines, bench marks and

level pegs thereon, site clearance, all fees duties, royalties, rent and compensation to owners for surface damage or taxes and impositions payable to local authorities in respect of land, structures and all material supplied for the work or other duties of or expenses for which the Contractor may become liable or may be put to under any provision of law for the purpose of or in connection with the execution of the contract and all such other incidental charges or contingencies as may have been specially provided for in the Specifications.

However, if rates of existing GST or cess on GST for Works Contract is increased or any new tax /cess on Works Contract is imposed by Statute after the date of opening of tender but within the original date of completion/date of completion extended under relevant GCC clause and the Contractor thereupon properly pays such taxes/cess, the Contractor shall be reimbursed the amount so paid.

Further, if rates of existing GST or cess on GST for Works Contract is decreased or any tax/cess on Works Contract is decreased / removed by Statute after the date of opening of tender, the reduction in tax amount shall be recovered from Contractor's bills/Security Deposit or any other dues of Contractor with the Government of India.

PRICE VARIATION CLAUSE in Works Contracts is dealt with in accordance with provisions of of **GCC July 2014 with latest amendments & correction slips.**

As per Railway Board's letter no. 2017/Trans/01/Policy dated 08/02/2018,**Since, the Cost of advertisement value of this tender is less than Rs 5 crore, so PVC will not be applicable.**

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

1.3.13.1 Certificate of Completion of Works: As soon as in the opinion of the Engineer, the work has been completed and has satisfactorily passed any final test or tests that may be prescribed, the Engineer shall issue a certificate of completion duly indicating the date of completion in respect of the work and the period of maintenance of the work shall commence from the date of completion mentioned in such certificate. The certificate, inter alia, should mention that the work has been completed in all respects and that all the contractual obligations have been fulfilled by the Contractor and that there is no due from the Contractor to Railways/DFCCIL against the contract concerned.
The Engineer may also issue such a certificate indicating date of completion with respect to any part of the work (before the completion of the whole of work), which has been both completed to the satisfaction of the Engineer and occupied or used by the Railway. When any such certificate is given in respect of part of a work, such part shall be considered as completed and the period of maintenance of such part shall commence from the date of completion mentioned in the completion certificate issued for that part of the work.

1.3.13.2 Contractor not Absolved by Completion Certificate: The Certificate of Completion in respect of the works referred to in Sub-Clause (1) of this Clause shall not absolve the Contractor from his liability to make good any defects imperfections, shrinkages or faults which may appear during the period of maintenance specified in the tender arising in the opinion of the Engineer from materials or workmanship not in accordance with the drawings or specifications or instruction of the Engineer, which defects, imperfections, shrinkages or faults shall upon the direction in writing of the Engineer be amended and made good by the Contractor at his own cost; and in case of default on the part of Contractor, the Engineer may employ labour and materials or appoint another Contractor to amend and make good such defects, imperfections, shrinkages and faults and all expenses consequent thereon and incidental thereto shall be borne by the Contractor and shall be recoverable from any moneys due to him under the contract.

1.3.13.3 Final Supplementary Agreement: After the work is completed and taken over by the Railway/DFCCIL as per terms and conditions of the contract agreement or otherwise concluded by the parties with mutual consent and full and final payment is made by the Railway/DFCCIL to the Contractor for work done, and there is unequivocal no claim on either side under the contract, the parties shall execute the final supplementary agreement annexed as **Annexure IV**.

1.3.14 Approval only by Maintenance Certificate: No certificate other than maintenance certificate referred to in relevant Clause of GCC of the Conditions shall be deemed to constitute approval of any work or other matter in respect of which it is issued or shall be taken as an admission of the due performance of the contract or any part thereof.

1.3.15.1 Maintenance Certificate: The Contract shall not be considered as completed until a Maintenance Certificate shall have been signed by the Engineer stating that the works have been completed and maintained to his satisfaction. The Maintenance Certificate shall be given by the Engineer upon the expiration of the period of maintenance or as soon thereafter as any works ordered during such period.
The Competent Authority to issue above Maintenance Certificate shall normally be the authority who is competent to sign the contract. If this Competent Authority is of the rank lower than JA Grade, then a JA Grade Officer (concerned with the work) should issue the certificate. The certificate, inter alia, should mention that the work has been completed in all respects and that all the contractual obligations have been fulfilled by the Contractor and that there is no due from the Contractor to Railways/DFCCIL against the contract concerned.

1.3.15.2 Cessation of Railway's/DFCCIL's Liability: The Railway/DFCCIL shall not be liable to the Contractor for any matter arising out of or in connection with the contract for execution of the works unless the Contractor has made a claim in writing in respect thereof before the issue of the Maintenance Certificate under this clause.
1.3.15.3 Unfulfilled Obligations: Notwithstanding the issue of the Maintenance Certificate the Contractor and the Railway/DFCCIL shall remain liable for the fulfillment of any obligation incurred under the provision of the contract prior to the issue of the Maintenance Certificate which remains unperformed at the time such certificate is issued and for the purposes of determining the nature and extent of any such obligations, the contract shall be deemed to remain in force between the parties thereto.

1.3.16.1Final Payment: On the Engineer's certificate of completion in respect of the works, adjustment shall be made and the balance of account based on the Engineer or the Engineer's representative's certified measurements or Engineer's certified "contractor's authorized engineer's measurements" of the total quantity of work executed by the Contractor upto the date of completion and on the accepted schedule of rates and for extra works on rates determined shall be paid to the Contractor subject always to any deduction which may be made under these presents and further subject to the Contractor having signed delivered to the Engineer enclosing either a full account in detail of all claims he may have on the Railway/DFCCIL in respect of the works or having

delivered No Claim Certificate. and the Engineer having after the receipt of such account given a certificate in writing that the whole of the works to be done under the provisions of the Contracts have been completed, that they have been inspected by him since their completion and found to be in good and substantial order, that all properties, works and things, removed, disturbed or injured in consequence of the works have been properly replaced and made good and all expenses and demands incurred by or made upon the Railway/DFCCIL for or in the respect of damage or loss by from or in consequence of the works, have been satisfied agreeably and in conformity with the contract.

1.3.16.2 Post Payment Audit: It is an agreed term of contract that the Railway reserves to itself the right to carry out a post-payment audit and/ or technical examination of the works and the final bill including all supporting vouchers, abstracts etc. and to make a claim on the Contractor for the refund of any excess amount paid to him till the release of security deposit or settlement of claims, whichever is later, if as a result of such examination any over-payment to him is discovered to have been made in respect of any works done or alleged to have been done by him under the contract.

1.3.17 PRODUCTION OF VOUCHERS ETC BY THE CONTRACTOR:

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

(ii) If any portion of the work in a contract of value more than one crore of rupees be carried out by a sub-contractor or any subsidiary or allied firm or company , the Engineer shall have power to secure the books of such sub-contract or any subsidiary or allied firm or company, through the Contractor, and such books shall be open to his inspection.

(iii) The obligations imposed by Sub Clause (i) & (ii) above is without prejudice to the obligations of the Contractor under any statute rules or orders binding on the Contractor.

1.3.18 LABOUR:

1.3.18.1 Wages to Labour: The Contractor shall be responsible to ensure compliance with the provision of the Minimum Wages Act, 1948 (hereinafter referred to as the "said Act") and the Rules made there under in respect of any employees directly or through petty Contractors or sub-contractors employed by him for the purpose of carrying out this contract.

If, in compliance with the terms of the contract, the Contractor supplied any labour to be used wholly or partly under the direct orders and control of the Railways whether in connection with any work being executed by the Contractor or otherwise for the purpose of the Railway such labour shall, for the purpose of this Clause, still be deemed to be persons employed by the Contractor.

If any moneys shall, as a result of any claim or application made under the said Act be directed to be paid by the Railway, such money shall be deemed to be moneys payable to the Railway by the Contractor and on failure by the Contractor to repay the Railway any moneys paid by it as aforesaid within seven days after the same shall have been demanded, the Railways shall be entitled to recover the same from Contractor's bills/Security Deposit or any other dues of Contractor with the Government of India.

1.3.18.2 Apprentices Act: The Contractor shall be responsible to ensure compliance with the provisions of the Apprentices Act, 1961 and the Rules and Orders issued thereunder from time to time in respect of apprentices directly or through petty Contractors or sub-contractors employed by him for the purpose of carrying out the Contract.

If the Contractor directly or through petty Contractors or sub-contractors fails to do so, his failure will be a breach of the contract and the Railway may, in its discretion, rescind the contract. The Contractor shall also be liable for any pecuniary liability arising on account of any violation of the provisions of the Act.

1.3.18.3 Provisions of Payments of Wages Act: The Contractor shall comply with the provisions of the Payment of Wages Act, 1936 and the rules made there under in respect of all employees employed by him either directly or through petty Contractors or sub-contractors in the works. If in compliance with the terms of the contract, the Contractor directly or through petty Contractors or sub-contractors shall supply any labour to be used wholly or partly under the direct orders and control of the Engineer whether in connection with the works to be executed hereunder or otherwise for the purpose of the Engineer, such labour shall nevertheless be deemed to comprise persons employed by the Contractor and any moneys which may be ordered to be paid by the Engineer shall be deemed to be moneys payable by the Engineer on behalf of the Contractor and the Engineer may on failure of the Contractor to repay such money to the Railways deduct the same from any moneys due to the Contractor in terms of the contract. The Railway shall be entitled to recover the same from Contractor's bills/Security Deposit or any other dues of Contractor with the Government of India all moneys paid or payable by the Railway by way of compensation of aforesaid or for costs of expenses in connection with any claim thereto and the decision of the Engineer upon any question arising out of the effect or force of this Clause shall be final and binding upon the Contractor.

1.3.18.4 Provisions of Contract Labour (Regulation and Abolition) Act, 1970:

(1) The Contractor shall comply with the provision of the contract labour (Regulation and Abolition) Act, 1970 and the Contract labour (Regulation and Abolition) Central Rules 1971 as modified from time to time, wherever applicable and shall also indemnify the Railway from and against any claims under the aforesaid Act and the Rules.

(2) The Contractor shall obtain a valid license under the aforesaid Act as modified from time to time before the commencement of the work and continue to have a valid license until the completion of the work. Any failure to fulfill the requirement shall attract the penal provision of the Act.

(3) The Contractor shall pay to the labour employed by him directly or through sub-contractors the wages as per provision of the aforesaid Act and the Rules wherever applicable. The Contractor shall notwithstanding the provisions of the contract to the contrary, cause to be paid the wages to labour, indirectly engaged on the works including any engaged by sub-contractors in connection with the said work, as if the labour had been immediately employed by him.

(4) In respect of all labour directly or indirectly employed in the work for performance of the Contractor's part of the contract, the Contractor shall comply with or cause to be complied with the provisions of the aforesaid Act and Rules wherever applicable.

(5) In every case in which, by virtue of the provisions of the aforesaid Act or the rules, the Railway is obliged to pay any amount of wages to a workman employed by the Contractor or his sub-contractor in execution of the work or to incur any expenditure on account of the contingent, liability of the Railway due to the Contractor's failure to fulfill his statutory obligations under the aforesaid Act or the rules, the Railway will recover from the Contractor, the amount of wages so paid or the amount of expenditure so incurred and without prejudice to the rights of the Railway under the Section 20, Sub-Section (2) and Section 2, Sub-Section (4) of the aforesaid Act, the Railway shall be at liberty to recover such amount or part thereof from Contractor's bills/Security Deposit or any other dues of Contractor with the Government of India. The Railway shall not be bound to contest any claim made against it under Sub-Section (1) of Section 20 and Sub-Section (4) of Section 21 of the aforesaid Act except on the written request of the Contractor and upon his giving to the Railway full security for all costs for which the Railway might become liable in contesting such claim. The decision of the Chief Electrical Engineer regarding the amount actually recoverable from the Contractor as stated above shall be final and binding on the Contractor.

1.3.18.5 Provisions of Employees Provident Fund and Miscellaneous Provisions Act, 1952:
The Contractor shall comply with the provisions of Para 30 & 36-B of the Employees Provident Fund Scheme, 1952; Para 3 & 4 of Employees' Pension Scheme, 1995; and Para 7 & 8 of Employees Deposit Linked Insurance Scheme, 1976; as modified from time to time through enactment of "Employees Provident Fund & Miscellaneous Provisions Act, 1952", wherever applicable and shall also indemnify the Railway from and against any claims under the aforesaid Act and the Rules.

1.3.18.6 Contractor is to abide by the provisions of Payment of Wages act & Minimum Wages act in terms Indian Railways General Condition of Contract. In order to ensure the same, an application has been developed and hosted on website 'www.shramikkalyan.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:

(a) Contractor shall apply for one time registration of his company/firm etc. in the **Shramikkalyan portal** with requisite details subsequent to issue of Letter of Acceptance. Engineer shall approve the contractor's registration in the portal within 7 days of receipt of such request.

(b) 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.

(c) The contractor once registered on the portal, shall provide details of his Letter of Acceptances (LOA) / Contract Agreements on shramikkalyan 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 contractor within 7 days of receipt of such request.

(d) 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 shramikkalyan portal on monthly basis.

(e) 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.

(f) 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 Shramikkalyan portal at **'www.shramikkalyan.indianrailways.gov.in'** till ____Month, ____Year."

1.3.18.7 Provisions of "The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996" and "The Building and Other Construction Workers' Welfare Cess Act, 1996":
The tenderers, for carrying out any construction work, shall get themselves registered with the Registering Officer under Section-7 of the Building and Other Construction Workers Act, 1996 and rules made thereto by the concerned State Govt., and submit certificate of Registration issued from the Registering Officer of the concerned State Govt. (Labour Dept.). The Cess shall be deducted from contractor's bills as per provisions of the Act.

1.3.18.8 Reporting of Accidents: The Contractor shall be responsible for the safety of all employees directly or through petty Contractors or sub-contractor employed by him on the works and shall report serious accidents to any of them however and wherever occurring on the works to the Engineer or the Engineers Representative and shall make every arrangements to render all possible assistance.

1.3.18.9 Provision of Workmen's Compensation Act: In every case in which by virtue of the provisions of Section 12 Sub-Section (1) of the Workmen's Compensation Act 1923, Railway is obliged to pay compensation to a workman directly or through petty Contractor or sub-contractor employed by the Contractor in executing the work, Railway will recover from the Contractor the amount of the compensation so paid, and, without prejudice to the rights of Railway under Section 12 Sub-section (2) of the said Act, Railway shall be at liberty to recover such amount or any part thereof from Contractor's bills/Security Deposit or any other dues of Contractor with the Government of India. Railway shall not be bound to contest any claim made against it under Section 12 Sub-Section (1) of the said Act except on the written request of the Contractor and upon his giving to Railway full security for all costs for which Railway might become liable in consequence of contesting such claim.

1.3.18.10 Provision of Mines Act: The Contractor shall observe and perform all the provisions of the Mines Act, 1952 or any statutory modifications or re-enactment thereof for the time being in force and any rules and regulations made thereunder in respect of all the persons directly or through the petty Contractors or sub-contractors employed by him under this contract and shall indemnify the Railway from and against any claims under the Mines Act, or the rules and regulations framed thereunder, by or on behalf of any persons employed by him or otherwise.

1.3.19 DETERMINATION OF CONTRACT:

1.3.19.1 Right of Railway/DFCCIL to Determine the Contract: The Railway/DFCCIL shall be entitled to determine and terminate the contract at any time, should in the Railway's opinion, the cessation of work becomes necessary owing to paucity of funds or from any other cause whatever, in which case the value of approved materials at site and of work done to date by the Contractor will be paid for in full at the rate specified in the contract. Notice in writing from the Railway of such determination and the reasons therefore shall be conclusive evidence thereof.

1.3.19.2 Payment on Determination of Contract: Should the contract be determined under sub clause (1) of this clause and the Contractor claims payment for expenditure incurred by him in the expectation of completing the whole of the work, the Railways/DFCCIL shall admit and consider such claims as are deemed reasonable and are supported by vouchers to the satisfaction of the Engineer. The Railway's/DFCCIL's decision on the necessity and propriety of such expenditure shall be final and conclusive.

1.3.19.3 The Contractor shall have no claim to any payment of compensation or otherwise, howsoever on account of any profit or advantage which he might have derived from the execution of the work in full but which he did not derive in consequence of determination of contract.

1.3.19.4 Determination of Contract owing to Default of Contractor: If the Contractor should:

(i) Becomes bankrupt or insolvent, or

(ii) Make an arrangement for assignment in favour of his creditors, or agree to carry out the contract under a Committee of Inspection of his creditors, or

(iii) Being a Company or Corporation, go into liquidation (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), or

(iv) Have an execution levied on his goods or property on the works, or

(v) Assign the contract or any part thereof otherwise than as provided in Clause 7 of these Conditions, or

(vi) Abandon the contract, or

(vii) Persistently disregard the instructions of the Engineer, or contravene any provision of the contract, or

(viii) Fail to adhere to the agreed program of work by a margin of 10% of the stipulated period, or

(ix) Fail to execute the contract documents.

(x) Fails to submit the documents pertaining to identity of JV and PAN. Form available in the Regulations for Tenders and Contracts.

(xi) Fail to remove materials from the site or to pull down and replace work after receiving from the Engineer notice to the effect that the said materials or works have been condemned or rejected.

(x**ii)** Fail to take steps to employ competent or additional staff and labour as required.

(xiii) Fail to afford the Engineer or Engineer's representative proper facilities for inspecting the works or any part thereof as required.

(xiv) Promise, offer or give any bribe, commission, gift or advantage either himself or through his partner, agent or servant to any officer or employee of the Railway/DFCCIL or to any person on his or on their behalf in relation to the execution of this or any other contract with this Railway.

(xv)(A) At any time after the tender relating to the contract, has been signed and submitted by the Contractor, being a partnership firm admit as one of its partners or employee under it or being an incorporated company elect or nominate or allow to act as one of its directors or employee under it in any capacity whatsoever any retired Engineer of the gazetted rank or any other retired gazetted officer working before his retirement, whether in the executive or administrative capacity, or

whether holding any pensionable post or not, in the Railways/DFCCIL for the time being owned and administered by the President of India before the expiry of one year from the date of retirement from the said service of such Engineer or Officer unless such Engineer or Officer has obtained permission from the President of India or any officer duly authorized by him in this behalf to become a partner or a director or to take employment under the contract as the case may be, or

(xv)(B) Fail to give at the time of submitting the said tender:

(a) The correct information as to the date of retirement of such retired Engineer or retired officer from the said service, or as to whether any such retired Engineer or retired officer was under the employment of the Contractor at the time of submitting the said tender, or

(b) The correct information as to such Engineers or officers obtaining permission to take employment under the Contractor, or

(c) Being a partnership firm, the correct information as to, whether any of its partners was such a retired Engineer or a retired officer, or

(d) Being in incorporated company, correct information as to whether any of its directors was such a retired Engineer or a retired officer, or

(e) Being such a retired Engineer or retired officer suppress and not disclose at the time of submitting the said tender the fact of his being such a retired Engineer or a retired officer or make at the time of submitting the said tender a wrong statement in relation to his obtaining permission to take the contract or if the Contractor be a partnership firm or an incorporated company to be a partner or director of such firm or company as the case may be or to seek employment under the Contractor.

(f) Submits copy of fake documents / certificates in support of credentials, submitted by the tenderer

Then and in any of the **said Clause**, the Engineer on behalf of the Railway/DFCCIL may serve the Contractor with a notice in writing to that effect and if the Contractor does not within seven days after the delivery to him of such notice proceed to make good his default in so far as the same is capable of being made good and carry on the work or comply with such directions as aforesaid of the entire satisfaction of the Engineer, the Railway shall be entitled after giving 48 hours' notice in writing under the hand of the Engineer to rescind the contract as a whole or in part or parts (as may be specified in such notice) and after expiry of 48 hours' notice, a final termination notice should be issued.

Note: Engineer at his discretion may resort to the part termination of contract with notices ,only in cases where progress of work is more than or equal to 80% of the original scope of work.

1.3.19.5 Right of Railway/DFCCIL after Rescission of Contract owing to Default of Contractor: In the event of any or several of the courses, referred to in Sub-Clause (1) of this Clause, being adopted:

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

(b) In the contract which has been rescinded as a whole, the Security Deposit already with railways under the contract shall be encashed/ forfeited and the Performance Guarantee already submitted for the contract shall be encashed. The balance work shall be got done independently without risk &

cost of the failed Contractor. The failed Contractor shall be debarred from participating in the tender for executing the balance work. If the failed Contractor is a JV or a Partnership firm, then every member/partner of such a firm shall be debarred from participating in the tender for the balance work in his/her individual capacity or as a partner of any other JV /partnership firm.
Further the authorized representative of failed Contractor cannot be accepted as authorized representative in new contract.

(c) In the contract rescinded in part or parts,
(i) The full Performance Guarantee for the contract shall be recovered. No additional Performance Guarantee shall be required for balance of work being executed through the part terminated contract. The contract value of part terminated contract stands reduced to the balance value of work under the contract.
(ii) The Security Deposit of part terminated contract shall be dealt as per relevant clause of GCC.
(iii) The defaulting Contractor shall not be issued any completion certificate for the contract.
(iv) The balance work shall be got done independently without risk & cost of the failed Contractor. The failed Contractor shall be debarred from participating in the tender for executing the balance work. If the failed Contractor is a JV or a Partnership firm, then every member/partner of such a firm shall be debarred from participating in the tender for the balance work in his/her individual capacity or as a partner of any other JV /partnership firm.
(v) Further the authorized representative of failed Contractor will not be accepted as authorized representative in new contract.

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

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

PART – I

CHAPTER- IV

SCOPE OF WORK & EXPLANATORY NOTES

1.4.1 Explanatory notes for various items of work in schedule .

1.4.2 The basic quantities of components and materials required to make up a unit of work for selected items are indicated for guidance only. There may be minor variation to suit erection but no adjustment in prices of Schedule 1&2 shall be made on that account. In estimating the prices for various items of work provision for loss and wastage in transit and erection should be provided for over and above the basic quantities of components and materials required to make up a unit work, indicated herein, except where otherwise specified for materials supplied by the purchaser.

1.4.3 In the explanatory notes 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 and nuts and washers where required for fastening the small parts steel work to any structural member. The term "attachment" wherever used is intended to cover castings, forging, machined or welded components or fittings, which are attached directly to a structural member, or mounted on small parts steel work and shall include bolts and nuts for fastening the attachment to the structural member or small parts steel work.

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

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

1.4.6 Reconciliation of Materials Supplied by the Purchaser:

(a) The following procedure shall be adopted for the final reconciliation of the various 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 materials and/or workmanship shall be returned to purchaser by the Contractor.

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

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

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

Note:

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

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

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

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

1.4.8EXPLANATORY NOTES

Note: 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.

1.4.8.1Sub – Section -1 (General)

Item no. 1 – Fabrication , development and supply of sectioning diagram, schematic and TSWR board for all stations- Fabrication and supply of pre compressed particle laminated boards white in colour with aluminum beadings 1/2"x1/2" on all around the board and an arrangement of fixing/ hanging on wall of adequate strength on top boards as required.

The price shall cover supply of sectioning diagram, schematic & TSWR and erection of TSWR board with supply of fixing material (Clamp, back flat strip & fasteners).

Item no. 2 – Fabrication , development and supply of sectioning diagram, schematic and TSWR board for all stations- Developing the sectioning diagram, schematic diagram & TSWR diagram with computerized digital printing on adhesive vinyle of adequate size as required.

The price shall cover supply of sectioning diagram, schematic & TSWR and erection of TSWR board with supply of fixing material (Clamp, back flat strip & fasteners).

Item no. 3 – Supply without insulator and erection of 25 kV Post Insulator.

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

Item no. 4 – Supply without insulator and erection of a suspension (9 ton) Insulator.

The price is applicable to the provision of 9 ton suspension insulator assembly for suspension of an All-Aluminum 2x25 kV feeder, 288 sq.mm or 120 sq.mm overhead equipment conductor or any other similar type of suspension. The price shall cover supply of all components, required for the suspension assembly including the appropriate suspension clamp but excluding 9 ton insulator assembly and small parts steel work with bolts nuts etc. if any. The price shall cover erection of all

components, including the 9 ton insulator assembly but excluding small parts steel work, with bolts and nuts etc. if any. The price shall include the cost of provision of a flat armour tape only to be used in connection with suspension of 'Feeder' conductor.

Item no. 5 – Adjustment on bracket assemblies for lowering/raising the height of contact & catenary wire where encumbrance is changed.

The price shall cover supply & replacement of all required components of bracket assembly for changing the encumbrance at a cantilever location to lower/raise the height of contact and catenary wire and adjustment of droppers on adjacent spans. The price shall also include all necessary adjustment on the bracket assembly and the adjacent spans on both sides to suit the required profile of OHE. The price shall cover temporary off loading and reloading of OHE from/on the cantilever, whichever required.

Item no. 6 – Extra on erections under power block @100% for item no 3.

The price under this Item covers extra charges over and above, the erection rates of item no 3 for the work in the vicinity of energized OHE and feeders, which call for a power block (shut-off of traction power). The price payable under this Item shall be extra over the erection rates of the Items referred to above, provided such work is not called for on account of non-compliance with specification approved drawings instructions given by the purchaser. Extra erection rates under this Item will not be payable if power block is given for a total duration of 4 hours or more in a day. Where the prices under this Item are applicable, the contractor shall finalize the quantities to be done under a power block jointly with the purchaser's engineer prior to taking work in hand.

Item no. 7 – Turnout adjustment

The price shall cover turnout adjustment while raising/restoring of OHE or for any modification work in OHE and to make it normal/fit at turnout locations by pantograph checking.

Item no. 8 – 100% Extra for turnout adjustment

The price under this item cover extra charges over and above erection rate of items as per (view detail) of schedule for erection of equipment in the vicinity of energized overhead equipment and feeders or erection of equipment with joints in equipment energized or on energized equipment which calls for a power block (shut off of traction power). The price payable under this item shall be 100% extra over the erection rate of the items referred to above, provided such work is not called for on account of non -compliance with specifications, approved drawings and instructions given by the purchaser from time to time.

The extra erection rate under this item will not be payable, if power block is given for a total duration of 4 hrs. or more in a day. Where the prices under this item are applicable, the contractor shall finalize the quantities of various items of work to be done under a power block, jointly with the purchaser's Engineer prior to taking the work in hand.

1.4.8.2 Sub-section-2. (concrete) - Foundations to be casted in this work is of circular type. In particular condition RDSO type foundations may be casted with prior approval of DFCCIL . Design for circular type foundations will be made available by DFCCIL

Item no. 1 – Concreate for Foundation and Plinth - In other than Hard Soil & Rock (supply)

The price shall cover excavation, supply and handling of all materials and accessories, temporary arrangements for excavation in hard soil and concrete/masonry drains/walls requiring use of chisel and hammer or requiring blasting, Shoring where necessary, casting concrete including frame work where necessary, tamping of concrete, grouting of masts and finishing the top of concrete foundation or anchor blocks. The price also includes dismantling of all connected temporary arrangements, back filling with earth and compacting the same to the required height and width as per drawing to ensure safety of foundation, confining the exposed height of foundation block to within 10 cm., and removal of spoil. The Purchaser's Engineer shall certify where use of chisel and hammer or blasting has been necessary. The contractor shall arrange for supply of explosives and all tools and plants for blasting operations at his own cost. If half or more of the depth or width of excavation is in hard soil/concrete/masonry drains/walls or in rock, the entire foundations shall be paid or as the case may be. If half of the depth or width of the excavation is in hard soil/concrete/

masonry drains/walls and the other half is in rock, the entire foundation shall be paid. The price shall include the cost of cement.

Notes for measurement:-

1. The payable volume of the foundations shall be the designed for which the hole has been blasted, irrespective of the actual configuration assumed by the latter due to the blasting.
2. The depth of the excavation shall be measured from the formation level to the maximum excavated point.

1.4.8.3 Sub Section – 3 (Ferrrous)

Item no. 1 – Supply and erection of steel structure (traction mast) Galvanised and fabricated type B - series (B-150,B-175,B-200 etc.)

The price shall cover the cost of supply of B-Series traction mast 9.5 m and/or 11.4 m long i.e. B-Series Mast fabricated and galvanized as per RDSO Drg No. ETI/C/0071 (Mod-E), TI/DRG/CIV/B-Mast/00001/13/0 with latest mod and specification No. ETI/OHE/13 (4/84), with latest specification or Emergency Mast of RDSO specification Drg. No. ETI/C/0072. Steel shall be conforming to IS-2062/2011 Gr. A and Zinc conforming to IS-209 latest. The price shall also cover the supply of all size of B-Series mast required which has not been mentioned. The price shall cover cost of erection, alignment and setting before grouting of individual traction masts and main masts of Switching and Booster Transformers stations including those for head spans. The price shall also include the cost of repairing of platform shelters in case the shelter is dismantled/removed/damaged during the course of erection of a mast at platforms.

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

Item no. 2 – Supply & erection of Fabricated and galvanised structure (O,N,R type portal, TTC) with necessary component other than masts.

The price shall cover the cost of supply of O, N & R type portals, TTC (Boom length 5.5 mtr./8 mtr.) with components as per RDSO's Drg No. :

(i) ETI/C/0008 Sheet No.1 latest Mod for 'N' type
(ii) ETI/C/0017 Sheet No.1 latest Mod for 'O' type
(iii) ETI/C/0011 Sheet No.1 latest Mod for 'R' type
(iv) ETI/C/0009 Sheet No.1 latest Mod for TTC

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

The price shall cover, cost of erection, alignment and setting before grouting, wherever required, of portals assembly of boom components and erection of the same. The prices shall also include supply and erection of galvanised bolts, nuts washers etc. wherever required as per approved designs and drawings. The price shall cover assembling, adjustment and erection of all types of booms including TTC booms and any special structures across the track. The price shall also include the cost of repairing of platform shelters in case the shelter is dismantled/ removed/damaged during the course of erection of a portal at platforms.

Item no. 3 – Supply & Erection of Fabricated and Galvanised Steel other than Portal & Traction masts (SPS)

The price shall cover the cost of supply of all fabricated Small parts of steel work excluding fasteners which are required to be supplied by the contractor. The quantity of steel work shall also be included under this item as per the schedule. For standard fabricated steel works for which RDSO’s approved drawing are available, the weight of steel.

Item no. 4 – Supply & Erection of Structure bond size

The price shall cover supply of all materials including mild steel flat (40x6) required to provide a structure bond connecting a traction mast or structures to the nearest non-track circuited rail, or earth electrode, including all fasteners at both ends. The price shall include shaping and drilling of the bond as well as rail and erection of all materials including the bond. The price shall also include

provision of heat shrinkable PVC tube for structure bond under track circuited rail. This would also cover connection or earthing terminals of equipments like L.T. Transformers with structure and then to rails as per relevant drawings. The price shall cover provision of buried rail to running rail as per RDSO drawing No.ETI/OHE/G/05306, with latest mod and shall include supply, fabrication and erection of all connections (including drilling at both ends) and refilling of buried rail pit. The digging up of 1 m deep pit for the purpose of buried rail shall be done by the Railways.

Item no. 5 – Supply & Erection of Single Earth Electrode.

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

Item no. 6 – Supply & Erection of material for earthing of each mast as per DFCCIL drawing & specification.

The price shall cover the supply of all materials including 17.2 mm dia,4 meter long,250 micron thick copper clad steel rod. The price shall also cover erection of copper earth electrode & connection to structure bonds.

1.4.8.4 Sub – Section -4 (Non Ferrous)

Item no. 1 – Supply & Erection of 25KV Lightweight Section Insulator assembly with suspension (as per DFCCIL drawing & specification)

This is an imported item. The price shall cover supply of all components required for a standard section insulator assembly (serving both the overhead equipment conductors) including special droppers for supporting the equipment and all terminal fittings for conductors and the section insulator assembly. The price shall cover erection and adjustment of all components including light weight section insulator assembly, insulating rod on the catenary and droppers.

Item no. 2 – Supply without insulator & Erection of 25 KV 1600 Amp Single pole isolator (manually operated) without earth contact assembly

The prices shall cover supply and erection of Isolator switches of approved make, complete with arcing horns, operating rods, operating rod guides, mounting base including cost of 25 KV Solid Core Post and Operating rod insulator (Cost of insulator will be paid in Schedule-1, Section-5).The price shall also cover supply and erection of a number plate of approved design for each isolator. The price shall not include supply and erection of small parts steel work complete with bolts and nuts etc. for support of isolators and for support of operating rods on gantries/ masts, and insulator to support jumper and jumper connectors.

Item no. 3 – Extra for supply & Erection of an earth contact assembly in an insulator

The price shall be payable as extra for erection of an earth contact assembly in any isolator The price shall cover the cost of supply and erection of 3x25 mm copper connections between the earth contact assembly and the structures.

Item no. 4 – Supply & Erection of large copper jumper wire

The price shall cover the supply of Large jumper wire size 105 Sq.mm(19/7/1.02mm) made of annealed stranded 100% pure copper conductor as per RDSO's specification No.ETI/OHE/3(2/94) with A&C Slip No 1(latest spec.), and on a flat rate basis, the supply of all components and fittings required for providing a flexible copper large jumper connection, including supply of parallel clamps, bi-metallic and Aluminum Copper Al-Cu strips, wherever required, and bolted type terminal connectors where ever required. The price shall also cover the erection of the complete jumper assembly including jumper wire.

Item no. 5 – Supply & Erection of small copper jumper wire

The price shall cover supply of Small jumper wire size 50 Sq.mm(19/1.80 mm) made of annealed stranded 100% pure copper conductor, and on a flat rate basis, the supply of all components and fittings required for providing a flexible small copper jumper connection, including supply of parallel clamps, bi-metallic and Aluminum Copper Al-Cu strips, wherever required, and bolted type terminal connector where ever required.

Item no. 6 – Supply & Erection of solid copper bus bar 18mm

The price shall cover supply and erection of solid copper busbar 18mm including bending and shaping including all fasteners and accessories.

Item no. 7 – Supply & erection of solid copper bus bar connectors : Bus terminal (6310)

The price shall cover supply and erection of solid copper bus-bar junctions and connectors of various types specified, including bolts, nuts, etc, required at junctions or terminations of solid copper bus-bars.

Item no. 8 – Supply & Erection of solid copper bus bar connectors : Bus terminal (6320)

The price shall cover supply and erection of solid copper bus-bar junctions and connectors of various types specified, including bolts, nuts, etc, required at junctions or terminations of solid copper bus-bars.

1.4.8.5Sub Section -5 (Insulator)

Item no. 1 – Supply of 25 kV post insulator

The price shall cover only supply of 25 kV Post insulator to be supplied at site for execution of work.

Item no. 2 – Supply of 25 kV 9 tonne porcelain insulators (CD-1050)

The price shall cover only supply of any of the following 9 tonne insulator assembly to be supplied at site for execution of work.

Item no. 3 – Supply of 25 kV operating rod insulator & post insulator for 25 KV single pole isolator.

1.4.8.6 Sub- Section -6 (100 % Extra on erection rate for work done under power block)

Item no. 1 to 6 –

The price under this item shall cover extra charges over and above erection rates of various items (specified in the tender schedule) in the vicinity of energized overhead equipment, feeders or erection of equipment which joints equipment already energized or on energized equipment which calls for a power block (Shut off traction power). Contractor shall provide sufficient trained staff for discharging and earthing of relevant section as directed by purchaser during power block (Discharge rod shall be arranged by contractor).

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

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

1.4.8.7 Sub-Section-7 (Transportation of material)

Item no. 1 – Handling /Loading, unloading and transportation of DFC supply/Released OHE/PSI/GPS/Material such as Mast, Bus-Bar, AT, Brackets. Fittings, contact / catenary wire from IMD/IMSD to site & release material from site to IMD/IMSD.

PART-II

CHAPTER-I

OVERHEAD EQUIPMENT

2.1.7 Track Gauge & Track Centers:

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

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

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

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

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

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

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

2.1.8 Sectioning:

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

(b) Yard Supply: The sectioning diagram/s also indicate the tracks in station yard and siding whose equipment is electrically independent from those of other tracks.
The overhead equipment in yards and sidings may be fed through isolator switch or interrupter in accordance with arrangement indicated in the sectioning diagram/s.

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

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

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

2.1.9

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

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

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

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

2.1.10 Overhead Equipment:

(a) Brief Description: Essentially the traction overhead equipment shall consist of a standard catenary wire from which a grooved contact wire is suitably suspended by means of droppers. In order to cater for a speed of 160 Kmph the contact wire is given a pre-sag of about 50 mm for 58.5 m span and reduced suitably for other spans or as per latest guideline.

(b) Catenary: The catenary wire shall be hard drawn stranded magnesium copper 19/2.8mm, 120mm² in size.

(c) Contact wire: The contact wire shall be grooved and made of hard drawn copper having 150 sq. mm cross section.

(d) Droppers: Droppers shall be made of stranded conductor wrought copper alloy BZII Cu-Mg wire approximately 10 mm2 flexible, Dia. 4.5 mm.

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

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

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

(h) Anti - theft jumper: Anti-theft jumper of 50 mm sq nominal, 19/1.8 mm in size shall be used in out of run wire of conventional OHE and copper cadmium anti creep wire as an anti-theft measures.
The jumper connecting the aluminum conductors to any other conductor's terminal or clamp shall be made with the aid of suitable bi-metallic clamps. All aluminum jumpers of size 19/7/1.4 mm bore 3/4 hard shall be used to connect other aluminum conductors such as return conductors. The tail ends of feeder wires from the strain clamps at the termination of a feeder, return feeder of return conductor to be connected directly to a terminal or clamp where possible to avoid the use of a separate jumper wire.

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

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

An anti- creep shall be provided at a point approximately midway between two tensioning devices and not more than 750 meter from any one of them. The general arrangement of an anti -creep is shown in a drawing listed in Annexure. The arrangement shall generally consist of the galvanized steel wire anchored on the masts adjacent to the anti-creep central mast in accordance with the relevant drawing. Alternatively, the arrangement may consist of catenary on either side of the boom of a portal with the contact wire running through and providing a jumper connection as per general arrangement shown in typical drawing listed in Annexure.

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

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

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

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

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

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

2.1.13 Tensions:
(a) Regulated:
(i) In regulated equipment the tension in the catenary shall be 1428 kgf and in the contact wire shall be 1632 kgf in each conductor.

(b) **Unregulated:** At 35^0 C without wind 1000 kgf in each conductor.

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

2.1.14 Clearances:

(a) **General:** The distance between live parts and parts at earth potential (or part likely to be earthed) shall be as large as possible. In all cases the values given in Standard Schedule of Dimensions of DFCCIL, 1676mm Gauge (2013 revised) shall be observed along with any other supplementary rules, that may be issued by the Railway Board and advised to the Contractor.

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

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

2.1.15 Height of Contact Wire:

(a) Normally, the minimum height of contact wire above rail level shall be 5.80 m at mid span under the worst temperature condition. This height may be reduced under bridges and the in tunnels to the extent permitted by the Purchaser. The minimum height shall be 4.80 m. In electric locomotive sheds and over electric locomotive inspection pits, the minimum height shall be 5.80 m. At level crossing the minimum height shall be 5.80 m. Any infringement restricting minimum height at level crossings will be removed by the Purchaser. These heights could be varied as per new guidelines/instructions.

(b) **Gradient of Contact wire:** Any change in the height of the contact wire shall be made gradually and the maximum slope shall not normally exceed 3 mm per meter on main line and 10 mm per meter on sidings. The end spans of any section with a gradient of contact wire shall have a slope not greater than half the main slope.

2.1.16 Stagger: To ensure uniform wear of contact strips of pantographs, the contact wire shall normally be staggered in a manner which will be indicated by the Purchaser.

2.1.17 Termination:

(a) **General:** Traction overhead lines shall be terminated using components specified. The termination may be carried forward by one or two spans if anchoring facilities so required.

(b) Terminating wires shall be electrically connected to the conductors with which they are likely to approach closely or come into contact under normal conditions.

(c) **Supplementary insulation:** If a terminating wire passes a live conductor to which it should not be connected, i.e., in a different elementary section, the portion of the terminating wire close to the live conductor shall be separated by means of insulators. The insulators shall be located in such a manner as to clear the swept zone of the pantograph under the worst conditions and as far away as is possible from live conductors.

2.1.18 Type of structures:

(a) **Cantilever:** The overhead equipment of main tracks in case of multiple track sections shall be electrically and mechanically independent of one another by provision of independent cantilever masts to the maximum extent possible (See Annexure for general arrangement drawing).

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

(c) Portals: In case where the tracks in a multiple tracks section do not permit location of independent masts and where automatic tensioning of overhead equipment is required, rigid portals may be used. Also in the vicinity of points and crossings, portals may be used, provided it is not possible to have prescribed setting with independent cantilever masts. These structures shall be equipped with standard bracket assemblies for supporting individual equipment of different tracks. The use of such structures is to be avoided as far as possible and for this purpose the Purchaser will arrange to slew the tracks, if practicable. A single portal shall normally not cover more than five tracks. Portal structures will also be employed at anti creep central locations and such portals will have necessary guy arrangement.

(d) Foundations: Foundations for all structures shall be designed in an economical manner by following the methods of design indicated by the Purchaser and observing the schedule furnished by him.

2.1.19 Cantilever assembly: The bracket assembly carrying overhead equipment shall be of the swiveling type. The assembly shall be such that the tubes adopted will permit easy adjustment of the whole equipment after erection to cater for displacement of the track during maintenance up to the extent of 100mm on either side except as otherwise relaxed by the Purchaser. In special locations, pull off arrangements may be used with the approval of the Purchaser with the approval of the Purchaser (See Annexure for drawing of the bracket assembly and component).

2.1.20 Overlaps: Overlaps shall be provided at suitable intervals such that neither the tension length exceeds 1,500 m nor the fixed anchor to balance weight anchor exceeds 750 meter.
(a) General: The two contact wires at the overlapping zone shall be parallel to each other in a place parallel to the track and run separated from each other (See Annexure for general arrangement drawings).

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

2.1.21 Points and Crossings: Arrangements of overhead equipment of different type e.g. regulated, unregulated or tramway at points and crossings shall be in accordance with the standard drawings listed in Annexure.

2.1.22 Light weight Section Insulators:
(a) Brief description: The section insulators shall provide effective electrical isolation of two elementary electrical sections of overhead equipment and permit smooth passage of the pantograph in either direction at all speeds up to 120 Km/h. The outline of a section insulator is shown in a drawing listed in Annexure. The section insulators shall be of light weight section insulator type.
(b) Size: The section insulator assembly shall be such it should be possible to install the insulator in overhead equipment provided the axial distance between the cat nary and the contact wire with section insulator in position is not less than 450 mm.
2.1.23 Isolators: Manually operated isolator single or double pole type with or without earth contact assembly may be required to bridge certain section insulator or insulated overlap. In certain large Yards, isolators controlling different lines may be grouped together on a gantry (See Annexure).

2.1.24 Return Conductors: At all booster stations, the return conductor shall be provided with a cut-in- insulators. At point midway between two booster stations, the return conductor be

connected to the rail through suitable terminal which will provide a means of isolation, when required. The drawings showing the general arrangement of connection to the return conductor are listed in Annexure. The connection from the isolating arrangement to the rail shall be by means of 2 MS flats, each of minimum size 40mm x 6mm and at feeding stations 4 MS flat each of minimum size 40mm x 6mm. The flats shall be given to coats of red oxide zinc chromate's primer to IS:2074 CNSL based and finished with two coats of Bitumen 85/25 blown grade. Return conductors may be taken underground in special locations such as under overline structure with the approval of the Purchaser. The return conductor shall also be connected with buried rail on either side the overlap before the feeding post and cut- in- insulator should be provided on the return conductor before the feeding post within the overlap limits and two independent rail connection links from the masts on either side on the cut- in- insulator. The same practice is to be adopted in all sub - sectioning posts and sectioning posts for the return conductor.

2.1.25 Bridges and tunnels over Bridges:

(a) Over Bridge: The complete overhead equipment (i.e., both the catenary and the contact wires) shall normally pass under overline structures. Additional intermediate suspension points shall be provided if necessary, to ensure the specified minimum height of contact wire being maintained. In general case the cat nary may be anchored on either side of the over line structure and the contact wire carried underneath.

(b) Tunnels and Cuttings: The arrangements proposed for the equipment in tunnels and cuttings shall take into account the special features of each location and shall be in accordance with general design specified.

(c) Safety Screen: On overbridges metallic protective screens shall be provided in order to prevent and person from coming into contact with the live overhead equipment. Such screens shall be properly earthed.

(d) Height Gauge at Level Crossing:

Height gauge is to be provide at all level crossing in accordance with the general arrangement drawings listed in Annexure.

2.1.26 Bonding and Earthing:

(a) Bonding and earthing shall be done in accordance with the code for bonding and earthing.

(b) Longitudinal and Transverse Bonding: Longitudinal and transverse bonding of tracks, bonding of structures including traction structures to rails and associated earths shall be provided in accordance with the above code.

(c) Traction Structure Bonding: Every traction mast or structure shall be bonded to a non -track circulated rail unless it is provided with a continuous earth wire or it is individually earthed by means of an earthing station. For general arrangement drawings, see Annexure.

(d) Double Rail Track Circuit: Where track circuits are provided on both rails, traction masts/structures shall not be bonded to rails but shall be provided with an earth wire made of steel reinforced aluminum conductor consisting of 6 strands of aluminum and one strand of steel each of 4.09mm dia. (RACOON) (Conforming to IS 398 Pt. II 1976). The earth wire shall be run on traction masts or structures. They shall be divided into different electrical sections not exceeding 1,000 m long. The earth wire in each such section shall be connected at two traction structures, situated at distance not exceeding 250m on either side of the midpoint of the Section to two 10 Ohm, earths which will be provided by the Contractor.

PART - II

CHAPTER - II

FOUNDATIONS

2.2.1 Scope: This chapter deals with the design of foundations and anchor blocks for traction structures carrying OHE (including those on bridges) structures at switching and other concrete work. It also deals with specification for concrete. **Either Circular type or RDSO type or both type foundations to be casted in this work. Design for circular type foundations will be made available by DFCCIL**

2.2.2 Design of Foundations:

(a) Soil Pressure: For design of foundations of traction structures carrying overhead equipment, the Contractor shall determine the type and allowable bearing pressure of soil at suitable interval and adopt the type and size of the foundation suitable for the particular location with the help of the approved employment schedules. In cases of particularly weak soil, the bearing pressure may have to be determined for each location where so advised by Purchaser.

Soil bearing pressure, using SPT (Falling weight equipment) should be determined generally for 5 Km interval or less wherever change of soil is encountered. In general IS/Code of Practices (IS :6403) shall be followed. In addition, at every 250 m and soil bearing pressure should be determined by Dial gauge type Penetro-meter. Dial gauge penetro-meter shall be made available by the Contractor for each foundation site so as to facilitate cross check at each individual location.

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

(b) Structures Carrying Overhead Equipment: Foundation for traction structures carrying overhead equipment shall be either of the side bearing side gravity or new pure gravity type according to the location, formation of the sub grade and bearing pressure of the soil. In new filled up soil or cinder foundation, pure gravity sand filled core foundations, foundation with cast in-situ reinforced concrete piles or cantilever type foundation with counter weights guyed foundations may be adopted.

(c) On Bridge Piers: complete design of foundations for traction structures on bridge to suit different locations and conditions will be furnished by the Purchaser.

(d) Masts and Fabricated Structures at Switching Stations: Foundations for the masts of gantries at switching stations shall be of the pure gravity type, the base of which shall rest on consolidated soil.

(e) Fencing Posts: Foundations for fencing posts shall rest in consolidated soil if the depth of unconsolidated soil is less than 1.5 m below the datum level and shall be rectangular parallel piped in shape. If the depth of unconsolidated soil is more than 1.5 m, the foundation block shall rest on reinforced concrete piles cast–in-situ or reinforced concrete foundation may be adopted as desired by the Purchaser.

(f) Typical Design: Typical designs and drawings of side bearing and pure gravity and side gravity type foundations were included in the drawings listed in Annexure.
Latest Employment schedule for standard foundations for traction structures for various locations and types are to be followed.

(g) Special Foundations: In the case of foundations at locations not covered by the employment schedules furnished by the Purchaser, the Contractor shall prepare special designs and furnish full design calculations justifying the choice of the type of foundations for such locations. In black cotton soil specially piles foundations of under reamed type as per RDSO's standard designs (Reference RDSO's drawing No.ETI/C/0062 Mod. `A') or any other approved design may have to be cast at limited locations for trial purpose. The tenderer may furnish the technical details of alternative design, construction methods proposed to be adopted and their previous background/experience, if any. The decision of the Purchaser with regard to feasibility and suitability of adoption of the alternative design for each type of foundation will be final.

(h) Equipment Pedestals: Pedestals for interrupters and LT supply transformers where required, shall be of mass concrete with the base resting on consolidated soil.

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

2.2.3 Bearing Pressure: The following allowable bearing pressure may generally be expected for various kinds of soil. The information is given for general guidance only.

(i) Average good soil in banks and cutting 11,000 kg per Sq. meter.

(ii) Morrum soil in cutting 22,000 kg per Sq. meter.

(iii) New banks & bad soils in bank & cuttings 5,500 kg per Sq. meter.

(iv) Black Cotton Soil: Pure gravity foundation shall normally be adopted. However, under reamed pile foundations may be adopted at the option of the Purchaser in limited locations for trial purpose. In the case of dry black cotton soil, the soil should be subjected to a bearing pressure as close as possible but not exceeding 16,500 kg/sq. meter the depth of the foundation block being not less than 2.8m. In the case of wet black cotton soil, the soil should be subjected to a bearing pressure as close as possible but not exceeding 8,000 kg/sq. meter.

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

2.2.4 Concrete: Concrete for foundations shall be nominal mix of grade M-10 obtained by mixing cement, coarse aggregate, fine aggregate and water in accordance with proportions given vide Table 3 of IS:456, 1978. For grouting, muffing, embedding of structures in foundations and for cable trenches at switching stations, nominal mix concrete M-15 obtained by mixing materials in proportions as indicated in Table - 3 of IS:456 - 1978 shall be used. Volume batching may be adopted vide clause 9.2.2 of IS:456 - 1978.

In judging the acceptability of the materials, quality of concrete and the method of work, the Purchaser will generally observe the provisions of the "Indian Standard Code of Practice for Plain and Reinforced Concrete, IS 456-1978. The crushing strength of concrete shall not be less than the limits given below:

Crushing Strength of 15 cm cubes by Works Test:

Concrete	At 7 days age	At 28 days age
(a) M-10	70 Kg cm^2	100 Kg/cm^2
(b) M-15	100 Kg cm^2	150 Kg/cm^2

Note:

(a) Test specimens of works tests shall be taken at the site of work for mixtures of concrete ready for pouring into the foundation hole. All tests shall be carried out in accordance with IS: 516-1959 or its latest version. The sample of concrete from which test specimens are made shall be representative of the entire batch. One Sample will be taken for each 50 cum or part thereof.

(b) Age is reckoned from the day of casting.

2.2.5 Size and Grading of Aggregates: The graded coarse aggregate 40 mm nominal size (table 2 of IS: 383-1970) shall be used for foundation. A coarse aggregate for grouting muffs and embedding shall be 20 mm graded nominal size as per table 2 of IS: 383-1970 (Specification for coarse and fine aggregate from natural sources for concrete).
Fine aggregate shall be graded from 10mm downwards. The maximum size of aggregate for under reamed pile foundation shall be 20mm graded nominal size.

2.2.6 Sand Cored Foundations: After erection of masts in sand cored foundations, the core hole of the foundation blocks shall be filled with dried sand and covered with a layer of bitumen of 80 mm thickness below 30 mm from top level of the block. A hemispherical shaped muff shall be provided on such foundations in lieu of standard type.

2.2.7 Sinking of Concrete Shells: Where the water table is high, one or more sections of reinforced concrete shells may have to be sunk before casting concrete. The size of each shell shall be 1,200 mm outside dia x 50mm thick x 600 mm high reinforced with 6mm (1/4") dia rods spaced 150mm. Apart from both longitudinally and circumferentially, the concrete shall be of grade M-15.

2.2.8 Type of Foundation in Black Cotton Soil: The foundations in dry black cotton soil should be of type BC or NBC or any other type as approved by the Purchaser.

2.2.9 Cement: The cement to be used in the construction of RCC structures should be of ordinary Portland cement to IS 269-1976.

PART - II

CHAPTER -III

STRUCTURES AND STEEL WORK

2.3.1 Scope: This chapter deals with the design of steel structures and steel work for overhead equipment, switching stations and L.T. supply transformer station and the specification for steel masts.

2.3.2 Types: Structures and gantries may consist of any or more of the following type:

(i) Broad flange beams.
(ii) Rolled steel joists (I Section).
(iii) Fabricated steel structures (Welded/bolted).

Structure/uprights shall generally be embedded in concrete foundation blocks, in special cases structures may be secured by means of holding down bolts.

2.3.3 Design:
(a) Steel Structures: Designs for steel structures shall, except where otherwise provided comply with the "Indian Standard Code Practice for use of Structural Steel in General Building Construction" IS 800 -1984. The thickness of smallest steel section used shall be 5mm for galvanized members.

(b) All the steel structures and small parts steel for carrying overhead equipment are to be fully galvanized after drilling and fabrication as per specification ETI/OHE/13(4/84) and with A and C slip number 1 of 5/86, 2 of 4/90, 3 of 4/90, no painted structures are to be used.

2.3.4 Cantilever Mast:
(a) Load: For purposes of all designed and worst possible combination of all loads that may occur, shall be considered.

The load shall include the following (weights to be assumed for design of structures are shown against important items):

(i) Weight of overhead equipment (1.60 Kg/meter for each conventional and 1.32 Kg/meter for each composite OHE).

(ii) Weight of bracket supporting the overhead equipment (60 Kg/normal Bracket).

(iii) Weight of a man (60 kg).

(iv) Weight of an earth wire (0.32 Kg/meter).
(v) Weight of feeder, return conductor or other special equipment wherever they occur.

(vi) The effect of concentricity of vertical and horizontal loads on the bracket due to variation in temperature.

(vii) Wind loads perpendicular and paralleled to the track.

(viii) Radial forces on the mast, due to stagger, curvature, anchorage etc.

(ix) Weight of the mast itself.

(x) Any load or loads that may occur due to the special location of the structure.

(b) Deflection: Notwithstanding the provisions contained in IS:800-1984 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 be exceed 8 cm at the level of the contact wire.

(c) Torsion: The tensional rotation of the mast due to permanent loads shall not exceed 0.1 radian.

(d) Typical design: The typical design of traction mast is included in the set of standard drawings listed in Annexure. Employment schedules for standard masts for various locations and types are included in the standard drawings listed in Annexure to enable selection of suitable types for different location and local conditions.

2.3.5 Anchor Masts:

(a) Masts at which overhead equipment will be anchored shall also normally be of the same type as those in other locations. Anchor masts shall normally be provided with suitable guys but struts may be permitted in special cases.

(b) Dwarf Masts: At certain locations where due to local conditions it is not feasible to anchor the guy rod on a foundation block in the ground, a dwarf mast shall be used in accordance with approved designs.

2.3.6 Head spans:

(a) Load: The loads to be considered shall be as detailed in Para 2.3.4(a) as far as applicable and at their worst combination.

(b) Sag for Head-span Wire: The sag of the head span wire shall be approximately one - tenth (1/10) of the span.

(c) Minimum Tension in Cross-span and Steady-span Wire: For purpose of design, a minimum tension of 200 kg shall be ensured in the span wires for worst combination of temperature and wind load.

(d) Deflection of Mast: Deflection at the top of the mast or structure shall be limited to one eightieth (1/80th) of its height above foundation.

(e) Typical Design: Typical design for head span mast carrying overhead equipment of 4 tracks will be furnished to the Contractor.

2.3.7 Portal:

(a) General: Portals shall be of fabricated steel of standard types of purchaser's designs. The most important designs are covered by Drawing listed in Annexure.

(b) Load: The loads shall be as detailed in Para 2.3.4(a) applicable.

2.3.8 Structures on Bridges:

(a) The structures may be either cantilever masts or portals (Hinged or fixed at base) depending on the type and condition of bridge pier capping. As for as possible, cantilever masts grouted in foundation blocks on piers will be used. Where this is not possible cantilever masts with holding down bolts or suitable portals (hinged or fixed at the base) may be adopted.

(b) Designs of structures on bridges to suit different locations and local conditions will be furnished to the Contractor by the Purchaser.

2.3.9Special Structures: In the event of structures at locations not covered by the employment schedules furnished by the Purchaser, the Contractor shall furnish complete design calculations justifying the choice of the type of structures for such locations.

2.3.10Setting of Structures:

(a) The setting is the distance from the central line of the track, on straight or curve to the face of the mast/structure of fitting located on the mast.

(b) On straight and outside of curve, the standard setting shall be as per the relevant drawing included in Annexure. Minimum setting of structures shall be 2.5 m plus curve allowance as required. Whenever this distance could not be provided, specific approval of Purchaser shall be obtained before erection. Setting of portal upright, overlap/turn-out structures, anchoring structures and other masts carrying more than one OHE will be 3.0 m wherever possible.

(c) Extra clearance in curves: The minimum setting of structures on curves shall be determined by adding to the above minimum figures an extra clearance indicated in the table included in the set of standard drawings listed in Annexure.

(d) In case of structures carrying counter weight assemblies, the term setting shall refer to the minimum distance of the counter-weight from the track centre under the worst conditions of wind.

(e) Structure on Platforms: The setting of structures on platforms shall be not less than 4.75 m.

(f) Structures near Signals: In the vicinity of signals, structures shall be located in a manner which shall ensure good visibility.Where necessary, the setting shall be increased as per the relevant drawing included in Annexure.

(g) Setting of Structures: The value of setting of masts/structures shall be painted on each mast/structure. The figure shall be 25mm 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.

2.3.11Number of Structures Carrying Overhead Equipment: All structures shall be numbered in accordance with the numbering given in the approved overhead equipment layout plans. Retro-reflective number plates shall be provided on each mast on structure as per approved design.

2.3.12 Steel: Steel conforming to IS:2062 - 1992 shall be used for all fabricated steel work.

PART - II

CHAPTER - IV

EQUIPMENT, COMPONENTS AND MATERIALS

2.4.1 General: This chapter deals with the details and specifications of the equipments, components and materials to be used for traction overhead equipment, switching stations, booster transformer stations and LT supply transformer stations. This chapter does not cover structures and foundations, which are dealt in Part II, Chapter II and III. In general based on the specifications issued by various bodies, such as Indian Standards Institution, British Standards Institution etc, specifications have been issued by the CORE.

2.4.2 Compliance with Standard Specification: In the technical specification of 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) Indian standards (abbreviated as IS or BIS).

Tenderers may, however offer equipment in accordance with the appropriate national standard specifications of the country of manufacture. But such offers will be treated as deviations and should be quoted clearly English rendering of the text and illustrations of the national standard specifications and explanatory notes on the specific deviation from IEC, British or Indian Standards in question, shall also be submitted in Form 3. In case of doubt, the Purchaser shall decide the clause and specification applicable and the contents of the specification and standard mentioned above shall guide such decisions.

2.4.3 Quality Assurance: The provision of Part I for quality assurance will apply, including facilities to be provided by the manufacturer.

2.4.4 Inspection and Test: These comprised inspection and tests conducted at the manufacturer's factory for ensuring quality of manufactured items as part of the Quality Assurance Programme.

2.4.4.1 All works connected with this contract shall be done in accordance with the standard established methods of inspections and shall comply with relevant Indian Electricity Rules, ISI code, RDSO /CORE Specification and Standards.

2.4.4.2 Normally the inspection of all the equipments, materials, fittings and components will be carried out by RITES at the manufacturer’s premises. In case of extreme emergency /exceptional circumstances, material may be inspected by authorized representative of DFCCIL at the manufacturer’s premises before dispatch and no materials shall be dispatched from the manufacturer’s premises until these are inspected and/or approved. Any unreasonable delay in inspection will be reasonable ground for extension of time for completion of the work.

2.4.4.3 All erection work will be subjected to inspection by the authorized representative of DFCCIL to ensure that the work is done in accordance with the specification and approved drawing. The decision of the authorized representative of DFCCIL shall be final in respect of acceptability or otherwise of any material, fitting, component or equipment required for the work.

2.4.4.4 The works which shall be rejected by the inspecting officer of the DFCCIL, the contractor shall replace such rejected equipments/assemblies of the work forthwith but in any event not later than a period of one week from the date of rejection. The contractor shall bear all the cost of such replacement including freight etc but without being entitled to any extra time on this account.

2.4.5 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 proto type test. Three copies of the routine test carried out of each equipment shall also be furnished, after the equipment is passed by the Purchaser's representative for inspection.

2.4.6 INSPECTION:

2.4.6.1 The works shall be accepted after inspection by the DFCCIL particularly for the following aspects.

i. Setting out of Electrical equipment.
ii. Approval of quality of works.
iii. Erection, testing & commissioning as per the approved drawings and the Indian Standard codes of practice.
iv. Safety works to conform to Indian Electricity Rules. These aspects shall be checked during periodical inspections. Any defects, deficiencies noticed in the works will be recorded in the site order book so that the contractor acts upon it without loss of time.

2.4.6.2 The cost of the inspection will be on DFCCIL accounts subjects to any other provisions contained hereunder or elsewhere in contract. One week's notice must be given by the contractor to the Inspecting Officer to take up the inspection.

2.4.6.3 The contractor shall provide without any extra cost to the DFCCIL all materials, equipments, machine, plant, tools and labour etc of every kind of which the DFCCIL inspecting officer may consider necessary for any test and examination to be made at site or elsewhere.

2.4.6.4 All the equipments and material shall be of best quality and will be tested/inspected by the Engineer or Engineer's representative at site of work and approved before they are installed/used in the works covered in the contract. If the contractor uses any equipment's materials without the prior approval of DFCCIL these are liable to be rejected.

The decision of the Inspecting Officer with regard to the acceptance or rejection of the equipment/work will be final and binding on the contractor

2.4.7 Bulk manufacture: Bulk manufacture may be undertaken only after specifications approved of the Purchaser or his representative has been obtained indicating that tests on the proto types are satisfactory. Where prototype has already been approved in connection with manufacturer may proceed after exemption from proto type tests is received from the purchaser in writing.

2.4.8 Interchangeability: All equipments, components and fittings shall be interchangeable and supplies shall be in accordance with the purchaser's design unless otherwise specifically approved by him. Components such as fuses, indication lamps etc should be replaceable with substitutes available indigenously as far as possible. Important components and fittings and their drawings have been listed in Schedule.

2.4.9 Technical specification: Following specifications (latest revision) will govern the supply and testing of important materials, components and equipments:

Structural Steel:	IS 2062-1992
	IS 800-1984
	IS 808-1989

Tensile Testing: IS 1608 - 1972 for steel products etc.
IS 1731 - 1971
IS 2004 - 1991

Welding: IS 816 - 1969

Tin Bronze Castings: IS 306 - 1983

Aluminum Bronze Castings: IS 3091 - 1965

Malleable Iron Castings: IS 2108 - 1977

Grey Iron Castings: IS 210 - 1978

Aluminum Castings: IS 617 - 1975

Copper Strip for Formed Fittings: IS 1897-1983

Contact Wire: ETI/OHE/76(6/97)with A & C slip No 1,3,4,5,6,7,8 & 9

Annealed stranded copper Conductor for: ETI/OHE/3(2/94) with A&C jumper wire slip No.1 issued on 4(95)

Copper Bus-bar: RE/30/OHE/5(11/60)

Steel Tubes: ETI/OHE/11(5/89)

Hot dip zinc galvanization of steel masts: ETI/OHE/13(4/84) with A&C (Rolled and fabricated) tubes and Fittings slip No.3 of (4/90)

Stainless steel wire rope: TI/SPC/OHE/WR/1060(06/06) with A&C slip 2 of (5/07)

Solid core Porcelain Insulator: TI/SPC/OHE/INS/0070(04/07) with A & C Slip No-01 & 02 (10/16)

Silicone Composite Insulators: TI/SPC/OHE/INSCOM/1071, Rev-01 (12/16)

25 kV Single and Double pole Isolators: ETI/OHE/16(1/94) with A & C for RE slip No. 2 (03/04)

Bolts, Nuts and Washers: TI/SPC/OHE/FASTNERS/0120 with A&C slip No.5 of (03/13)

Aluminum Alloy section and tube for 25 kV: ETI/OHE/21(9/74)

Standard Drawings and Traction: ETI/OHE/53(6/88) with A&C slip No.5 of Overhead Equipment (11/06)

Light Weight Section Insulator: Sheet-1, W/3/PS/1030, Rev.-D Typical arrangement of light weight section insulator with suspension (Ref. No. 1001316) EDFC

Enameled Steel Plates: ETI/OHE/33(8/85)

Retro-Reflective Structure Number Plates: ETI/OHE/33A(12/97) with A &C Slip no. 8 (11/12)

Fittings for 25 kV, 50 HZ, AC: ETI/SPC/OHE/FITTINGS/0130 (10/13) with OHE A&C slip No.1 (10/13)

Cadmium Copper Conductor: ETI/OHE/50(6/97) with A/C slip no-1 to 5 for OHE traction (09/16)

Bimetallic (Al -Cu) Strip : ETI/OHE/55(4/90)

Specification for 3-pulley type regulating equipment (3:1 ratio) with A & C Slip No. 1 (09/16): TI/SPC/OHE/ATD/0060 Rev. 1

Technical Specifications for Fittings: ETI/SPC/OHE/FITTINGS/0130(10/13) for 25 KV AC OHE

Specification for discharge/earthing pole Assembly for 25 kV ac Traction: ETI/OHE/51(9/87)

Specification for continuous cast copper wire rods Slip No. 1 to 4 (09/16): ETI/OHE/65(8/87) with A & C

Code of bonding and earthing for 25kV AC 50 Hz single phase traction system: ETI/OHE/71(11/90) (03/93)

Specification for 4 axle car for winding and/or unwinding of contact wire and catenary wire: ETI/OHE/72(11/91)

Gearless hand operated pulling and Lifting machines (TIRFOR) (11/99): TI/SPC/OHE/TOOLPL/1990

Ratchet lever Hoist (Pull - lifts): TI/SPC/OHE/TOOLPL/1990 (11/99)

Insulated Cadmium copper catenary 19/2.1mm. diameter for provision under Over line structures in the 25 KV AC Electric traction: TI/SPC/OHE/INSCAT/0000 with A & C Slip No. 1 & 2

2.4.10 (a) Nomenclature and Marking: All components and fittings supplied by the contractors shall bear the respective identification number and a mark to identify the source of supply except in the case of galvanized tubes, bolts and nuts and/or any other fittings as may be agreed to by the purchaser.

(b) In case of insulators, galvanized steel tubes, stainless steel wire rope and conductors, name of manufacturer shall be specified in "As Erected" drawings for identification.

2.4.11 Steel Work and Protection against Rust:

(a) Galvanizing: All ferrous materials and fittings shall be hot dip galvanized according to the Specification ETI/OHE/13(4/84) with A & C slip No.1 of 5/86), 2 & 3 of (4/90).

(b) Painting: Some components or parts may, with the approval of the purchaser, be protected only by paint and parts as protected shall be given two coats of composite Aluminum primer and two coats of aluminum paints. The second coat of aluminum paint shall be applied after erection.

(c) Rectification at Site: In case of modifications, which would damage the protective coat, repairs to such damage would be allowed only in exceptional circumstances. The part damaged shall be protected in accordance with the method indicated in specification ETI/OHE/13/(4/84) with A&C slip 1 of 5/86 or 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 for Unregulated Tramway type Equipment:
Unregulated equipment shall normally span two tracks and the contact wire carried on V- Type clamps suspended from a span wire. The span wire shall be provided with a turn buckle at only one end.

2.4.13 Droppers:
(a) General Designs: The droppers shall generally be designed as shown in standard drawings and made of copper wire about 5mm dia meter conforming to IS:282, and shall be attached to the cat nary wire by a copper dropper clip. The contact wire shall be held by a clip of aluminum bronze as shown in the standard drawings. The distribution of dropper shall be in accordance with standard design.
(b) Loading: The droppers shall be able to withstand a vertical load of 200 Kg. at the point of attachment to the contract wire and the clip shall not slide under horizontal load of 120 Kg.
(c) The permissible tolerance in the overall length of a dropper will be ± 5mm.

2.4.13 (a) Insulators: All insulators except those on return conductor and earth wires shall be of the solid core type. Disc insulators shall be used on return conductors and earth wires or other locations as desired by the Purchaser. All solid core insulators shall conform to TI/SPC/OHE/INS/0070 (04/07) with A & C Slip no-01 & 02 (10/16) or TI/SPC/OHE/INSCOM/1071, Rev-01 (12/16) as the case may be.
(b) Interchangeability: For free inter changeability only the following types of insulators shall be used. While the shapes of the insulators may vary slightly from those shown in the drawings, the essential dimensions of the galvanized malleable cast iron caps as given in standard drawings shall be adopted.
(i) Stay- arm Insulators: These insulators will be used in conjunction with the tubular stay arm of all bracket assemblies.
(ii) Bracket Insulators: These will be used at the base of each bracket assembly in conjunction with bracket tubes.
(iii) 9 -Ton Insulators: These will be used at all places for cut in and terminal insulation including these in return conductors, but excluding those in earth wire.
(iv) Sold Core Post Insulators: These will be used at all places for supporting isolator mechanism, bus bars, jumpers etc of 25 KV.

2.4.14 Ending Fittings and Splices:
(a) General Designs: Terminating or ending fittings and splices on copper conductors shall be of the cone type clamping on both the inner and outer strands of conductors except for contact wire ending clamps which may be wedge type. The arrangements shall be easy to install and also be such as would apply the clamping pressure gradually without shock (See ETI/OHE/49(9/95) with A&C slip No.1 of 3(97).
For Aluminum Alloy/pure aluminum 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 threads no damage shall occur when they are subjected to a load equal to two third of the ultimate strength of the wire.
(c) Restricted use of Splices: The use of splices shall generally be avoided and their use shall be restricted to the minimum necessary. Over main tracks, there shall be no splice in the contact wire on first erection. Elsewhere, not more than one splice be used in any tension length (i.e. anchor to anchor) for which prior approval shall be taken from the Purchaser. Additional splices may,

however, be provided to enable retention of conductors which are found defective during and/or after erection. Splices may also be permitted for repair of damage due to theft or railway accidents.

(d) Strength of Assembled Fittings: The strength of fittings assembled with appropriate conductors or wires shall not be less than that of the conductors or wire itself.

(e) Additional Terminating Wires: Cadmium copper stranded wire of 65 sq.mm nominal section of 37/.2.1mm (as used in head span construction) may be used as addition al terminating wires for extending single and double conductors respectively, if termination at the nearest structure is not feasible.

2.4.15 Electrical Connections for OHE:

(a) General Designs: All electrical connections between conductors shall be made by parallel clamps. The general arrangements of connections are shown in the standard drawings, listed in Annexure.

(b) Jumper: Copper jumpers shall be of any of the following:

(i) Large Jumper of annealed copper in accordance with specification ETI/OHE/3 (2/94) A and C Slip No.1 of April-1995.

(ii) Small jumper of annealed copper in accordance with the specification IS 434 Pt-I. Aluminum jumpers, wherever used, shall be of all aluminum stranded conductor 19/7/4 mm bare 3/4 H generally conforming to IS:8130:1984.

(c) Bus Bars: Bus bar or rigid jumpers in copper where used shall be of 18mm dia of copper rod in accordance with RE/30/OHE/5(11/60). Aluminum bus bars wherever used shall be of 36/30.4mm or 36/28mm tubing. Aluminum tubular bus bars shall be made of alloy to IS:5082-1981. The tolerance on diameter and thickness shall be as per class-I IS:2673-1979.

(d) Feeders: Feeders shall be of all aluminum conductor 19/3.99mm (Spider).

(e) Return Conductor: The return conductors shall be of all aluminum conductor 19/3.99mm (SPIDER) and is included in a drawing listed in Annexure.

(f) Earth wire shall be of steel reinforced aluminum conductor 7/4.09mm (Raccoon) conforming to IS 398 -(Part II) 1976.

2.4.16 Regulating Equipment:

(a) A general arrangement is shown in the standard drawings listed in Annexure. The regulating equipment should have a minimum adjustment range of 950mm. Stainless steel wire rope in accordance to TI/SPC/OHE/WR/1060 (06/06) with A & C slip no. 1 & 2 (05/07) 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 in) measured transverse to the track under the worst condition of wind. The vertical upward movement shall be listed with a fixed top.

(c) Reduction Ratio: Reduction ratio in the arrangement used shall be five for winch type and three in three pulley type.

2.4.17 Head-span Construction:

(a) Size and Factor of Safety: All span wires used in head span construction shall be stranded cadmium copper of 65 sq.mm or 130 sq.mm cross section. All the wires shall be designed with a factor of safety of not less than 4 under the most unfavorable conditions.

(b) Turn Buckles: Each span wire shall be equipped with a turn buckle at each end of the span.

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

2.4.18 Isolators: 25 KV Isolator switches shall comply with specification as indicated in Para 2.4.9.

2.4.19 Bus Bars:

(a) No splicing will normally be allowed in the tubular bus bars unless the length of the bus bar exceeds 6m.

(b) General: The bus bar shall be clean, smooth, mechanically sound and free from surface and other defects. Provision shall be made where necessary to allow for expansion and contraction of bus bars caused by temperature variation. The open ends of bus bars shall be covered by suitable tubes cap, wherever the tubular bus bars are required to be bent, the radius of the bend shall be not less than 200mm.

(c) Joint: The joints in bus bars shall be mechanically technically and electrically sound so that the temperature rise under normal working conditions does not exceed 40^0 C for an ambient temperature of 65^0 C.

(d) All aluminum joints shall be thoroughly cleaned and smeared with suitable corrosion inhibiting joint compound before and after assembling the joint. Similar procedure shall be followed for connecting the equipment terminals to the aluminum bus bars with bimetallic connectors.

PART – II

CHAPTER -V

DESIGNS & DRAWINGS

2.5.1 General:
(a) This chapter deal 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, witching stations, booster transformer stations and LT supply transformer stations in an expeditious and economic manner.

(b) Responsibility: It is to be clearly understood that all original designs and drawings shall be based on a thorough study. General designs and dimensions shall be such that the Contractor is satisfied about the suitability of the designs for the purpose. The Purchaser's approval will be based on these considerations and notwithstanding the Purchaser's acceptance, the ultimate responsibility for the correct design and execution of the work shall rest with the Contractor.

2.5.3 Standards for Drawings: All designs, legends notes on drawings and schedules of materials shall be in English and shall be prepared in the metric system. All designs and drawings shall conform to specification RE/OHE/25(3/66).

2.5.4 Basic Designs:
(a) Standard Designs: Where the Contractor adopt designs and drawing conforming to standard designs, drawings and specifications of the Research, Designs and Standards Organization, Manak Nagar, Lucknow (RDSO) for basic arrangements, equipments, components and fittings of traction overhead equipment, switching stations booster transformer stations and LT supply transformer stations and adopts employment schedules furnished by the Purchaser, he shall verify such designs and drawings and employment schedules and satisfying himself that these are correct and the latest approved drawings, before use. Within two months of the issue of letter of Acceptance of Tender the Contractor shall indicate to the Purchaser, the list of standard basic arrangement, components and fittings, drawings and employment schedules, which he will adopt for the purpose of the work. The procedure outlined in specification shall be followed for approval of basic designs.

(b) Deviations: Normally deviation from the standard drawings of the Purchaser will not be accepted. However, in exceptional cases where the Contractor desires to suggest improvements as a results of his experience or other developments, he shall justify his proposals with supporting explanatory note.

2.5.5 Special Designs:
(a) In cases where standard designs, drawings or employment schedules do not cover requirement of special location or site conditions, the Contractor shall submit his own designs or drawings along with supporting calculations and notes for scrutiny and approval of the Purchaser.

(b) Such special designs shall generally be in conformity with basic designs furnished by the Purchaser and in accordance with the specifications. If the Contractor wishes to adopt special designs which do not conform to the general basic designs of the Purchaser, he shall submit alternative designs and drawings justifying his proposal.

2.5.6 Particular Designs and Working Drawings for OHE:

(a) Contractor's Pegging Plans: The Contractor shall carry out survey and prepare overhead equipment pegging plans. He shall submit such plans for approval after checking their feasibility at site.

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

(c) Provisional Layout Plans: The contractor shall prepare and submit overhead equipment layout plants incorporating the following information:

(i) The run of wires in different thickness or color in special cases and termination.

(ii) The run of wires for future wiring indicated to the contractor, in dotted lines.

(iii) Exact position of all cut- in- insulators, including section insulators.

(iv) Direction and value of stagger at each traction structure location.

(v) Clearance of live conductors to structures in the vicinity including bridges, signals gantries etc.

(vi) Layout of feeders.

(vii) Jumper connections and connection to switches and switching stations.

(viii) List of infringements.

(ix) Kilometer numbers and type of structures.

(x) Location and number of switches.

(xi) Schematic sectioning diagram drawn to a convenient scale showing section insulator, number of switches, elementary sections and connections to the switches and switching stations.

(xii) Table giving reference of approved profile drawings, feeder layout plans and other relevant drawings.

(d) OHE Profile Drawings: After completion of the overhead equipment layout plans, the Contractor shall prepare an overhead equipment profile drawing showing the actual height of the contact wire under each over line structure, the gradient and height of the contact wire on either side of the structure and the encumbrances at structure until normal height of contact wire and encumbrances are restored.

(e) Cross Section Drawing: While the layout plans are being finalized, the Contractor shall submit for approval, insofar as yard between outermost points and crossing are concerned, cross section drawings for each structure showing guy rods, if any, indicating the cross section of the formation, height and nature of the bank, whether new or old, nature of soil, type of foundation

block, structure proposed, reverse deflection of the structure and all necessary particulars for erection of the foundation and the structures. In the preparation of drawings, care shall be taken to show all obstructions such as Signal wires, points rods and their correct location in reference to track/tracks as well as underground obstructions like pipes, cables etc after collecting such information from the site.

In open line sections, cross-sections shall be submitted in the following Performa, separately for each Railway line. For special foundation drawings with all necessary details shall be submitted to the Purchaser. In case of side bearing foundation with extra depth, formation details at such location and necessary details of anchor foundation will be submitted.

Cross Section for the Open Route Section:

Km----------to----------
S.No. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Location No.

Chainage

Setting Distance in 'm'

Step Distance in 'm'

B.M. Code

Soil Type & Pressure

Foundation Type & Size

Mast Size & Length in 'm'

Mast Embedded Length in 'm'

Reverse Deflection Cm

Super Mast Length (m)

Cross Arm Length (m)

Any Obstruction

(f) Final Layout Plans: After all the cross- section drawings in a section covered by layout plan are finalized and foundations are casted, the Contractor shall revise the layout plans to take into account any modifications to the locations of structures during the process of casting of foundations.

(g) Structure Erection Drawings: The Contractor shall then submit structure erection drawings for each structure incorporating all the details included in the cross-section drawing for the structure and as erected at site and the details of the bracket assembly, mast extensions, isolator mounting frame and anchorage of overhead equipment, feeder return conductors proposed for each structure together with all particulars necessary for the correct erection of overhead equipment at the structure. For structures with isolators, the details of electrical connection shall also be incorporated. In open line sections the Contractor shall submit structure erection particular in the

typical Performa as given below separately for each main line track in addition to particular details as indicated in the Performa for cross-section drawings. Modification to this Performa if found necessary will be finalized at the time of the structure erection drawings.

Sr. No. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Location No.

Chainage

---

1. Encumbrance
2. Contact wire height

3. Stagger
i) Cat nary
ii) Contact

4. Stay arm
i) (a) M
ii) CODE

5. Bracket
i) (b) M
ii) CODE

6. REGISTER
i) C/D(m)
ii) CODE

7. STD/BENT Code

8. Identification Mark: Other Reference/Codes for Misc. items line steel work for stay/bracket attachment Misc. single/double cat etc. will be indicated.

2.5.7 Schedule of Quantities:

(a) Within a month of the issue of Letter of Acceptance of tender, the contractor shall assess the quantities of various items of work including various components and fittings as covered in Schedule 1, Section 2 and submit Schedule 1, Section-2 (Assess 1) along with the corresponding quantity of various fittings and components for approval of the Purchaser. Such an assessment shall be revised at suitable intervals after the first assessment is approved till the work is completed. Such reassessments denominated as Schedule 1, Section-2 (Assess.2) (Assess. 3) etc., shall also be submitted for approval of the Purchaser.
On receipt of approval of each & final layout plan from the purchaser, the following schedules of quantities relating to each layout plan shall be submitted within a fortnight.

(i) Schedules of number of masts, weight of different masts and total weight of masts.

(ii) Schedules of number of foundations, types volume of different foundations and total volume.

(iii) Schedule of quantities of various items of work other than masts and foundations under Schedule -I.

(iv) Schedule of net tension lengths of contact, cat nary and feeder wires and lengths required to be ordered.

(v) Schedule of length of other wires and conductors required to be ordered and

(vi) Schedules of small parts steel-work.

2.5.8 Submission of Drawing Schedules:

(a) The submission of designs and drawings for approval shall be done in the manner indicated below.

In case Contractor wish to deviate from standard drawings, he should submit to the Purchaser revised drawings with full details of deviation sought explaining the necessity of deviation, calculations and other supporting documents. The Purchaser, if satisfied about the necessity and adequacy of deviations, shall refer the matter to RDSO for necessary approval. In case of deviations on working drawings, decision shall be communicated by the Purchaser to the Contractor. The number of copies of drawings which shall be submitted are indicated in the following sub - pares. The Purchaser will return one copy of the drawing either with approval, subject to modification where necessary or with comments. The Purchaser shall endeavor to return this copy within a period of fifteen days from the date of receipt and shall normally return the copy within a month. Where drawings are returned with comments or approval subject to modifications, the Contractor hall submit to the Purchaser within fifteen days of receipt of such advice revised drawings for approval taking into account the comments or modifications. Also the Contractor shall as far as possible avoid correspondence on such comment and shall endeavor to settle any difference of opinion on the comment by discussions with the Purchaser's Engineers. No drawings shall be resubmitted without incorporating the modifications required by the comments of the Purchaser, unless the Purchaser has agreed to the deletion of such comments.

(b) Deviation from Standard: In case of deviations from standard designs and drawings, copies of correspondence and drawings shall be sent in duplicate to the Dy. Chief Electrical Engineer/Const/North Central Railway, Allahabad or his successor/nominee. In the particular case of deviation in the design of fittings the drawings of deviation in the design of fittings the drawings submitted by the Contractor shall be actual manufacturing drawings complete with tolerances and full specifications of the materials used. In addition, four samples of the modified fittings shall also be submitted after the drawings are approved.

(c) Special Design: Special designs to meet the requirement of particular locations and local conditions shall be submitted in due time in duplicate for approval.

(d) Contractor's Pegging Plans: The contractor should survey and prepare pegging plans and submit three copies of such plans for approval.

(e) Cross Section Drawings: Cross-section drawings shall be submitted for approval in two copies for a convenient section at a time separately for sections within station limits. Such drawings shall be submitted progressively and as for as possible without gap.

(f)OHE Layout Plans and Profile Drawings: Overhead equipment layout plan, provisional and final and profile drawings shall be submitted for approval in three copies.

(g) Structure Erection Drawings: Structure erection drawings shall be submitted for approval in two copies for a section at a time separately for section within station limits and sections outside station limits, progressively and without gaps.

(h) Schedule of Quantities: Schedules of quantities for each approved layout plan/switching station shall be submitted for approval in two copies.

(i) Distribution Copies: On receipt of Purchaser's qualified approval to the Contractor's drawings, Schedule of quantities, the Contractor, shall submit original tracings of those drawings and schedules for the signature of the Purchaser in token approval within seven days of the receipt of approval and the Purchaser shall as far as possible return the same to the contractor within 7 working days thereafter. On receipt of the tracing from the purchaser, the contractor shall submit copies for distributions to field officers and other department as indicated below within 7 days of receipt of approval tracings:

i. Standard designs including fittings drawings: 8 copies.
ii. Special designs: 8 copies.
iii. Final pegging plans: 8 copies.
iv. Structure cross- section drawings: 6 copies.
v. OHE layout plans: 14 copies
vi. OHE profile drawings: 8 copies
vii. Structure erection drawings: 8 copies
viii. Schedule of quantities: 6 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.

2.5.9 Completion Drawings and Schedule: After completion of work, all drawings and designs submitted by the Contractor and approved by the purchaser shall be made up to date incorporating actual supply and erection particulars including the name of make of insulators, galvanized steel tube, stainless steel wire rope etc. The mark of conductors shall be specified in the "As erected" OHE Layout plans, SED and other relevant drawings for identification. Such drawings and schedules shall then be verified and corrected, if necessary, by the Contractor jointly with the Purchaser's representatives. The verified and corrected drawings shall be supplied in four sets, one of which shall be transparencies of linen or film reproduction or any other durable material approved by the Purchaser.

PART - II

CHAPTER -VI

ERECTION AND INSTALLATION OF EQUIPMENT

2.6.1Scope: This chapter deals with the methods of erection and installation of traction equipment, including casting of foundations and erection of structures.

2.6.2 Methods of Erection: All work shall be done in accordance with methods of erection and installation of equipment approved by the purchaser. In the case of switching station, booster transformer stations, LT Supply transformer stations, standard methods adopted for erection and installation of electrical equipment shall be adopted.

2.6.3 Sectioning: The entire equipment shall be erected in accordance with the finally adopted sectioning diagram and in such a way so as to facilitate sectioning which may be required in future and which will be indicated by the purchaser.

2.6.4 Inspection: All erection and installation work shall be subject to inspection by the purchaser to ensure that the work is done in accordance with the specification, approved designs and drawings and is of the best quality suitable for the purpose.

2.6.5 Measurements: All measurements for location of structures and foundations shall be made with the aid of steel tapes. On curves, these measurements shall be taken on the outer rail of the middle track in the case of odd number of and on the inner Rail of the first outer tracks from the center of the formation in the case of an even number of tracks, structures on curves shall be located in the radial of set of the location as determined.

2.6.6 Bolts, Nuts etc: All bolts, nuts, locknuts, screws, locking plates and split cotter pins etc, hall be properly tightened and secured and the contractor shall carry out systematic inspection of this aspect of work after all adjustments to overhead equipment are completed and prior to offering completed section of equipments to the purchaser for inspection and testing.

2.6.7 Damage to Galvanizing Painting: In loading, transport and erection, all galvanized painted materials shall be handled with care to avoid damage to galvanizing/painting. If galvanizing/painting is damaged inspire of all care taken, the damaged parts of component shall be put up for inspection, to obtain permission from the purchaser to carry out repairs.

2.6.8 (a) Foundations: The contractor shall carry out soil pressure tests in accordance with methods approved by the purchaser to determine permissible bearing pressure of various representative types of soils in the presence of the purchaser's representative during the pegging out of site inspection. He shall adopt only those values as accepted by the purchaser for the design and foundations.

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

(c) Method of Installation: The contractor shall adopt mechanized method (Concrete mixer) for installations of foundation in the station areas with five lines or more. The contractor may adopt either manual or mechanized method for installation of foundations in the other areas. He may erect traction mast or structures in the same operation as casting of foundations or erect them subsequently in cored holes left in foundation blocks and grout them separately. In any case, the

method of casting of foundation blocks and erection of masts or structures shall be subject to the approval of the purchaser.

(d) Excavation: Normally, excavation of soil for foundations or anchor block along the tracks may be done up to length of 1 to 1.2 m and depth of 0.8 to 1 m without shoring, providing the excavated hole is concreted immediately and not left overnight. Shoring shall otherwise be done unless the hole is re-filled with soil and tempted. In case the length of excavation is 1 to 1.2 m and depth of excavation is 1 to 1.2 m and depth for foundations and anchor blocks alongside the tracks is more than 0.8 to 1 m, the excavation may be undertaken only after certification by the Purchaser's representative to be safe and concrete is cast on the same day. Shoring shall be done to the satisfaction of the purchaser's representative, if the excavated hole is left overnight. All water logged locations will come under the purview of this Para. In poor soil or ash banks, no excavation shall be done without adequate shoring and piling. For large foundations and water logged locations shoring shall be done in accordance with drawings submitted/shuttering of the pits should be provided effectively to the satisfaction of the purchaser. Core hole covers should be provided promptly on casting of foundation (within 48 hours) and their edges cemented to the foundation block. Prior to doing so, water should be filled in the core hole so as to assist in curing. The date of casting should be inscribed on the foundation block. In case of platform areas and level crossings, the core should be filled with sand before provision of core hole covers so as to prevent any injury to rail users even if the core hole cover gets damaged or is displaced. The track ballast should be restored to its original form promptly after casting of the foundation block. The exceed earth should be removed well clear of the area so as to avoid any mixing up with the track ballast or any obstruction to the track drains. In case of cuttings, the earth should be thrown well away from the shoulders so that there is no risk of its flowing back to the drain during the rains.

(e) Concreting: All concreting or grouting shall be done in accordance with Para 2.2.4 with ballast graded for the purpose specified in Para 2.2.5. The concrete shall be poured and tamped properly in accordance with the method approved by the purchaser. The contractor shall arrange to provide concrete testing samples for tests once every week or as and when required by the purchaser, to determine crushing strength after **7 days or 28 days** curing as required.

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

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

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

2.6.9 (a) Masts and Structure Erection: In case traction masts or structures are erected in cored foundations, till such time they are grouted, they shall be properly wedged to prevent them leaning towards the track and endanger safety of moving vehicles.
In case traction masts or structures are erected simultaneously with the casting of the foundations, the contractor shall provide suitable temporary supports approved by the purchaser. The masts shall be embedded in the foundation blocks for the correct length specified in approved drawings.

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

(b) Reverse Deflection: All traction masts and structures shall be erected with the correct reverse deflection so that they become reasonably vertical after they are loaded. The method of erection of masts with the correct reverse deflection shall be submitted to the purchaser for approval.

(c) Infringement to Standard Dimensions: In erection, care shall be taken to ensure that no part of the traction mast, structure or any fitting located on such mast or structure infringe the Schedule of Dimensions 1676 gauge 1939 printed in metric units in 1973.

(d) Alignment of Masts at Gantries: The main masts of gantries shall be carefully aligned to enable easy and good assembly of fabricated steel work.

2.6.10 Overhead Equipment:

(a) A suggested method for erection of OHE which would ensure good speed and quality erection is included in section 2 of this chapter. The contractor may, however, follow other methods which they consider would speed up and ensure good quality work, subject to the approval of the purchaser. Any wiring method should take into consideration appreciable stretch of the catenary and contact wires in the initial days after they are strung and put 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 cat nary suspension bracket is at least 200 mm to facilitate adjustment during maintenance.

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

(d) Insulators: Before insulators are used in bracket assemblies or dispatched to work site for erection from the contractor's stores depot, they shall be tested as specified for routine mechanical test. No chipped or cracked insulators shall be installed. All insulators shall be cleaned before offering complete sections of equipment for inspection and testing.

(e) Stringing Catenary: Care shall be taken to avoid kinking or bride caging of the catenary wire in stringing and subsequent operations. While stringing, the wire shall be suspended from pulley blocks hung from the suspension clamp eye of bracket assemblies. The pulleys shall be fitted with ball bearing free movement in all directions to prevent damage to the strands of the wire. The design shall also be such that it will prevent slipping off of the wire. The design shall also be such that it will prevent slip of the wire during stringing operations. The designs of the pulley shall be submitted to the purchaser for approval. After initial stringing of the catenary, it shall be maintained of the 'No Load Tension' for a minimum duration of 48 hours before the pulley blocks are removed and the catenary is clamped to suspension clamps of bracket assemblies. Shorter periods may, however, be allowed by the purchaser.

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

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

(h) Clipping Droppers: The droppers shall be clipped on the contact wire only after a minimum duration of 48 hours from the time the automatic tensioning device is brought into action. Shorter periods may, however, be allowed by the purchaser.

(i) Auto Tensioning Device: The auto -tensioning device shall be erected with the correct height of the counter weight above rail level with corresponding distance between the pulleys of the device for a temperature of 35^{o}C before it is connected to the overhead equipment and put into action. The installation of the device shall be such as to permit free, easy and unobstructed movement of counter-weight.

(j) Cut- in Insulators: All insulators in out of run shall be so positioned that they are away from the swept zone of the pantographs and will not foul with them. The live parts of these insulators shall also be so located that they are at least 2m away from structures other then these supporting traction overhead equipment.

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

(l) Anti-wind Clamp: Anti-wind clamp shall be provided as shown in drawing (Annexure).

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

(n) Separation between OHE: In erection, the physical separation required between overhead equipments and bracket assemblies on the same structure at insulated overlaps shall be ensured.

(o) Gradient of Contact Wire: The gradient of the contact wire on either side of over line structures with restricted clearances shall be correctly adjusted and adequate clearance maintained between the over line structure and live equipment

(p) Adjustment at turnouts etc: Careful adjustment of equipment shall be made on equipments at turn-outs cross over, diamond crossings, overlaps and special locations for position of bracket assemblies, stay arms and height of contact wire to ensure that pantographs of electric rolling stock on the run will not foul with any parts of the bracket assemblies and changeover of the contact wire is affected smoothly.

(q) For wiring in large yards, the contractor shall prior to the execution of works, submit to the purchaser's Engineer for his approval the sequence of stringing of catenary and contact wires to arrange for proper crossing of wire. Endeavor will be made to arrange for traffic blocks to suit approved sequence of wiring.

2.6.11Isolators: 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: Bus-bars and connections shall be neatly shaped and bent to give a good appearance.

2.6.13 Earthing: The copper earth strips of MS flat used for earthing shall be bent and shaped neatly before connection to the structure or frame work of equipment. The connection of MS flat to steel work shall be made at a height not exceeding 15 cm from the datum level of a switching station. Before making earth connections the ends shall be cleaned copper strips. All junctions shall be properly secured to void loose contact. Portions of copper earth strips which remain visible above the ground level should be painted with suitable paint to make them inconspicuous.

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

(a) Measurements: The span length shall not vary more than ± 50mm as measured along the appropriate rail.

The cumulative error of measurement of all spans in a kilometer shall be not more than 1000mm.

(b) Setting of Structures: The setting of structure shall be not less than that included in the appropriate cross- section drawings, especially those with the minimum setting of 2.36m. A tolerance of ±20mm will be permitted subject to minimum specified value, if the structure is not located in between tracks.

(c) Height of Contact Wire: ± 20mm will be permitted to the height of contact wire at point of supports as shown in the relevant structures erection drawing, except under over line structures where no tolerance will be permitted.

(d) Stagger: Generally ± 20 mm will be permitted for stagger.

(e) Dropper Lengths: ± 5mm will be permitted for dropper length.

Dropper location: ± 100mm 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.

PART - II

CHAPTER -VII

INSPECTION AND TESTING

2.7.1 Scope: This chapter deals with the inspection and testing of completely erected overhead equipment, switching stations, booster transformer stations and LT supply transformer stations.

2.7.2 Overall Performance: The overall performance of the overhead equipment should be such as would permit collection of current by electric rolling stock with full load at speeds, up to and including the maximum specified for the design of overhead equipment, smoothly, without mechanical shocks or prejudicial sparks and without undue heating in the case of other equipments.

2.7.3 Responsibility: The general tests of overall performance stipulated below are only supplementary to other tests on structures, foundations, equipments, components and fittings as specified in Part -II, Chapter -II, III and IV. Any testing and acceptance by the purchaser of overall performance shall be subject to the general terms and guarantee which shall continue to the valid as provided for in Part -I, Chapter- II.

2.7.4 Test on OHE:

(a) General: As soon as a section is ready for inspection and testing, the Contractor shall advise the Purchaser in writing. Tests to be carried out by the Purchaser will be done in the presence of the Contractor's representative and shall include the following apart from other reasonable tests that the purchaser may like to conduct with a view to ensure, himself of the soundness of the equipments and their erection in strict compliance with the specification.

(b) Insulation: The strength of the insulation and the di-electric 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 merger.

(e) Switches: All isolators shall be tested for smooth and trouble free operation.

(f) Tension Device: All automatic tensioning devices installed shall be tested for sensitive functioning and adjustment.

(g) Stagger and Height: The stagger and height of contact wire over the entire section of completed overhead equipment and the clearance available shall be measured and the measurement shall be checked against approved drawings. These measurements shall be carried out at low speed with a vehicle or device to be arranged by the Purchaser, the movement of which will follow the track levels as closely as possible. Tolerances that will be permitted on the dimensions indicated in the approved drawings.

The actual position of the two contact wires, relative to each other, at overlaps and turnouts shall also be checked. Special attention shall be paid to a smooth movement of Pantographs over section insulators, particularly those which are likely to be frequently traversed.

(h) Mechanical Behavior: The mechanical behavior of the entire equipment shall be tested at various speeds under normal pantographs pressure without energizing the overhead equipment.

(i) Energizing: If the overhead equipment, after being subjected to the above tests in an unexercised condition, is found to be satisfactory, it will be energized with the normal 25 KV AC. supply.

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

2.7.5 Inspection and Testing Of Switching Stations Etc:

(a) Visual Inspection: Visual inspection which shall include check for satisfactory workmanship shall cover all connections, painting, plastering, cleanliness of all insulators etc. and compliance with INDIAN ELECTRICITY RULES.

(b) Operation Test: This test will be conducted on every individual item of equipment such as interrupters, isolators, relays etc. to ensure that the equipment as a whole is functioning properly and is mechanically sound, e.g. in the particular case of isolators the fixed contact and knife blade have been correctly aligned and operation does not cause undue strain on the equipment. The operation tests will be carried out with the high tension installation dis-connection from the supply, but by actuating power devices where such are provided. Continuity test of high tension connections after setting such interrupter and isolator in their respective positions shall also be conducted as part of the operation test.

(c) Insulation: The strength of insulation of the various items of equipment and of the entire installation as whole shall be tested with a 2500 V/500 V megger as required.

(d) Isolators: All isolators will be tested for smooth and trouble free operation.

2.7.6 Earthing:

(a) Earth wires will be checked for continuity and electrical isolation every 1000 m approx.

(b) Clearances between earth wires and out-run wires of overhead equipment and signals shall be checked.

(c) Earth resistance shall be measured separately for each earth electrode. In this case of interconnected earth electrodes, the net resistance of the interconnected electrodes shall also be measured.

2.7.7 Detailed Procedure for Tests: The detailed procedure for inspection and testing will be furnished to the Contractor. The contractor shall submit the result of tests in the Performa which will be furnished by the Purchaser, in quadruplicate.

PART-II

CHAPTER-VIII

WIRING PROCEDURE

2.8.1 Wiring Procedure: This section deals with the wiring procedure which may be adopted for erection of normal overhead equipment.

The following procedure for erection of overhead equipment has been formulated with a view to ensure that:

(i) bracket assemblies (brackets) and regulating equipment are correctly installed in their final position.
(ii) the conductors are correctly tensioned, and
(iii) the need for final adjustments of overhead equipment immediately before energization and commissioning, is virtually eliminated.

2.8.2 General: In the case of regulated equipment when the regulating equipments are in action, the tension in the conductors should remain constant, irrespective of variations in the ambient temperature. As the regulating equipments are brought into action a few days after the stringing of conductors the equipment is unregulated in the intervening period. Any of the following two procedures may be followed for tensioning and clamping of conductors of regulated overhead equipment during stringing operations, i.e., before the regulating equipments are brought into action.

(i) The catenary in tension to 1428 Kgf, the stipulated tension at the mean temperature of 35° C, whatever may be the ambient temperature during the stringing operations. In this case, at the time of clamping the cat nary to the bracket, the bracket should be placed at angular positions corresponding to temperature at the time of clamping and the proportionate to their distance from the anti- creep.

(ii) The aluminum alloy catenary is tensioned at the calculated tension to corresponding to 1000 Kgf. the stipulated tension at the mean temperature of 35° C whatever may be the ambient temperature during the stringing operations.

(iii) The catenary is strained to a stringing tension corresponding to the ambient temperature for the equipment span of the tension length. In this case the brackets are placed in the mean position, i.e., at right angles to the track, when the catenary is clamped or the regulating equipment commissioned.

The advantage of the second method is that once the catenary is strung at the proper tension, there would be no necessity to adjust each bracket separately at the time of clamping the catenary or commissioning the regulating equipment. The erection work is, thus considerably simplified and the possibility of errors greatly reduced. This is also applicable to erection of unregulated overhead equipment.

2.8.3 Erection of Brackets: After the brackets are fabricated correctly in the contractor's depot, in accordance with the approved structure erection drawings, and provided with indelible labels or/painted marking indicating the intended locations for each bracket, they are removed to the site of work and erected on traction masts or supports. The brackets are swiveled to a position at right angles to the track and secured in that position by means of steel wires tied to similar brackets located on the opposite side of the track or other suitable means.

2.8.4 Anti-Creep: The anti-creep of the tension length is then installed in its final position.

2.8.5 Locking the Regulating Equipment: In the case of regulated overhead equipment, the regulating equipments are erected on the terminal masts or structures and their movement locked by suitable means in the middle position, with the distance between the pulleys of the regulating equipment corresponding to 35° C.

2.8.6 Temporary Arrangement: A pulley approximately 30 cm dia is attached to the overhead equipment end of the regulating equipment by means of temporary accommodation fittings at both ends of the tension length to be wired. Over this pulley a flexible stranded wire is passed over. At each of the wire two ending clamps, one for cat nary and one contact wire, are attached. The wire is also clipped in the middle by 'U' - clamp. The length of this temporary arrangement from the regulating equipment to the extremities of the stranded wire passing over the temporary pulley shall be a little longer than the distance between the regulating equipment and the ends of the cat nary and contact wires in their final position, to permit easy clamping of terminal fittings during the final termination of the wire.

2.8.7 Stringing Catenary: The catenary is initially terminated in the ending clamp of the temporary arrangement at one end of the tension length. The catenary is thus paid out from the reel of the wiring train and run on pulley blocks hung from the suspension clamp eyes of brackets until the terminating point at the other end of the tension length is reached.

2.8.8 Tensioning of Catenary: The catenary is strained up to the 'stringing tension' corresponding to the 'equivalent' span of the tension length and the ambient temperature at the time of stringing with the aid of a dynamometers, end terminated at the tension. For this purpose, the ambient temperature shall be deemed to be the temperature registered by a thermometer tied to a length of catenary wire 3 to 4 meters long, laid flat on the top platform, on one of the wagons of the wiring train. Subsequently the tension in the wire is checked by measurement a sag with the help of leveling lathe attached to suspension points and to the catenary at mid span by a ladder working party. The sag shall be measured in two spans, each preferably greater than 54 meters, and situated on either side of anti- creep approximately midway between the anti- creep and the termination points. The value of sag measured by this method should be within ± 5% of the theoretical value for the corresponding stringing tension, and the temperature at the time of this measurement. In case of discrepancy is noted, the tension should be adjusted again and sag re-checked as above. After the sag is checked, the catenary is terminated at the ending fitting of the temporary arrangement at the terminating point.

In order to restrict the duration of traffic blocks to the minimum, in the first block, the catenary is strained to the stringing tension with the aid of dynamometers and the catenary is terminated. In a subsequent block, the sag is checked and the Tension readjusted with ladders, if necessary.

2.8.9 Clamping the Catenary: The catenary is clamped on the brackets placed at right angles to the track.

2.8.10Droppering: Droppers are fitted to the catenary at the correct locations. At the contact wire ends these droppers May be provided with small pulleys or hooks to act as temporary supports when the contact wire is strung. Hooks made of scrap contact wire, suspended from the catenary wire, may also be used as temporary supports.

2.8.11 Stringing Contact Wire: The contact wire is initially terminated in the contact wire ending clamp of the temporary arrangement at one end of the tension length. The wire is then paid

out from the reel wagon of the wiring train and supported on the pulleys hung from droppers or on hooks until the terminating points at the either end of the tension, length is reached. In curves, the contact wire shall be registered on pulleys located at traction masts or supports corresponding to the approximate final position of the wire. The axes of these pulleys should be more or less vertical.

2.8.12 Tensioning Of Contact Wire: The contact wire is strained to a tension on approximately 1.2 times the tension corresponding to the ambient temperature and terminated in the ending clamp of the temporary arrangement.

2.8.13 Regulating Equipment in Action: The regulating equipment is put into action with the counter weight at the correct height above rail level with distance between pulley or the regulating equipment corresponding to a temperature of 35°C. The regulating equipment is then released and brought into action. The 'U' clamp connecting the flexible stranded wire passing round the temporary pulley is also removed.

2.8.14 Final Adjustment: The entire installation is left in this condition as long as it is possible, preferably for a period not less than 15 days. The temporary pulleys are removed and the conductors terminated in the permanent ending fittings, compensating plates, insulators and turnbuckles. The equalizer plate is kept vertical or at a vertical or at a slightly inclined position (by 2 or 3 cm the contact wire being shorter than the catenary) and the position of the regulating equipment is checked in relation to, the temperature at the time. The contact wire is clipped on to droppers (in the vertical position) and on the steady arms. Contact wire height at the bracket is adjusted as also the stagger and register arm clearance.

2.8.15Concluding Remarks: If the above method is followed with care, no further adjustment may be needed.

NOTE:

(**1**) It should be ensured that sagging is done carefully and accurately. The adjustment of tension in the catenary after checking of sag, if required, would be easy if a temporary turnbuckle is inserted in the temporary termination.

The use of leveling lathes is recommended for the following reasons:

(i) The accuracy of adjustment is greater than that with dynamometers.

(ii) No traffic block is required for this operation.

(iii) It obviates the necessary of initial tensioning of the catenary accurately thus permitting a reduction in the period of traffic block required for the wiring train.

(2) If feasible, without any hindrance to progress of works, the catenary may be maintained at stringing tension for a period of 48 hours before checking sag and clamping it to the brackets. This would ensure equalization of tension in the different spans. Before clamping the catenary to the brackets, the sag should however, be checked in two spans as indicated.

(3) If it is difficult to obtain separate traffic block for stringing contact wire, the wire may be paid out at the same time, as the catenary, with the following precautions:

(i) The contact wire is run and suspended from independent pulleys hooked on the brackets, separately from the catenary pulleys, to avoid twisting together of the two conductors.

(ii) The contact wire should not be suspended from the catenary until the later is clamped on the brackets.

(iii) The tension in the contact wire before termination should be about 1,500 Kgf. This will ensure that sag is not excessive.

(iv) The adjustment of tension and checking of sag of the catenary wire is carried out as if the contact wire had not been strung. Only after adjustment of tension and checking of sag is

completed, the contact wire is transferred to the pulleys attached to the droppers or to hooks suspended from the cat nary and the tension is adjusted.

(4) When the contact wire is under tension creep takes place which results in an increase in the length of wire and, consequently, the droppers and the equalizer plates would become oblique. Though creep may continue for a long time, about a year, the bulk of it would occur during the days following stringing. If sufficient period of time is allowed, the contact wire may be clipped to the droppers and the equalizer plates, all in the vertical position and the necessity for any further adjustments before energization and commissioning of the OHE may be reduced to a great extent. If this precaution is not taken at the time of energization of the OHE, the droppers may not all be vertical and staff would have to be deputed for shifting the dropper clips with risk of damage to the contact wire.

(5) Before the temporary arrangement is removed, a reference mark should be made on each conductor. After final termination of the conductors, it should be ensured that two marks are in the same relative longitudinal position as they were before the removal of the temporary arrangement.

PART-II
CHAPTER -IX

SPECIFICATION OF IMPORTED ITEMS

2.9.1 Scope- Specification covered in this chapter are for imported items to be used in this work. These specifications are indicative, details if required by the Contractor will be provided by DFCCIL. Any specification of material not covered in this chapter will be provided by DFCCIL.
Note: Most of the component, fittings & fixtures used in BPUN-KRJN section are imported.

2.9.2 Technical Specifications for Cantilever assembly -

Purpose: The Purpose of this document is to define and elaborate the suitability of cantilever design to the functional requirements and ultimate loadings of OHE on cantilevers. The cantilever assembly is commonly referred to as OCS3.
The brief description of assembly is as below:

Material	Aluminum
Corrosion	No corrosion risk
Allocation distance	Up to 4.50 m
Weight (push 3.5m)	30 kg
Components	20
Insulators	Composite (1 type)
Tube attachments	1 type
Contact wire clamp	With screws
Tubes	2 sizes
Max load on FEM	254MPa (97%)

The cantilevers shall be pivoted to the support structures and capable of swiveling along the track as well as adjustable in transverse direction. The cantilever assembly shall hold 120sqmm Cu-mg Messenger wire and 150 sqmm Cu-Ag contract wire tension 14kN in messenger wire and 16kN in Contact wire respectively.
This specification covers the requirement of cantilever assembly on OHE masts/Portals, tubes and insulators. The cantilever assembly shall consist of suitable mast attachments, 25kV bracket and stay insulators, Cantilever tubes, catenary wire suspension system and contact wire registration system including steady arm and the drop bracket/drop tubes, and any other components or assemblies essential to support the OHE for smooth current collection.
The Cantilever assembly shall be of a proven design with proven service in mechanical, electrical and environmental condition similar to those specified in this specification. The cantilever assembly shall be capable for use with trains speed up to 120 Kmph.

2.9.3 Governing Specifications:

PS and GS of CP- 104 Contracts.
EN 50119:2009+A1:2013 “Railway applications: Fixed installations Electric Traction overhead contact lines”.

2.9.10 GENERAL AND TECHNICAL REQUIREMENTS

The cantilever shall be fabricated as per the approved SED (tube dimensions) to suit the site requirement and as per basic arrangement shown in the cantilever assembly drawings.
The cantilever assembly shall be suitable for a maximum span length of 58.5m with a minimum radius of curvature 700m. The cantilever assembly shall include.
Complete cantilever assembly including steady arms
Both stay and bracket arm insulators (silicone Composite)
Mast/Portal attachments
Associated fittings

All fasteners and fitting shall be suitable for connection to the OHE masts used on Indian Railways.

2.9.11 ENVIORNMENTAL REQUIREMENTS:

The works/supplies under the scope of these technical specifications shall also be fully operable and maintainable in the following climatic and atmospheric conditions.

Ambient air temperature	-2.5℃degrees to +50℃
Average ambient temperature for One year	+35℃
Maximum temperature of a metallic object under the sun	+70℃
Maximum relative humidity	100%
Annual rainfall	Dry arid regions and also heavy monsoon affecting regions with rain100fall ranging from 1750mm to 6250mm
Maximum number of thunderstorms days per annum	85
Maximum number of dust storm days per annum	35
Number of rainy days per annum	120
Basic wind pressure	
Cree page distance for (i)Extreme pollution condition (ii)Polluted conditions	As per IEC 60815-2008
Horizontal Seismic Zone	Refer IS 1893 Part 1 for earthquake mapping

Table 1 Environmental Conditions

2.9.12 CANTILEVER ARRANGAMENT:

The following cantilever arrangement are proposed for this work.

S.N.	Reference	Description	Drawings available in this office Dwg no.
1	2001101	Pull off cantilever Arrangement Drawing	W3/PS/1061
2	2001102	Push off cantilever Arrangement Drawing	W3/PS/1062
3	2001103	Pull off Cantilever Arrangement Drawing(Heavy Curve R<2000m)	W3/PS/1063
4	2001104	Push off Cantilever Arrangement Drawing(Heavy Curve R<2000m)	W3/PS/1064
5	2001105	Pull off Cantilever Arrangement Drawing – Overlap inter location	W3/PS/1078
6	2010106	Push off Cantilever Arrangement Drawing – Overlap inter location	W3/PS/1080
7	2001107	Pull off Cantilever Arrangement Drawing- Overlap Inter location (Heavy Curve R<2000m)	W3/PS/1087
8	2001108	Push off Cantilever Arrangement Drawing – Overlap inter location (Heavy curve R<2000m)	W3/PS/1088
9	2001109	Pull off Cantilever Arrangement Drawing for Mid – point	W3/PS/1089
10	2001110	Push off Cantilever arrangement Drawing for Mid- point	W3/PS/1094
11	2001111	Out of Run Cantilever arrangement Drawing	W3/PS/1242
12	2001114	Pull off cantilever Arrangement for Turnout location	W3/PS/1245
13	2001115	Cantilever arrangement at Central mast of overlap	W3/PS/1394
14	2001116	Push off Cantilever arrangements for low encumbrance	W3/PS/1243

15	2001117	Pull off cantilever arrangements for low encumbrance	W3/PS/1246

2.9.13 CANTILEVER CONSTRUCTION

The catenary is suspended from insulated cantilevers that can be oriented and maintained on the OHE support structures by means of fastener's and fittings such as adapters, backing angles and mast bracket attachments. In case of multiple track portals or twin track cantilever structures the insulated cantilevers are held in positions by drop members attached to the portals. The cantilevers are composed of several items.

Component	**Material**	**Tube characteristics**	**Comments**
Top tube for all cantilevers except out of running Cantilevers	Aluminum Alloy tube	Circular Diameter=60x4mm	Attached to an insulator MW stagger adjustment possible by horizontal movement of suspension clamp on the top tube.
Top Tube for Out of running cantilevers	Aluminum Alloy tube	Circular diameter=60x6mm	Attached to an insulator MW stagger adjustment possible by horizontal movement of suspension clamp on the top tube.
Cantilever Tube for all type of cantilevers except low encumbrance	Aluminum Alloy tube	Circular Diameter=60x6mm	Attached to an insulator
Cantilever Tube low encumbrance	Aluminum Alloy tube	Circular Diameter=60x4mm	Attached to an insulator. The strut tube is horizontal and the top tube is inclined.
Registration Tube	Aluminum Alloy tube	Circular Diameter=60x4mm	With cripped tennon end fitting
Reinforcement tube and wind stay tube	Aluminum Alloy tube	Circular Diameter=38x4mm	With cripped tennon end fitting both sides
Steady Arm	Aluminum	Circular Diameter=36mm Thickness=3mm	Ensures Contact wire bracing

The following cantilevers assemblies are proposed for this work.

S.N.	**Reference**	**Description**	**Drawings available in this office Dwg no.**
1	3001101	25kV OCS-3 Cantilever-Standard Push off type	W3/PS/1263
2	3001102	25kV OCS-3 Cantilever-Standard Pull off type	W3/PS/1264
3	3001103	25kV OCS-3 Cantilever- Heavy curve Push off type	W3/PS/1265
4	3001104	25kV OCS-3 Cantilever- Heavy curve Pull off type	W3/PS/1266
5	3001105	25kV OCS-3 Cantilever- Intermediate type for Out of running cables	W3/PS/1267
6	3001107	25kV OCS-3 Cantilever- Push off cantilever assembly for low encumbrance	W3/PS/1269
7	3001108	25kV OCS-3 Cantilever- pull off cantilever assembly for low encumbrance	W3/PS/1270
8	3001109	25kV OCS-3 Cantilever- Mid-point Pull off type	W3/PS/1271

9	3001110	25kV OCS-3 Cantilever- mid-point Push off type	W3/PS/1273

The following cantilevers sub-assemblies are proposed for the work.

S.N.	Reference	Description	Drawings available in this office Dwg no.
1	4001101	5 mm dia wind stay wire sub assembly	W3/PS/1248
2	4001102	Steady Arm Bracket attachment with tube 60x4 mm	W3/PS/1369
3	4001103	Steady Arm Attachment	W3/PS/1249
4	4001104	Steady Arm Aluminum L= 100mm for cantilever component drawing	W3/PS/1250
5	4001105	Bent Steady Arm L= 1300mm for overlap axis cantilever component drawing	W3/PS/1251
6	4001106	Deep Curve Steady arm L= 1200mm in curves for cantilever component drawing	W3/PS/1252
7	4001107	Tube dia 60mm attachment for cantilever component drawing	W3/PS/1253
8	4001108	Single messenger wire suspension clamp for cantilever component drawing	W3/PS/1254
9	4001109	Single messenger wire clamp (for low encumbrance) for cantilever component drawing.	W3/PS/1255
10	4001110	Double messenger wire suspension clamp for cantilever component drawing	W3/PS/1256
11	4001111	Contact wire clamp for cantilever component drawing	W3/PS/1257
12	4001112	Swivel attachment to OOR registration subassembly	W3/PS/1258
13	4001113	Direct attachment to OOR registration arm	W3/PS/1259
14	5001101	Mast Bracket attachment sub-assembly drawing	W3/PS/1260
15	7001101	Top Tube 60x6 mm	W3/PS/1366
16	7001102	Strut tube 60x6 mm	W3/PS/1365
17	7001103	Registration tube 60x4 mm	W3/PS/1368
18	7001104	Reinforcement tube 38x4 mm (Aluminum) component drawing	W3/PS/1367
19	7001105	Top Tube 60x6 mm	W3/PS/1370
20	7002101	Insulator 25kV for tube 60 mm	W3/PS/1364

In addition, the following cantilevers elementary components are required.

S.N.	**Reference**	**Description**	**Drawing Number**
1	7003101	Socket for wind stay	W3/PS/1373
2	7003102	Clamp for wind stay	W3/PS/1374
3	7003103	Rear part for steady arm attachment	W3/PS/1375
4	7003104	Front part for steady arm attachment	W3/PS/1376
5	7003105	Clevis eye for steady arm attachment	W3/PS/1377
6	7003106	Tube Dia 36x3 mm thick for steady arm	W3/PS/1378
7	7003107	Steady arm swivel for steady arm	W3/PS/1379
8	7003108	Steady arm eye piece for steady arm	W3/PS/1380
9	7003109	Deep curvr Steady arm L= 1200mm in curves for cantilevers	W3/PS/1381
10	7003110	Steady arm eye piece for steady arm	W3/PS/1382
11	7003111	Steady arm eye piece for steady arm	W3/PS/1383
12	7003112	Body for Tube dia 60mm attachment	W3/PS/1384
13	7003113	Tube attachment for single messenger wire suspension	W3/PS/1385

14	7003114	Straight shackle for single messenger wire suspension	W3/PS/1386
15	7003115	Clamp for single messenger wire suspension	W3/PS/1387
16	7003116	Attachment element (for low encumbrance)	W3/PS/1388
17	7003117	Cable clamp (for low encumbrance)	W3/PS/1389
18	7003118	Double messenger wire suspension clamp for cantilever	W3/PS/1390
19	7003119	Body for swivel attachment	W3/PS/1391
20	6001101	Mast bracket swivel for cantilever	W3/PS/1261

2.9.14 FABRICATION, ASSEMBLY AND INSTALLATION OF CANTILEVERS

The vender shall supply his manufacturing drawings, design, dimensioning of components etc. for the proposed cantilever along with the required technical specifications of the materials and test documents.

Based on the vendor design, contractor shall prepare the arrangement; assembly and detail drawing of each component proposed for the cantilever design and get the approval of DFCCIL.

The manufacture will start his activity once the approval for all the drawings and specifications from DFCCIL conveyed to him.

The OCS designer shall determine the size and prepare the detailed mounting arrangements, of the cantilevers with dimensioning and calculation of tube lengths based on the inputs details like as built offset of masts installed received from the site. The mounting sheets shall also include the detailed interface of cantilevers and other OCS equipment may be mounted on independent structures such as masts or portal uprights or mounted on drop arms from the boom of portal or concrete walls and roof of over bridges etc.

The supplier will deliver the materials and tubes with eye clamps as per the required lengths mentioned in the mounting sheets supplied to him. The delivery of materials shall be packed as per type pieces like tubes packed per type length, steady arms in crates with labels clamps in boxes per type and insulators in separated boxes with protection.

Upon delivery at the contractor site workshop, the cantilever tubes, clamps and other components shall be checked off against the delivery form and then be pre-assembled at the workshop and transported location wise to site and installed in accordance with the OCS design and as detailed herein.
A preliminary check shall be made to ensure that the cantilevers are the same as the design cross sections and ready for installation.
REQUIRED DOCUMENTS

For the quality issues, the supplier has to submit the following:

Supplier’s client references

Supplier’s quality system certifications

The documents produced should follow the requirements below.

The standard language – English

Drawing in autocad or compatible

All the documents and drawings should be updated according to the final installation of the cantilever on site.

Standard and special cantilever assembly and sub- assembly drawing

Factory inspection and test procedure (type and routine) for each component.

Detail component and package list before shipping with at least following information.

Quantity of the components individually and in a package

Type of the component in each package

Type of the component in each package

Each component with proper certification number

2.9.15 Technical specification for Copper contact wire 150Sqmm

Scope:

This European Standard specifies the characteristics of copper alloy wire of cross section of 150 sqmm for use on overhead contact lines. For silver copper alloys, 100C is the permanent temperature limit for material mechanical properties as per table-1 of EN50119.
It establishes the product characteristics, the test methods, checking procedures to be used with the wires, together with the ordering and delivery condition.

Governing specifications

- PS AND GS OF CP- 104 CONTRACT.
- EN 50119:2009+A1:2013 “Railway applications: fixed installations Electric Traction overhead contract lines”.
- EN 50149:2012” Railway applications: Fixed installations Electric Traction Copper and copper alloy grooved contact wires”.

These below standards are in whole or in part, are normatively referenced in EN 50149:2012 and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- EN 1655:1997, Copper and copper alloys- Declarations of conformity.
- EN 1977:1998, Copper and copper alloys- Copper drawing stock (wire rod).
- EN ISO 6892-1, Metallic materials- Tensile testing- part 1; Method of test at room temperature (ISO 6892-1).
- EN 10204: 2004, Metallic Products- Types of inspection documents.
- IEC 60468:1974, method of measurement of resistivity of metallic materials.
-

Wire generally of circular shape, whose cross section is larger than the wire cross section, from which the contact wire is then drawn.

Electric conductor of an overhead contact line with which the current collector makes contact and is characterized by two clamping grooves.

A Environmental conditions
The works/supplies under the scope of these technical specifications shall also be fully operable and maintainable in the following climatic and atmospheric conditions.

Ambient air temperature	-2.5℃ degrees to +50℃

Average ambient temperature for one year	+35℃
Maximum temperature of a metallic object under the sun	+70℃
Maximum relative humidity	100%
Annual rainfall	Dry arid regions and also heavy monsoon affecting regions with rainfall ranging from 1750mm to 6250mm
Maximum number of thunderstorms days per annum	85
Maximum number of dust storm days per annum	35
Number of rainy days per annum	120
Basic wind pressure	120-200 kgf/m2,as per wind map based on IS-875, For long bridges (more than 150m) and within 100m from their abutments on either side and on banks, where the height of the catenary above surrounding mean retarding surface is more than 30 meters, the specified 25% reduction in wind pressure shall not be reckoned for purposes of design.
Creep age distance for (I)Extreme pollution condition (II)Polluted conditions	As per IEC 60815 – 2008
Horizontal Seismic Zone	Refer IS 1893 part 1 for earthquake mapping

The wire designation is EN 50149 – BC – 150 – Cu Ag 0.1.

The drawing stock or intermediate rod stock shall be copper silver alloy as defined in EN 1977:1998.

The wires shall not present any imperfections (roughness, sliver, seam, inclusion or cracks) liable to affect the mechanical and/or electrical properties specified in this European Standard or to cause difficulties during installation/operation.

The surface shall be clean and free of oxide inclusions or supplied generated during the manufacturing process or foreign substances such as pickling residue.

The colour of the metallic bright surface immediately after manufacturing may change due to atmospheric influence. This is acceptable.

All wires manufactured from alloys shall be clearly identified. For normal and high strength copper – silver.
Dimensional examination shall be performed either using a suitable micrometer or sliding caliper, or using a profile reflector with a minimum amplification of 10, or other appropriate methods.

Electrical properties
The resistivity or resistance per unit length measurements shall be made in conformity with IEC 60468:1974.

MECHANICAL PROPERTIES

Breaking Load And Percentage Elongation After Fracture

This test is performed in accordance with the requirements of EN ISO 6892-1. The gauge length for percentage elongation measurement shall be 200 mm.

The original cross sectional area is calculated from the measured mass per unit length and the density (8890 kg/m3 at 20℃) appropriate to copper silver alloy (seeC.6) of EN 50149:2012. Values shall be in accordance with 4.7.1.

Reverse bend test

The test is performed using a method similar to that shown in ISO 7801:1984 . The Distance from the top tangential plane of cylindrical supports to the bottom face of the guide shall be 200 mm max. The wire has to be placed so that the bottom and the head of the wire are tangential to the gripping faces of the support (as shown in Figure below). For the first bending the bottom of the wire has to be inside and the head of the wire outside.

The wire shall be subjected to a subjected to a number of bends, through 90℃ in opposite directions, around a mandrel with a radius of 30 mm. One bend consists of bending the free end of the test specimen through 90℃ and returning it to its original position, in accordance with figure below. The bends may be made by hand.

Integrity of wire

The internal and surface integrity of the wires may be checked by electro- magnetic. The test should be performed during the manufacturing process, before coiling the wire on the wire drum.

Ordering and delivery conditions

a. The nominal length on each drum and the type of drum to be used will be submitted as a part of drum schedule. The maximum length of wire on each drum will be as below.
   - All contact wire length which is < 1450m, should be fitted in a 1400mm dia drum. Whereas,
   - All contact wire length more than 1450m and less than 1800m, should be fitted in a 1800mm dia drum,

b. Joints are not allowed.

c. The specific tests and test required, viz.
   1) The method of stating electrical properties of the wire.
   2) Type and testing of joins in wire- this test is not required as joins are not allowed in wire for the present project.
   3) Requirement for reverse bend test
   4) Requirement for torsional tests
   5) Requirement for the checking of winding property
   6) Requirement for tests for microwaves on longitudinal axis of wire

d. Certification of compliance and/or test results

Packaging

The wires shall be delivered on wire drums. Wooden drums are phytosanitary and protected with wooden staves and iron straps. Each drum shall carry only one continuous length of wire.

The nominal length on each drum and the type of drum to be used will be submitted as a part of drum schedule. The maximum length of wire on each drum will be as below.

- All contact wire length which is < 1450m, should be fitted in a 1400 dia drum. Whereas,

- All contact wire length more than 1450m and less than 1800m, should be fitted in a 1800mm dia drum.

The wire shall be carefully coiled in layers with the contact side facing the center of the drum. Each coil shall be contiguous and well packed, particularly near the flanges of the wire drum, such that it will not be possible for the coil lay to be disturbed during transit. The ends of the wire are to be firmly secured to the flanges.

Tolerance on wire length
The tolerance on the length of wire supplied is +30m, -0m. The measurement of this length is taken from the indication of a length meter mounted on the wire drawing bench.

Wire drum markings

Every wire drum shall bear a permanently marked number, assigned by manufacturer, clearly visible on each flange, together with an arrow and the words "take off" indicating the direction of take – off the wire.
A label, resistant to deterioration and indelibly marked, shall be attached to one flange, bearing the following information.

- The name of the manufacture.
- The wire designation.
- The wire nominal length.
- The net mass of the wire.
- The gross mass (wire drum plus wire).
- A manufacturing number with at least the number of the week of drawing and the year of manufacture.
- The customer order or reference number.

The above information shall be supplied to the customer at his request.

The Employer/ Engineer and manufacturer shall agree the clauses selected from EN 10204:2004 or EN 1655:1997 relevant to the certificate of compliance and/or test results.

Testing Requirements
Contact wire shall go through following test during this order.

1. Prototype test.
2. Factory Acceptance test.

2.9.16 Technical specification for Hard Drawn Stranded Magnesium Copper Catenary Wires of sizes 120mm2 (19/2.8D)-

Scope:
The specification covers the requirements of technical specification for Hard Drawn Stranded Magnesium Coper Catenary Wires of sizes 120mm2 (19/2.8D) for Electric Traction. Far Mg Cu alias/Ez (0.2),100℃ is the perment temperature limit for material mechanical properties as per table – 1 of EN 50119.

Governing Specification

- PS and GS of CP-104 Contracts.

- DIN 48201- T2: Bronze stranded conductors edition 1981-04.
- DIN48200-2 Bronze wire for stranded conductors.
- DIN48203-2 Wrought copper alloy Bz. Wires and conductors technical delivery conditions.
- EN 50119:2013 Railway applications: Fixed installations electrical Traction overhead contract lines.
- DIN 46391-1:2014-D5 Delivery drums for cables and stranded conductors-Part 1 Delivery drums with diameter up to 2800mm.
- DIN 43138:1980-09 Flexible cables for overhead equipment and return current.

Environmental conditions

The works/supplies under the scope of these technical specifications shall also be fully operable and maintainable in the following climatic and atmospheric conditions.

Ambient air temperature	-2.5℃ to +50℃
Average ambient temperature for one year	+35℃
Maximum temperature of a metallic object under the sun	+70℃
Maximum relative humidity	100%
Annual rainfall	Dry and regions and also heavy monsoon affecting regions with rainfall ranging from 1750mm in 6250mm
Maximum number of thunderstorms days per annum	85
Maximum number of dust storm days per annum	35
Number of rainy days per annum	120
Basic wind pressure	120-200kg/m2,as per wind map based on IS-875.for long bridges (more than 150m) and within100m from their abutments on either side and on banks, where the bright of the catenary above surrounding mean reading surface is more than 30maters the specified 25% reduction in wind pressure shall not be reckoned for purposes of design.
Creepage distance for (i)Extreme pollution condition (ii)Polluted conditions	As per IEC 60815-2008
Horizontal seismic Zone	Refer IS1893 part 1 for earthquake mapping

Testing requirements

Catenary wire shall go through following test.

1. Prototype test (to be performed at the beginning of project- Once for complete ordering)

2. Factory Acceptance test (to be performed before each lot of supply/delivery).
   The prototype Test and factory Acceptance Test should be done in line with the specification.

Packaging-

The conductors shall be supplied on drums complying with DIN 46391 Part 1.
The drums shall be coated with a chemically neutral material in the winding area. No nails or other sharp objects shall project into the winding area. The lining shall be fastened in a suitable manner.

The conductor shall be wound on to the drum as tightly as possible, i.e. turn next to turn. The two ends of the conductor shall be securely fastened. The layer of the conductor shall be covered with a chemically neutral material and shall also be protected against mechanical damage. Unless otherwise agreed, only one length of conductor shall be wound onto one drum.

The following data shall be applied permanently to the drum:

- The direction of rolling of the drum for transportation shall be marked by arrows by arrows and words" Direction of rolling" on the two drum flanges in the direction opposite to the unwinding direction.
- Material, nominal cross section section, length and mass of the conductor.
- Supplier's works.
- Drum number.
-

Dimensions, mechanical and electrical values for cable 120sq.mm

1	2	3	4	5	6	7	8
Nominal size mm2	Actual size mm2	Strands No.	Strands Dia.mm	Cable dia.mm	Weight kg/km	Calculated breaking strength KN	Continuous rating A
						Bz I	Bz I
120	116.99	19	2.80	14.0	1060	56.68	410

1) The cable weights are calculated on the basis of a density of 8.9 kg/dm3 and the average lay ratio, which is taken as the arithmetic mean of the lowest and highest value of the respective lay ratios specified in the table below.
2) Breaking strength calculated in accordance with DIN 48203 part 2
3) Valid for up to 50HZ at a wind speed of 0.6 m/s with an ambient temperature of 35 ℃, to give a final conductor temperature of 70℃. For particularly shielded cases in still air the values should be reduced by 30% on average.

2.9.17 Technical specification for flexible cable DIN 43138- Bzll- 10x49 for overhead contact systems-

Scope:

The specification covers the requirements of technical specification for flexible cable DIN 43138-Bzll- 10x49 for overhead contact systems.

Governing specification

- PS and GS of CP-104 Contracts.
- DIN 43138- 1980-09 Flexible cables for overhead contact systems and return circuits.
- DIN 48200-2 “Bronze wires for stranded conductors”.
- DIN 48203-2 “Wrought copper alloy Bz. Wires and conductors technical delivery conditions.
- DIN 17566 Wrought- copper alloys, alloy treated composition.
- DIN 46391-1:2014-05 Delivery drums for cables and stranded conductor- Part 1: Delivery drum with diameter up to 2800 mm

Environmental Conditions

The works/supplies under the scope of these technical specifications shall be fully operable and maintainable in the following climatic and atmospheric and atmospheric conditions.

Ambient air temperature	-2.5℃ to+50℃
Average ambient temperature for one year	+35℃
Maximum temperature of a metallic object under the sun	+70℃
Maximum relative humidity	100%
Annual rainfall	Dry and regains and also heavy monsoon affecting regions with rainfall ranging from 1750mm to 6250mm
Maximum number of thunderstorms days per annum	85
Maximum number of dust storm days per annum	35
Number of rainy days per annum	120
Basic wind pressure	120-200 kgf/m2,as per wind map based on IS-975,For long bridges (more than 150m) and within 100m from their abutments on either side and on banks, where the height of the catenary above surrounding mean reading surface is more than 30 meters, the specified 25% reduction in wind pressure shall not be reckoned for purposes of design.
Creep age distance for (i)Extreme pollution condition (ii)polluted conditions	As per IEC 60815-2018
Horizontal Seismic Zone	Refer IS 1893 part 1 for earthquake

	mapping

Properties of strands

Diameter (mm)±0.03	Material	Wires after stranding		
		Tensile Strength	Elongation at break (1=100)	Applied load
mm		N/mm2	%mm	N
0.50	Wrought copper alloy Bzll	589		116

Electrical conductivity

Electrical conductivity for wrought-copper alloy wires (Bz II)>36/ohm, mm2.

Dimensions, mechanical and electrical values for cable for 10sq.mm Bzll.

Nominal size mm2	Desired cross section mm2	Wires		Cables	
		No.	Dia.mm ±0.03	Diameter (mm)±5%	Mean weight kg/km±8%
10	9.6	49	0.5	4.5	89

Requirements to be met by strands-

1) **Material:-** The particular wrought copper alloy (BZII) ordered shall be used for the wrought copper alloy (BZII) wires which shall be hard drawn and comply with requirements given in subclasses 8.5 and 8.6 before and after stranding.
2) **Surface characteristics of the base material :-** The surface of the base material to be worked into wire shall be smooth and shall have no sharp burrs or edges.
3) **Wire surface:-** The wires to be used for the stranded conductor shall be smooth and free from all imperfections not consistent with good commercial practice.
4) **Welded and soldered joints:** - Any welding or soldering on finish drawn wires shall be carried out with the greatest of care. The joints shall be annealed after the welding or soldering process over a distance of at least 200mm on each side of the joint and their mechanical properties need not match those of non- welded or non- soldered wires.

5) **Dimensions and tensile strength:** - The dimensions and tensile strength of wrought copper alloy (BZII) wire shall comply with DIN 48200Part 2.

   The tensile strength of the specimens shall be determined using an officially verified tensile testing machine. The test force shall be applied smoothly and uniformly. The rate of separation of the jaws of the testing machine shall be not less than 25mm per minute and not greater then 100mm per minute. The tensile specimens shall show a reduction of area at the point of fracture.

6) **Resistivity:** - The resistivity values or the electrical conductivity values shall be as below.

Wire made from	Resistivity at 20ºC(ohm/mm2/m) Max.	Electrical conductivity(in m/ohm mm2) Min.
BzII	0.02773	36

7) **Testing Requirements: -** Dropper wire shall go through following tests.
   1. Prototype test (to be performed at the beginning- once as per specification)
   2. Factory Acceptance Test FAT (to be performed before each lot of supply/delivery as per specification).
   3. The prototype test and factory acceptance test should be done based on this specification.

8) **Lengths of wires and conductors at delivery: -** Conductor shall be supplied in the manufacturers usual production lengths with a permissible deviation of ± 5% it is permissible to supply 5% of any one order in shorter lengths as long as none of these are shorter than 1/3 of the nominal length.
9) **Packing: -** These drums shall be coated with a chemically neutral material in the winding area. No nails or other sharp objects shall project into the winding area. The lining shall be fastened in a suitable manner.
   Theconductor shall be wound onto the drum as tightly as possible, i.e. turn to next to turn. The two ends of the conductor shall be security fastened. The last layer of the conductor shall be covered with a chemically neutral material and shall also be protected against mechanical damage. Unless otherwise agreed, only one length of conductor shall be wound onto one drum.

   The following data shall be applied permanently to the drums.
   1) The direction of rolling of the drum for transportation shall be marked by arrows and the words “Direction of rolling “on the two drum flanges in the direction opposite to the unwinding direction.
   2) Material, nominal cross section, length and mass of the conductor.
   3) Supplier’s works;
   4) Drum number;

2.9.17 Technical specification for OHE clamps & fittings –

The OHE clamps and fittings shall be designed according to Para 7 and Para 8 of EN 50119: 2013,

Reference Standards
□□EN 50119:2009+A1:2013 “Railway applications: Fixed installations Electric Traction overhead contact lines”
□□BS EN 573-3:2013 Aluminium and aluminium alloys. Chemical composition and form of wrought products.Chemical composition and form of products
□□BS EN 573-2:1995 Aluminium and aluminium alloys. Chemical composition and form of wrought products.Chemical symbol based designation system
□□BS EN 1706:2010 Aluminium and aluminium alloys. Castings. Chemical composition and mechanical properties

□□BS EN 10002-1:2001 tensile testing of metallic materials. Method of test at ambient temperature
□□BS EN 755-2:2013 Aluminium and aluminium alloys. Extruded rod/bar, tube and profiles. Mechanical properties
□□BS EN 1982:2008 Copper and copper alloys. Ingots and castings
□□BS EN 10025-1:2004 Hot rolled products of structural steels. General technical delivery conditions
□□BS EN 10083:2006 Steels for quenching and tempering. Technical delivery conditions for non-alloy steels
□□BS EN 10088-2:2014 Stainless steels. Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes
□□BS EN 12163:2011 Copper and copper alloys. Rod for general purposes
□□UNI EN ISO 1461:2009 Hot dip galvanised coatings on fabricated iron and steel articles – Specification and test methods.
□□CEI EN 61284:1999-06 Overhead lines – Requirements and tests for fittings

Environmental Conditions -

The works/supplies under the scope of these technical specifications shall also be fully operable and maintainable in the following climatic and atmospheric conditions.

Ambient air temperature	-2.5oC degrees to +50oC
Average ambient temperature for one year	+35°C
Maximum temperature of a metallic object underthe sun	+70°C
Maximum relative humidity	100%
Annual rainfall Dry arid regions and also heavy monsoon affecting regions with rainfall ranging	from 1750mm to 6250mm
Maximum number of thunderstorms days per annum	85
Maximum number of dust storm days per annum	35
Number of rainy days per annum	120
Basic wind pressure	120 – 200 kgf/m2, as per wind map based on IS – 875.
Creepage distance for (i) Extreme pollution condition (ii) Polluted conditions	As per IEC 60815 – 2008
Horizontal Seismic Zone	Refer IS 1893 Part 1 for earthquake mapping

2.9.18 Droppers (Dropper Clips)-

Dropper clips will suit 10sqmm Flexible droppers in accordance with DIN 43138, Messenger wire 120sqmm and 150sqmm contact wire. The mechanical and electrical requirements of the dropper clips are in accordance with EN 50119. The droppers shall withstand the loads without any adverse effects on the performance over the life cycle of the system. The size and performance of the droppers was verified by dynamic simulation for interaction between the pantograph and contact wire.

The factor of safety for the complete dropper assembly shall be 2.5 times for vertical and 1.5 times for horizontal loads.

The details and particular of dropper clips are mentioned below.

2.9.19 Catenary wire dropper clip for 120sqmm wire-

- Part No: 7005109 DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1354_Supplier Reference Code: 077250600NM
- Material : CuNi2Si EN12163 and Stainless steel Fasteners EN 10088Type Bolted type Suitable for 4.5 mm dia BZ II flexible dropper wire

Electrical Requirements: Current carrying dropper clip is designed to allow for current to flow between the messenger wire and the contact wire. The maximum resistant at the joint between the bronze droppers wire and the clamp, at the contact point between the clamp and the messenger and contact wire, shall be less than the less than the conductor of the same length. Resistance per meter length of dropper wire is; Rt = R20 (10.004(t-20)) where, R20 = 0.02773 ohm/m. The dropper is not required to be short circuit proof.

Mechanical Requirements: Tensile strength of dropper wire 589 N/mm² and the dropper clip is design to withstand a vertical load of 3 KN. Crimps CH: 9mm, Width: 8mm, Pressure: 400bar, Number: 2 Usage For in-span flexible dropper on the catenary/messenger wire.

2.9.20 Contact wire dropper clip for 150sqmm wire-

- Part No: 7005110. DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1355. Supplier Reference Code: 077075900NM.
- Material : CuNi2Si EN12163 and Stainless steel Fasteners EN 10088. Type Bolted type.Suitable for 4.5 mm dia BZ II flexible dropper wire.
-

Electrical Requirements: Current carrying dropper clip is designed to allow for current to flow between the messenger wire and the contact wire. the maximum resistant at the joint between the bronze droppers wire and the clamp, at the contact point between the clamp and the messenger and contact wire, shall be less than the less than the conductor of the same length. Resistance per meter length of dropper wire is; Rt = R20 (10.004(t-20)) where, R20 = 0.02773 ohm/m`. The dropper is not required to be short circuit proof.

Mechanical Requirements: Tensile strength of dropper wire 589 N/mm² and the dropper clip is design to withstand a vertical load of 3 KN. Crimps CH: 9mm, Width: 8mm, Pressure: 400bar, Number: 2. Usage For in-span flexible dropper on the catenary/messenger wire

2.9.21 Clamps (ending clamps) and Line Fittings (Splices)-

The ending clamps and the splices proposed for this project are in accordance with the electrical and mechanical requirements mentioned EN 50119. The breaking load of the ending clamps and the splices shall be more than that of the breaking load of the conductors on which they are intended to use. The ending clamps and splices shall be tested with a minimum of 2.5 times of the working load or with 85% of the calculated breaking load of the conductor to which they are secured. The higher value of the two shall be attained. The ending clamps shall not incur any permanent deformation when applied 1.33 times of the working loads. Line fittings are designed to provide a specified normal and short circuit current flow without causing failure wherever applicable.

Messenger wire End Clamp suitable for 120sqmm Cu-Mg 0.2 (BZ I) & Contact wire ending Clamp suitable for 150sqmm Cu-Ag 0.1.(Ending clamp is same for both messenger wire and contact wire)

- Part No: 7004102 & 7004103. DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1295.Supplier Reference Code: 076074504.
- Material : Body (X5CrNi1810 –EN 10088 Stainless steel) & Wedge (CuZn40Pb2-EN 12164, Copper alloy).Fasteners (X5CrNi1810, EN 10088-Stainless steel).
- Working load - 14 kN & 16 KN respectively for MW and CW (document W3/PS/4022 available in this office).
- Mechanical requirements - 85% of the breaking load of conductor or 2.5 times the working (for testing purpose) load. The higher value of the two shall be attained. The anchoring clamps used shall not incur any permanent deformations which impair operation at 1, 33 times the working load.
- Usage- OHE terminations. Section Insulator, Neutral Section and cut in insulation.

2.9.22 Large span wire End Clamp suitable for 150sqmm Cu-Mg 0.5 (BZ II) –

- Part No: 7004104. DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1295. Supplier Reference Code: 077430500.
- Material : Body (X5CrNi1810 –EN 10088 Stainless steel) & Wedge (CuZn40Pb2-EN 12164, Copper alloy) Fasteners (X5CrNi1810, EN 10088- Stainless steel).
- Working load - 30kN (document W3/PS/4022 available in this office).
- Mechanical requirements- 85% of the breaking load of conductor or 2.5 times the working (for testing purpose) load. The higher value of the two shall be attained. The anchoring clamps used shall not incur any permanent deformations which impair operation at 1, 33 times the working load.
- Usage - OHE Termination with large span wire in station area where OHE has to cross multiple tracks before anchoring.

2.9.23 Messenger wire Splice suitable for 120sqmm Cu-Mg 0.1 (BZ I) –

- Part No: 7005111. DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1360. Supplier Reference Code: 077181103.
- Material : Cu – ETP (tube) EN 13600.
- Type - Compression joint.

- Working load - 14 kN (document W3/PS/4022 available in this office).
- Mechanical requirements- 85% of the breaking load of conductor or 2.5 times the working (for testing purpose) load. The higher value of the two shall be attained. The splices used shall not incur any permanent deformations which impair operation at 1, 33 times the working load.
- Electrical requirement- Line fittings are designed to provide a specified normal and short circuit current flow without causing failure.
- Suitable for - Conductor dia 14.00 mm to 14.10 mm.
- Crimping details - Hexagon CH = 22mm, Wide = 28mm, number of crimps = 6 intotal, minimum capacity of press = 400 bar.

2.9.24 Contact wire Splice suitable for 150sqmm Cu-Ag-

- Part No: 7005112.DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1361.Supplier Reference Code: 075141600.
- Material : CuNi2Si UNI 2528 & EN 10088.
- Type- Bolted type (6 bolts).
- Working load- 16 kN (document W3/PS/4022 available in this office).
- Mechanical requirements- 85% of the breaking load of conductor or 2.5 times the working.(for testing purpose) load. The higher value of the two shall be attained. The splicesused shall not incur any permanent deformations which impair operation at 1, 33 times the working load.
- Electrical requirement- Line fittings are designed to provide a specified normal and short circuit current flow without causing failure.
- Suitable for - Conductor dia 14.50 mm. No of Bolts 6 Nos (Dia 10mm x 30mm).

2.9.25 Negative Feeder wire Splice suitable for 288sqmm AAAC-

- Part No: 7005114.DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1208. Supplier Reference Code: 05450102205
- Material : EN-AW 6060 T4 EN 755.
- Type - Compression joint.
- Working load 21.6 kN (maximum at -2.5°C and equivalent span of 27m)(document W3/PS/4022availbale in this office).
- Mechanical requirements- 85% of the breaking load of conductor or 2.5 times the working (for testing purpose) load. The higher value of the two shall be attained. The splices used shall not incur any permanent deformations which impair operation at 1, 33 times the working load.
- Electrical requirement - Line fittings are designed to provide a specified normal and short circuit current flow without causing failure.
- Suitable for- 22.05 mm.
- Crimps- Hexagon CH= 34mm, Wide = 33mm, number of crimps = 10 in total, minimum capacity of press = 400 bar.
- Usage - Negative feeder is proposed for back to back termination at every 8 Kms and at the end of each drum length (appx. 2 Kms) the negative feeder wire to be spliced.

2.9.26 Contact wire Splice suitable for 150sqmm Cu-Ag –

- Part No: 7005112. DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1361.Supplier Reference Code: 075141600

- Material : CuNi2Si UNI 2528 & EN 10088.
- Type - Bolted type (6 bolts).
- Working load -16 kN (document W3/PS/4022 available in this office).
- Mechanical requirements- 85% of the breaking load of conductor or 2.5 times the working.(for testing purpose) load. The higher value of the two shall be attained. The splices used shall not incur any permanent deformations which impair.operation at 1, 33 times the working load.
- Electrical requirement - Line fittings are designed to provide a specified normal and short.circuit current flow without causing failure.
- Suitable for - Conductor dia 14.50 mm. No of Bolts 6 Nos (Dia 10mm x 30mm).

2.9.27 Negative Feeder wire Splice suitable for 288sqmm AAAC –

- Part No: 7005114. DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1208.Supplier Reference Code: 05450102205.
- Material : EN-AW 6060 T4 EN 755.
- Type - Compression joint.
- Working load - 21.6 kN (maximum at -2.5°C and equivalent span of 27m) (document W3/PS/4022 available in this office).
- Mechanical requirements- 85% of the breaking load of conductor or 2.5 times the working (for testing purpose) load. The higher value of the two shall be attained. The splices used shall not incur any permanent deformations which impair operation at 1, 33 times the working load.
- Electrical requirement - Line fittings are designed to provide a specified normal and short circuit current flow without causing failure.
- Suitable for - 22.05 mm.
- Crimps -Hexagon CH= 34mm, Wide = 33mm, number of crimps = 10 in total, minimum capacity of press = 400 bar.
- Usage - Negative feeder is proposed for back to back termination at every 8 Kms and at the end of each drum length (appx. 2 Kms) the negative feeder wire to be spliced.

2.9.27 Aerial Earth Wire Splice suitable for 91.97sqmm ACSR-

- Part No: 7005115. DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1207.Supplier Reference Code: 05405411227.
- Material: Aluminium: EN-AW 6060 T4 EN 755. Steel: C40+N EN 10083.
- Type - Compression joint.
- Working load - 8.0 kN (maximum at -2.5°C and equivalent span of 27m) (document W3/PS/4022 available in this office).
- Mechanical requirements - 85% of the breaking load of conductor or 2.5 times the working (for testing purpose) load. The higher value of the two shall be attained. The splices used shall not incur any permanent deformations which impair operation at 1, 33 times the working load.
- Electrical requirement - Line fittings are designed to provide a specified normal and short circuit current flow without causing failure.
- Suitable for - 12.27 mm.
- Crimps for Aluminium: Wide = 43mm, number of crimps = 4 in total, For Steel: Wide = 40mm, number of crimps = 3 in total. Minimum capacity of press for both aluminium and steel = 400 bar.

- Usage - Aerial Earth wire is proposed for back to back termination at every 8 Kms and at the end of each drum length (appx. 2.6 to 3 Kms) the Aerial Earth wire to be spliced.

2.9.28 Electrical Connectors (PG Clamps)-

Design of Electrical connectors shall be able to sustain thermal load cycling with no reduction in mechanical and electrical integrity. The temperature rise with the specified short circuit current for 1 sec. shall not cause fusion or deformation or exceed the maximum allowable temperature of the wire which is 170°C. The temperature rise at normal operation of the electrical connectors shall not exceed the maximum allowable temperature of the conductor i.e. 80°C. Electrical connectors shall not be subjected to mechanical tension and the jumper shall be flexible.

Refer document number W3/PS/4248 – "Design of Jumpers" for various jumpers, sizes, the current carrying capacity and the temperature rise in the conductors for normal and short circuit currents.

2.9.29 Parallel Groove Clamp (22.05/22.05mm) for 288sqmm Negative Feeder-

- Part No: 7005101.DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1346. Supplier Reference Code: 042288851.
- Material : clamp EN-AC AlSi7Mg EN 1706,Stainless steel Fasteners A2-70 EN 3506.
- Type - Bolted type.
- Suitable for- 22.05mm/22.05mm AAAC conductor.
- Usage For feeder to feeder jumper at feeder termination for continuity.

2.9.30 Parallel Groove Clamp (22.05/19.75 mm) for 288sqmm Negative Feeder and 160sqmm Cu Jumper wire –

- Part No: 7005105. DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1350. Supplier Reference Code: 042288851E.
- Material : Half clamp EN-AC AlSi7Mg EN 1706,Stainless steel Fasteners A2-70 EN 3506 Bimetallic sheet.
- Type - Bolted type.
- Suitable for- 22.05mm/19.755mm AAAC conductor to Cu Flexible wire.
- Usage - For Isolator to feeder jumper at double pole isolator.

2.9.31 Parallel Groove Clamp (22.05/15.2 mm) for 288sqmm Feeder wire and 105sqmm Cu flexible Jumper wire –

- Part No: 7005113. DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1362. Supplier Reference Code: 042288850E.
- Material : Half clamp EN-AC AlSi7Mg EN 1706, Stainless steel Fasteners A2-70 EN 3506 Bimetallic sheet
- Type - Bolted type.
- Suitable for - 22.05mm/15.2mm for AAAC feeder wire to 105sqmm cu flexible wire.
- Usage - Jumper between OHE and Feeder at along track feeder termination.(at Switching station).

2.9.32 Parallel Groove Clamp (14/19.75 mm) for 120sqmm Messenger wire and 160sqmm Cu flexible Jumper wire –

- Part No: 7005103. DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1348. Supplier Reference Code: 077402800.
- Material : CuAl10Fe2 (UNI 1982) Stainless steel Fasteners A2-70 (EN 10088).
- Type - Bolted type.
- Suitable for - 14mm/19.75mm for Messenger wire to 160sqmm cu flexible wire.
- Usage - Jumper between OHE and Isolator at double pole and single pole Isolator.

Parallel Groove Clamp (14/15.2 mm) for 120sqmm Messenger wire and 105sqmm Cu flexible Jumper wire-

- Part No: 7005104. DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1349. Supplier Reference Code: 077403000.
- Material : CuAl10Fe2 (UNI 1982) Stainless steel Fasteners A2-70 (EN 10088).
- Type - Bolted type.
- Suitable for - 14mm/15.25mm for Messenger wire to 105sqmm cu flexible wire.
- Usage --**Jumper** between OHE to OHE for full current continuity at UIOL and Turnout.

2.9.33 Parallel Groove Clamp (12.27/12.27 mm) for 91.97sqmm Aerial Earth wire-

- Part No: 7005107. DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1352. Supplier Reference Code: 042288803.
- Material: Half clamp EN-AC AlSi7Mg EN 1706, Stainless steel Fasteners A2-70 EN 3506.
- Type - Bolted type.
- Suitable for - 12.27mm/12.27mm ACSR aerial earth wire.
- Usage - For earth wire to earth wire jumper at earth wire terminations.

2.9.34 Parallel Groove Clamp (14/9 mm) for 120sqmm Messenger wire and 50sqmm Cu flexible Jumper wire-

- Part No: 7005106. DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1351. Supplier Reference Code: 042288849EE.
- Material : Half clamp EN-AC AlSi7Mg EN 1706, Stainless steel Fasteners A2-70 EN 3506 Bimetallic sheet.
- Type - Bolted type.
- Suitable for - Dia 14mm messenger wire to Dia 9mm Cu jumper wire.
- Usage - Anti-theft Jumper (ATJ) and for Potential equalizing jumper.

2.9.35 Lug for 91.97 sqmm ACSR Aerial earth wire-

- Part No: 7005108. DRAWINGS AVAILABLE IN THIS OFFICE Drg No: W3/PS/1347. Supplier Reference Code: 076343700.
- Material : Tinned copper tube. Suitable for 91.97 sqmm ACSR Aerial earth wire.
- Crimps CH 15mm, crimped for the whole length, pressure 400 bar.
- Usage - For terminal lug to 91.97 sqmm ACSR Aerial earth wire

Tolrances-
Tolerance: Wherever not specified in the drawings, the following tolerances shall apply for non mating surfaces:

Dimension	Tolerance
Upto and including 35mm	+/- 0.5mm
Over 35mm	+/- 1.5%

In case of mating surfaces,

- On the holes tolerance shall be +0.50 mm
  - 0.50 mm.
- On Shafts Tolerance shall be +0.00 mm.
  -0.50 mm.

The tolerance for wall Thickness shall be +1.00 mm
-0.50 mm

2.9.36 Specification of splice for contact wire

References
PS and GS of CP-104 Contract
EN 50019:2009+A1:2013"Railway applications: Fixed installations Electric Traction overhead contact lines"
Selection of Splice for contact wire
The performance of fittings designed to terminate or splice stranded or individual wires is critical to the efficient operation and maintenance of the OHE.
The tensile feeling load of the fitting shall exceed the failing load of the wire or stranded wire with which it is to be assembled and used. The minimum breaking load of high strength contact wire CuAg 0.1 BC -150 used in the present project is 52.4 kN (ref document W3/PS/4129available in this office). The working load on contact wire is 16 kN (ref design available in this office) for the present project.
When the fitting is tested and assembled to the allocated wire or stranded wire the assembly shall achieve 85% or greater than the specified tensile failing load of the wire stranded wire.
Applicable factors of safety shall be as per European standards EN 50119.
Splices are primarily for use during maintenance and shall not be used in the contact wires by way of installation or repair. If need arises due to any exceptional reason, same shall be done with specific approval of engineer.
Mechanical Requirements.
Anchoring clamps should be capable of securing cables and wires with a minimum of 2.5 times the working load or with 85% of the calculated breaking load of the conductors. The lower value shall be attained in any case. The anchoring clamps used shall not incur permanent deformations which impair operation at 1,33 times the working load.
Other clamp and line fitting shall have a factor of safety of 2,5 times the working load. Clamps and line fittings subject to vibration shall be designed to prevent loosening over time. In addition, the

mass of in-line fitting should be kept to a minimum, within the functional requirement of the component.

Electrical Requirements

Clamps and line fitting shall provide a path for the specified normal and short- circuit current flow without cussing failure.

Testing

For testing requirements on clamps, splices and other fittings, reference is made to Para 8.1 and 8.2 of EN 50119.

2.9.37Specification of 3 pulley auto tensioning device for 25Kv AC SINGLE PHASE 50 HZ traction overhead equipment (OHE).

Purpose

Purpose of this document is to describe and suitability of 3 pulley auto tensioning device to the functional requirements of 25Kv OHE.

The 3 pulley auto tensioning device conforming to EN50119 shall in this project. The governing specification for the mechanical testing requirements shall be according to EN 50119.

Scope.

This specification covers the requirement of 3 pulley auto tensioning for 25Kv AC SINGLE PHASE 50 HZ traction overhead equipment (OHE). Tensioning device is a device to maintain the tension of conductor within the system design parameters.

Governing specifications

EN 50119:2009+A1:2013 “Railway application: Fixed installation Electric Traction overhead contact lines”

EN 50149: 2012” Railway applications: Fixed installations Electric Traction Copper and copper alloy grooved.

OHE Design Data

The OHE parameters for selection of ATD are as follow;

Reference document W3/PS/4163 E available in this office.

Catenary material: 120sq, mm, Cu, Mg Bzl alloy

Catenary wire diameter 14mm

Breaking load of catenary wire; 56.68 kN

Coefficient of thermal expansion of catenary 1.7x 10^{-3} / (EN 50149:2012)

Catenary tension 1428 Kgf (ref document W3/PS/4022 available in this office).

Reference document W3/PS/4129 E available in this office .

Contact wire material: High strength Copper silver alloy Cu-Ag 0.1 Per EN 50149:2012

Contact wire diameter 14.5mm (EN 50149:2012)

Breaking load of Contact wire : 52.4 KN (En 50149:2012)

Coefficient of thermal expansion of contact wire 1.7x10^{-3} /K (EN 50149:2012)

Contact wire tension 1632 Kgf (Ref document W3/PS/4022 available in this office)

Proposed catenary arrangement Flexible polygonal sagged simple auto tensioned overhead equipment (CI 8.1.1, PS – Elec works)

Design speed of railway line: 120kmph. (CL 8.2.7, PS –Elec works)

Type of Overhead equipment structures for termination: Double channel B series fabricated steel structure or Four angled lattice steel portal uprights (DocW3 PS 4018 available in this office for Selection of OHE masts)

Specification for Auto Tensioning Device

List of components

SN	Description of the Component	Material	Supplier Drawing number	Governing Standard	Qty per unit
1	Pulley dia 265	Al, Alloy castings	P 51229	EN 1706	2

		EN Ac Alsi 12(b)			
2	Pulley dia 200	Al, Alloy castings EN AC alsi 12(B)	P 51230	EN 1706	1
3	Clevis 90" with screws	Galvanized Steel	57006	EN 10083	1
4	Front Right Plate 80x8	Galvanized Steel	64246	EN 10083	1
5	Front left Plate 80x8	Galvanized Steel	64247	EN 10083	1
6	Rear Right Plate 80x8	Galvanized Steel	64248	EN 10063	1
7	Rear Left plate 80x8	Galvanized Steel	64249	EN 10083	1
8	Shaped Plate	Galvanized Steel	Ps2347/3	EN 10083	2
9	Anticut rods dia 16 with nuts and split pins	Galvanized Steel	64250	EN 10083	2
10	Terminal clamp for rope	Cu Alloy casting Cu Al 10 Fe2	52833	EN 1982	2
11	Rope dia 8.75 mm	Stainless steel		EN 10088	-
12	Axe dia 25/20 Length 73mm	Case Hardening Steel 17NICrMo6-4	PS 2348/2	EN 10084	2
13	Axe dia 25/20 length 92mm	Case Hardening Steel 17NICrMo6-4	PS2348/1	EN 10084	1
14	Bearing SKF 6305- Z with protection	-	-		6
15	Couple of washer SKF Z- 305	-	-		6
16	Washer 21x37 UNI 6592	Stainless steel	-	EN 10088	6
17	Washer 13x24 UNI 6592	Stainless steel	-	EN 10088	6
18	Spring washer A13 UNI 1751	Stainless steel	-	EN 10088	3
19	Special screw	Stainless steel XBC NiS 18-9	P033541/C	EN 10088-3	3
20	Graser M10x1 UNI 7662	Brass	-		3
21	Elastic ring 62 UNI 7437-75	Stainless steel	-	EN 10088	3
22	Screw M12x30UNI 5739	Stainless steel A2 - 70	-	EN 10088	3
23	CAP	VINYL	P52349		3
24	Screw M20x95x46, UNI 5737 Nut M12,UNI 5589 Split Pin 5x32 UNI 1336	Screw cl8.8 Nut cl.6s Stainless steel	-		1
25	Nut M12 UNI 5587	A2/70	-	UNI EN ISO 3506	3
26	Screw M12x100, UNI 5737Nut M 12.UNI 5587 washer 13x24, UNI 6592 Spring washer A12 UNI 1751	A2/70	-	UNI EN ISO 3506	3
27	Spacer ½* length 57, UNI 3324	Galvanized Steel	-	EN 10083	3
28	Crimped clamp	Copper	P52838/A		1

The material for the components shall conform to the specific standards mentioned in the above table.

The components are made of aluminum alloy, copper alloy, galvanized steel stainless steel fabricated steel. The material and norm of the component is specified in the drawings

Classification of tests and criteria of acceptance

The tests are divided into three groups.

i) Type tests
ii) Acceptance tests
iii) Routine tests

Tolerances

Unless a different tolerance is shown in the drawings mentioned in the above component list produced by the manufacture at the time of inspection, a tolerance of 1.0mm shall be accepted on all dimensions of non-mating surfaces. Tolerances on the dimensions representing thickness shall be +0.5mm/-0.00mm. For the shaft diameter to tolerances are +0.00mm/-0.013mm. For bearing house bore the tolerances are 0.00mm/-0.03mm.

Material Specification and testing requirements

The aluminum alloy casting used for the components shall confirm to EN 1706:2000. Al si 12 the aluminum casting alloy be used for the pulleys.

The stainless steel component mail the wire rope and the fasteners shall be made stainless steel bars of Grade 316 and confirm to EN 10088.

The fabricated components and fitting made of galvanized steel shall confirm to requirements mentioned in the standard EN 10083.

Test Methods.

Tensile Testing EN 10002-1 (method of tests at ambient temperature)

Visual Test: All the clamp, pulleys and attainments shall be examined visually for good work man ship and smooth finish including marking as specified in drawing and for freedom from defects stipulated in the relevant specifications. The visual inspection shall be carried out in accordance with standard UNI EN ISO 9712.

Chemical Composition Test: Chemical composition shall be expressed in accordance with the writing rules given in the following European standards.

For Aluminum and aluminum castings EN 1706 and EN 577-3.
For Coper and Copper alloy EN 1982.
For Stainless Components and Fasteners EN 10083-2

Material shall confirm to the relevant specification and as per the composition given in the table respective standards. The vendor shall produce the certificate of Rave material and certificate of ingots in conformance to the table given in the standards.

Tensile Test.

The tension device shall be tested in accordance with the requirements given in 7.5 of EN 50119 which is reproduced below.

The tensioning device shall maintain the mechanical tension in the overhead contact line conductor (s) defined in the specification i.e. 3060 kgf (1428kgf in catenary wire= 1632 kgf in contact wire). The device shall be designed to achieve an efficiency > 97% over the specified design temperature range of the equipment.

Efficiency Test.

The efficiency of ATD shall be >97% and shall be proven by the suppler by means of a test.

PART - III

LIST OF STANDARD DRAWINGS AND SPECIFICATIONS FOR INDIGENOUS ITEMS

This Annexure contains reference to drawing number, charts, schedule specifications and other data referred to in various paragraphs of this tender paper.

All references to drawings, charts, schedules or specifications given in this annexure shall be taken to be the version available as on date of issue of LOA of such drawings, charts and schedule of specifications as issued by the Purchaser.

LIST OF STANDARD DRAWINGS:

Sl No.	Brief Description	Drawing		Mod No.
		Series	Number	
1.	Extra allowance for setting of structures on curves (1676 mm Broad gauge)	ETI/OHE/G	00111 Sh-1	B
2.	Standard setting of structures in the vicinity of signals (broad gauge)	-do-	00112	C
3.	Typical design of bearing foundation	-do-	00131	-
4.	Deleted-			
5.	Typical design of cantilever mast	RE/33/G	00141 Sh.3	-
6.	Standard drilling schedule of OHE masts 9.5 m long RSJ and BFB respectively	ETI/OHE/G	00144 Sh.3	C
7.	Span and stagger chart for (conventional OHE, Cad-Cu Catenary & Cu Contact Wire) wind pressure 75,112.5 & 150 kgf /sq. meter	ETI/OHE/G	00202	-
8.	Employment schedule for Cantilever mast regulated OHE cat.65/Cu and Cont 107/Cu, WP 112.5 kgf/Sq m without Ex & without RC	ETI/OHE/G	00153 Sh.1	E
9.	Employment schedule for Cantilever mast regulated OHE cat.65/Cu and Cont 107/Cu, WP 112.5 kgf/sq m without Ex & without RC	ETI/OHE/G	00153 Sh.2	E
10.	Employment schedule for Cantilever mast regulated OHE cat.65/Cu and Cont 107/Cu, WP 112.5 kgf/sq m without Ex & with RC.	ETI/OHE/G	00153 Sh.3	E
11.	Employment schedule for Cantilever mast regulated OHE cat.65/Cu and Cont 107/Cu, WP 112.5 kgf/sq m without Ex & without RC.	ETI/OHE/G	00153 Sh.4	D
12.	Employment schedule for Cantilever mast regulated OHE cat.65/Cu and Cont 107/Cu, WP 112.5 kgf/sq m at 35 XC & 28 kgf/Sq m at 4xC without (E x & RC)	ETI/OHE/G	00154	D
13.	Employment schedule of bracket tubes regulated pressure Conventional OHE (Cd Cu catenary & Cu contact wire 1000 kgf tension Each).	ETI/OHE/G	00158 Sh.1 (for wind pressure 75 kgf/sq m)	-
		-do-	Sh.2(for wind pressure 112.5	

			kgf/sq m)	
		-do-	Sh.3(for wind pressure 150 kgf/sq.m.)	
14.	Dropper schedule for – un-insulated Overlap spans.	-do-	00169	A
15.	Dropper schedule for – insulated Overlap spans.	-do-	00170	A
16.	Dropper schedule for conventional regulated OHE. With Zero pressure (1400/1400).	-do-	00177	A
17.	Adjustment chart of Regulating equipment 3-pulley Type 3:1 ratio.	-do-	00195	A
18.	Schematic arrangement of regulated OHE	-do-	02101	A
19.	Schematic arrangement of un-insulated overlap(3&4 span overlaps)	-do-	02121 Sh.4	A
20.	Schematic arrangement of insulated overlap.	ETI/OHE/G	02131 Sh.3	A
21.	Termination arrangement of OHE with 3 pulley type regulating equipment (3:1 ratio).	ETI/OHE/G	04212	B
22.	General distribution of droppers.	ETI/OHE/G	00161	-
23.	Outline of Pantograph (Broad gauge and meter gauge)	RE/33/G	00181	A
24.	General formation of single track Embankments and cutting (Broad gauge)	RE/33/G Sh.1	01101	A
25.	General formation of double track in Embankments and cutting (Broad gauge)	-do-	01102 Sh.1	A
26.	General formation of multiple tracks (1675mm. Gauge).	-do-	01103 Sh.1	A
27.	Standard anchor arrangement	-do-	01401	E
28.	Anchor arrangement with dwarf mast.	ETI/OHE/G	01402	B
29.	Schedule of anchor block for BG track	-do-	01403 Sh.1	D
30.	Double guy rod arrangement with anchor block for BG track..	-do-	01403 Sh.2	C
31.	Schedule of anchor block for BG track (Black cotton soil).	-do-	01403 Sh.3	B
32.	Standard guide tube arrangement on a mast and structures.	ETI/OHE/G	01505	-
33.	Trapezoidal counter weight arrangement on OHE structures.	-do-	01502	-
34.	Arrangement of 3 KV & 25 KV Pedestal insulator supports on OHE masts and portals.	-do-	01601	-
35.	Standard arrangement for mounting of number plate on OHE structure.	ETI/OHE/G	01701	A
36.	Schematic arrangement of regulated overhead equipment.	-do-	02101	A
37.	Typical arrangements of OHE on cantilever masts for double track section.	-do-	02102	-
38.	Typical arrangement for fixing of bracket assembly on 9.5 m mast and structure to suit raising of tracks(in future)	-do-	02102 Sh.3	-
39.	Mast on platforms (1676mm. Gauge)	ETI/OHE/G	02104 Sh.2	A
40.	Details of bracket arrangement on tangent and	-do-	02106 Sh.1	A

	curved tracks.			
41.	Details of bracket arrangement for OHE (High speed).	-do-	02106 Sh.3	C
42.	Single bracket assembly on structures and dropped arms.	RE/33/G	02107	D
43.	Box type cantilever arrangement.	ETI/OHE/G	02108	A
44.	Arrangement at anti-creep.	-do-	02111	A
45.	Standard cantilever arrangement for boom anchor anti-creep location.	-do-	02113	-
46.	Schematic arrangement of un-insulated over Lap (type-I) 3 & 4 span overlaps.	RE/33/G	02121 Sh.1	F
47.	Schematic arrangement of insulated overlap.	ETI/OHE/G	02131 Sh.1	
48.	General arrangement of regulated OHE at turnout (overlap & crossed type).	-do-	02141	C
49.	General arrangement of regulated OHE at cross over (overlap & crossed type).	-do-	02151	
50.	Arrangement of neutral section	-do-	02161 Sh.1 of 2.	C
51.	Arrangement of neutral section assembly (PTFE Type) at SWS	-do-	02162	-
52.	Arrangement of short neutral section.	-do-	02161 Sh.2 of 2	-
53.	Schematic arrangement of unregulated overhead equipment.	-do-	03101	-
54.	Standard termination of OHE (Regulated & un-regulated)	ETI/OHE/G	03121	D
55.	General arrangement of unregulated OHE at turnout (overlap and crossed type).	-do-	03151	-
56.	General arrangement of unregulated OHE crossovers and diamond crossings (overlap and crossed type).	-do-	03152 Sh.1	-
57.	General arrangement of unregulated OHE crossovers and diamond crossings.	-do-	03152 Sh.2	-
58.	General arrangement of head span.	-do-	03301	-
59.	General arrangement of pull off.	-do-	03201	A
60.	In span jumper connection between cat nary & contact wire.	-do-	05101	-
61.	Continuity jumper connection at un-insulated overlap.	-do-	05102	C
62.	Arrangement of anti-theft jumper.	-do-	05107	A
63.	Connection at turnouts.	-do-	05103	B
64.	Potential equalizer connection at insulated overlap and neutral section.	-do-	05104	-
65.	Connections at diamond crossing.	-do-	05106	A
66.	General arrangement of connections to OHE by copper cross feeder (150)	-do-	05121 Sh.1	C
67.	General arrangement of connections at switching station on double track section by copper cross feeder (150)	ETI/OHE/G	05122 Sh.1	C
68.	General arrangement of connections at switching station on multiple track section by copper cross feeder (150)	ETI/OHE/G	05123 Sh.1	C

69.	Suspension of 25kv feeder (spider) on OHE masts.	-do-	05143	B
70.	Termination of feeder, return conductor and return feeder (copper & aluminum).	RE/33/G	05145-1	
71.	Arrangement of suspension of double spider 25 KV feeder and return feeder between sub-station and feeding station.	-do-	05152	C
72.	Assembly of section insulators.		051181	C
73.	General arrangement of earth wire on OHE mast.	ETI/OHE/G	05201	A
74.	General arrangement of earth wire on OHE mast.	ETI/OHE/G	05201-1	-
75.	Arrangement of transverse bonds	ETI/OHE/G	05251	A
76.	Connection of return conductor to track.	-do-	05306	F
77.	Suspension arrangement of aluminum return conductor (spider) on traction structures.	-do-	05306	B
78.	Suspension of return conductor (spider) from boom of structures (with clevis type disc insulators).	-do-	05312	A
79.	Connections between OHE and aluminum return conductor at booster stations.	ETI/OHE/G	05413	B
80.	Mounting of 25kv isolators on OHE structures (General arrangement).	-do-	05513 Sh.1	A
81.	Details of small part steel work for supporting 25kv isolator on new T.C.C. boom.	-do-	05513 Sh.2	A
82.	Connection from isolator to OHE	-do-	05516	A
83.	Characteristics of conductors/bus bar for 25kv AC traction	-do-	05600	A
84.	Arrangement of mounting 25 KV/240,10 KVA LT supply transformer.	ETI/OHE/G	05522	-
85.	Employment schedule for cantilever mast regulated OHE Caty.65 Cu.Cont.107/CU (WP 75 kgf/sq. m.)	ETI/C	0702(OHE only)(Sh.1)	A
		ETI/C	(OHE+EW)(Sh.2)	A
86.	Employment schedule for Tramway type regulated OHE (WP 75 kgf/sq. m.) without EW& without RC.	ETI/C	0704	A
87.	Employment schedule for 8”x8”35 lbs BFB (9.5 M. long) (WP 112.5 kgf/sq. m. Cat.65/CU & Cont.107/Cu. cantilever mast regulated OHE Caty.65 Cu.Cont.107/CU.	ETI/C	0702(OHE only)(Sh.1)	A
88.	Employment Schedule for OHE mast overlap central location with 3.0 m implantation. Cat. 65/Cu & Cont. 107/Cu. WP 75 kgf/sq. m.	-do-	0709	A
89.	Employment Schedule for OHE mast overlap central location with 3.0 m implantation. Cat. 65/Cu & Cont. 107/Cu. WP 112.5 kgf/sq. m.	-do-	0710	A
90.	Employment Schedule for OHE mast (9.5m) overlap central location with 3.0 m implantation. Cat. 65/Cu & Cont. 107/Cu. WP	-do-	0711	A

	75 kgf/sq. m.			
91.	Employment Schedule for OHE mast overlap central location with 3.0 m implantation. Cat. 65/Cu & Cont. 107/Cu. WP 112.5 kgf/sq. m.	-do-	0712	A
92.	Employment Schedule for (9.5m) long 200x200x49.9 kgf.OHE mast overlap inter location with 3.0 m implantation. Cat. 65/Cu & Cont. 107/Cu. WP 75 kgf/sq. m.	-do-	0713	A
93.	Employment Schedule for 9.5 m. long 200x200x49.9 kg mast Cat. 65/Cu & Cont. 107/Cu. WP 112.5 kgf/sq. m.	-do-	0714	A
94.	Employment Schedule for OHE mast (9.5 m) overlap Anchor location with 3.0 m implantation. Cat. 65/Cu & Cont. 107/Cu. WP 75 kgf/sq. m.	-do-	0715	A
95.	Employment Schedule for OHE mast overlap anchor location with 3.0 m implantation. Cat. 65/Cu & Cont. 107/Cu. WP 112.5 kgf/sq. m.	-do-	0716	A
96.	Employment schedule 0721 for regulated OHE mast (9.5 m) wind pressure 75 kgf/sq. m. for composite OHE (1000&1000)kgf. tension.	ETI/C	0721 (OHE only)(Sh.1)	
		-do-	(OHE+EW)(Sh2	
		-do-	(OHE+RC) (Sh.3)	
		-do-	(OHE+EW+RC)(Sh.4)	
97.	Employment Schedule for regulated OHE mast (9.5m) wind pressure 75 kgf/sq. m. for composite OHE with extra setting distance Overlap Anchor location.	-do-	0722	-
98.	Employment Schedule for regulated OHE mast (9.5m) wind pressure 75 kgf/sq. m. for composite OHE with extra setting distance Overlap center location.	-do-	0723	-
99.	Employment Schedule for regulated OHE mast (9.5m) wind pressure 75 kgf/sq. m. for composite OHE with extra setting distance Anchor location.	-do-	0724	-
100.	Employment Schedule for pre-stressed concrete mast (PC-42) 9.5 m long, for conventional OHE, Normal Location (WP 150,112.5 and 75 kgf/sq. m.) regulated OHE mast (9.5m) wind pressure 75 kgf/sq. m.	-do-	0725	-
101.	Standard portal (N.O,P,R,G & Double BFB type)	ETI/C	0064	
102.	Volume chart and equivalent chart of foundation.	-do-	0058 Sh.1	E
103.	-do- new pure gravity	-do-	0058 Sh.2A	C
104.	-do- Dry black cotton soil (NBC type)A	-do-	0058 Sh.3A	-
105.	-do- new pure gravity(500m,exposed)	-do-	0058 Sh.4	A
106.	-do- Dry black cotton soil (NBC type)2.5m depth.	-do-	0058 Sh.5	A
107.	-do- (for a direct load of 4000 Kg).	-do-	0058 Sh.6	A

108.	Special BFB portal for 5 tracks(general C arrangement)	ETI/C	0026 Sh.1	C
109.	Protective screen at foot over bridge and road over bridge.	-do-	008	F
110.	Chart for portal foundation	-do-	005/68	
111.	Muff for OHE structures	-do-	007/68	D
112.	Structure muff for sand core foundations.	-do-	0012/69	D
113.	9.5 m standard traction mast (fabricated 'K' series)	-do-	0018-2	D
114.	Remote control cubicle at switching station, foundation, RCC slab Building plan & steel door.	-do-	0067	B
115.	9.5 m standard traction mast (fabricated with bottom plates 'B' series)	ETI/C	0071	E
116.	Details of OHE foundation in soft rock (bearing capacity 45,000 Kgf/sq. m.	-do-	0059	A
117.	Details of foundation for fencing upright	-do-	0032	A
118.	Employment schedule for switching and booster station main masts	ETI/C	0185	B
119.	Drilling schedule for S-1 mast	ETI/C	0030	F
120.	-do- S-2 mast	-do-	0031	D
121.	-do- S-3 mast (length 11.4m).	-do-	0180	C
122.	Drilling schedule for 8"x6"x35 lbs RSJ mast 8.0 m long for booster transformer station Type S-4	-do-	0036	E
123.	Drilling schedule for S-5 mast (11.4m long)	-do-	0042	E
124.	-do- S-6 mast (length 12.4m)	-do-	0181	C
125.	-do- S-7 –do-	-do-	0182	C
126.	-do- S-8 -do-	-do-	0182	C
127.	-do- S-9 mast (length 9.4m)	-do-	0184	C
128.	General arrangement & details of fencing panels & gate for switching station.	-do-	0186 Sh.1	E
129.	Details of fencing upright and anti-climbing device for switching station	-do-	0186 Sh.2	E
130.	S-100 fabricated mast for mounting LT supply transformer and drop out fuse switch at switching station.	-do-	0043	B
131.	S-101 details of mast for supporting isolator inside switching station.	ETI/C	0044	A
132.	Details of anchor beam or SP, SSP, & FP.	-do-	0033	D
133.	Details of small part steel for switching station.	ETI/C	0034 Sh.1	K
134.	Details of bracing for switching & B.T. masts.	ETI/C	0034 Sh.2	B
135.	Details of small parts steel of out rigger for switching stations and booster transformer stations.		0037	C
136.	Details of small parts for booster transformer stations.	ETI/C	0040	E
137.	Details of pre-cast cable trench for switching station.	-do-	0038	E
138.	Standard 'R' type portal rod laced general arrangement.	-do-	0011/69 Sh.1	C

139.	Standard 'G' type portal special upright and end piece.	-do-	0056	C
140.	Short bored pile foundation for traction mast(permissible BM & volume)	-do-	0062	C
141.	Chart for portal foundations in dry black cotton soil safe bearing capacity 16500 Kg/sq.mm.	-do-	0063	B
142.	Dwarf mast foundation on wet & dry black cotton soil.	RE/ALD/OHE/SK/C	02	-
143.	Typical design of new pure gravity foundation.	ETI/SK/C	131	-
144.	Typical design of side gravity foundation	-do-	142	-
145.	Rock Anchor for BG Track.	ETI/SK/C	208	-
146.	Bracket fitting for PSC Masts capacity- 4.200 kg. m.	ETI/SK/C	214 Sh.1	E
147.	SPS details of earth wire clamp of PSC mast.	ETI/SK/C	214 Sh.1 of 2	-
148.	Special arrangement of OHE under over line structure.	ETI/OHE/SK	529	D
149.	Ear thing and bonding of PSC mast	ETI/OHE/SK	537 Sh.2 of 2	D
150.	Typical Ear thing arrangement in SPUN D PSC Mast with 18mm. dia rod.	-do-	537 Sh.2	B
151.	Arrangement of antitheft jumper at overlap.	ETI/OHE/SK	566	-
152.	Cat nary dropper assembly	ETI/OHE/P	1190	B
153.	Parallel clamp (20/20)	ETI/OHE/P	1550	E
154.	Standard guide tube assembly.	ETI/OHE/P	5060-2	C
155.	Standard anti-wind clamp.	-do-	2550-1/2	L
156.	Multiple cantilever cross arm assembly.	RE/33/P	3120	H
157.	Anchor fitting assembly on rolled sections.	ETI/OHE/P	3230	C
158.	Anchor fitting assembly on 'K' series, TCC masts and 'P' type portal upright.	-do-	3240	D
159.	Anchor assembly on 'N' and 'O' type portal upright.	-do-	3250	D
160.	Structure bonds	-do-	7000	E
161.	Ear thing station	-do-	7020	B
162.	Longitudinal rail bond	-do-	7030	F
163.	Short super mast assembly.	ETI/C/P	8010	G
164.	Long super mast assembly	-do-	8020	C
165.	Bracket attachment assembly on portal upright (N,O,R,P,G & BFB Type).	-do-	8030	B
166.	Super mast assembly on portals.	-do-	8050	C
167.	Medium super mast assembly.	ETI/OHE/P	8060	C
168.	Compensating plate.	-do-	5191-1/2	D
169.	Suspension clamp.	RE/33/P	1160	J
170.	Double suspension clamp.	-do-	1170	K
171.	Double suspension lock plate.	-do-	1172	C
172.	Cat nary splice (65)	ETI/OHE/P	1090	-
173.	Typical location & schematic connection diagram for a three interrupter switching station.	ETI/PSI	003	E
174.	Typical general arrangement of a three interrupter switching station.	-do-	004	E
175.	Typical location plan & general arrangement for sectioning & paralleling station.	-do	005	E
176.	Typical location plan & arrangement for A	-do	006	E

	feeding station.			
177.	Typical general arrangement at a Booster transformer station (with 4 cross feeder) type-III.	-do	013	B
178.	Typical general arrangement of 280 KVA Booster transformer station (with 4 cross feeder type-III.	-do-	018	A
179.	Typical general arrangement at a booster transformer station. (without cross feeder type-I.	-do-	011	C
180.	Typical number plate for auxiliary transformer.	ETI/PSI/P	7525	-
181.	Typical fencing and anti-climbing arrangement at switching station.	ETI/PSI	104	E
182.	Typical ear thing layout of sub-sectioning and paralleling station.	-do-	201	B
183.	Typical ear thing layout of a sectioning and paralleling station.	-do-	202	B
184.	Typical ear thing layout of a feeding station.	-do-	203	B
185.	Ear thing details for interrupter LT supply transformer 25 KV lightning arrestors PT Type-I (S-100 masts, S-101 mast, fencing upright and n masts).	-do-	204	A
186.	Typical ear thing layout at a booster transformer stations (without cross feeder) for Type-I & II.	-do-	211-1	A
187.	Typical cable run layout of a sub-sectioning & paralleling station.	-do-	301	C
188.	Typical cable run layout of a sectioning and paralleling station.	-do-	302	C
189.	Typical cable run layout of a feeding station.	-do-	303	B
190.	Typical ear thing layout at a booster transformer station (with 4 cross feeder for Type-III,IV and V.	ETI/PSI	212	B
191.	Typical drawing for a terminal board.	-do-	501	C
192.	36mm. Aluminum Bus terminal	ETI/PSI/P	6480	C
193.	-do- Splices.	-do-	6490	B
194.	-do- Tee connector.	-do-	6500	C
195.	36mm. Aluminum terminal.	-do-	6510	D
196.	36/15 Tap connector.	-do-	6520	B
197.	36mm. Aluminum flexible bus splice.	-do-	6550	B
198.	36mm. Alu. Bus splice cum tee connector.	-do-	6560	B
199.	Typical number plate for interrupter and double pole isolator.	-do-	7520	B
200.	Typical number plate for potential transformer type.	-do-	7521	B
201.	Typical number plate for booster transformer.	-do-	7522	B
202.	Standard plan Remote Control cubicle at switching station.	RE/Civil/BS-11/95		-
203.	Typical details of pressed steel door window and ventilator.	RE/Civil/S-115/95	R1	-
204.	Bolted base connection for portals located n drains.	ETI/C	0010	C

205.	Details of base plate for mast on drains in station yards.	-do-	6002/68	A

LIST OF STANDARD DRAWINGS FOR COMPOSITE OHE (REGULATED):

206.	Employment schedule for OHE masts unregulated OHE without RC & EW (WP=150 kgf/m2 at 10 deg.C).	ETI/OHE/G	00150	D
207.	Employment schedule of bracket tube regulated conventional OHE (Cd-Cu catenary and Cu-contact wire (1000 kgs tension each)) for wind pressure 150 kgf/m2 at 10 deg C.	ETI/OHE/G	00158 Sh.3	-
208.	Employment schedule of bracket tubes un regulated conventional OHE (Cd-Cu catenary and Cu-contact wire)	ETI/OHE/G	00159 Sheet-3	-
209.	Schematic arrangement of un-insulated overlap (Al. Alloy) catenary and copper contact wire.	ETI/OHE/G	02121 Sh.3	-
210.	Schematic arrangement of insulated overlap for (Al. Alloy) catenary & Cu Contact wire.	ETI/OHE/G	02131 Sh.2	-
211.	General arrangement of regulated composite OHE at turnouts (overlap and crossed type)	ETI/OHE/G	02141 Sh.2	-
212.	Standard termination of Regulated composite OHE.	-do-	03121 Sh.2	B
213.	In span jumper connection between Alu. Alloy cat nary & copper contact wire.	-do-	05101 Sh.2	B
214.	Continuity jumper connection at un-insulated overlap(Al. Alloy cat nary and copper contact wire).	-do-	05102 Sh.2	-
215.	Connections at turnouts for composite OHE.	-do-	05103 Sh.2	-
216.	Potential equalizer connection at insulated overlap& neutral section (Al. Alloy cat nary & copper contact wire).	-do-	05104 Sh.2	-
217.	Connection at diamond crossing for composite OHE.	-do-	05106 Sh.2	C
218.	General arrangement of connection to composite OHE by cross feeder (SPIDER)	-do-	05124 Sh.2	C
219.	General arrangement of connection at switching station on double track section for composite OHE.	-do-	05125 Sh.2	C
220.	General arrangement of connection at switching station on multiple track sec.(with composite OHE and spider cross feeder).	-do-	05126 Sh.2	C
221.	Assembly of section insulator (with Al. Alloy cat nary and copper contact wire).	-do-	05181 Sh.2	
222.	Std. Arrangement of supporting cantilevers on Boom of portals and TTC (to avoid Bird's nesting).	ETI/C	0076	C
	Employment schedule for OHE mast (9.5 M) wind pressure 112.5 kg/f sq. m. for composite OHE (1000+ 1000) Kgf Tension.			
223.	OHE only.	ETI/C/0717	Sh.1	-

224.	-do- OHE + EW		Sh.2	-
225.	-do- OHE + RC	ETI/C/0717	Sh.3	-
226.	-do- OHE+EW+RC		Sh.4	-
	Employment schedule for OHE Mast (9.5 M) wind pressure 112.5 kgf/sq.m. with 3.0 m implantation composite OHE (1000+1000) KGF Tension.			
227.	-do- Overlap anchor location.	ETI/C/0718		-
228.	-do- Overlap Central location	ETI/C/0719		-
229.	-do- Overlap inter location	ETI/C/0720		-
230.	Employment schedule for OHE mast (9.5m) for wind pressure 150 kgf/m2 copper OHE	ETI/C	0726 Sheet-1	-
231.	Employment schedule for OHE mast (9.5m) for wind pressure 150 kgf/m2 copper OHE & EW.	ETI/C	0726 Sheet-2	-
232.	Employment schedule for OHE mast (9.5m) for wind pressure 150 kgf/m2 copper OHE & RC.	ETI/C	0726 Sheet-3	-
233.	Employment schedule for OHE mast (9.5m) for wind pressure 150 kgf/m2 copper OHE, RC & EW.	ETI/C	0726 Sheet-4	-
234.	Employment schedule for OHE mast (9.5m) for wind pressure 150 kgf/m2 copper OHE with higher implantation overlap anchor location.	-do-	0727	-
235.	Employment schedule for OHE mast (9.5m) for wind pressure 150 kgf/m2 copper OHE with higher implantation overlap central location.	-do-	0728	-
236.	Employment schedule for OHE mast (9.5m) for wind pressure 150 kgf/m2 copper OHE with higher implantation overlap inter location.	-do-	0729	-
237.	Employment schedule for Tramway type regulated OHE WP 150 kgf/m2 without RC & EW.	-do-	0706	A
238.	Aluminum Alloy cat nary suspension clamp (MCI)	ETI/OHE/SK	176	D
239.	Double suspension lock body (Galvanized MCI)	-do-	205	B
240.	Parallel grove clamp (14/9).	-do-	123	D
241.	Parallel grove clamp (18/14)	-do-	231	D
242.	Cat nary dropper clip assembly with bimetallic washer.	-do-	333	D
243.	Envelope type end fitting assembly for all Al. Alloy standard Cat. Wire (size 19/2.79mm).	-do-	436	B
244.	Crimp type repair sleeve for AAA standard cat nary wire.	-do-	285	C
245.	Cat nary splice (cone type) AL. Alloy cat nary.	-do-	134	D
246.	Aluminum cat nary suspension clamp assembly (MCI)	-do-	468	A

247.	Double suspension clamp assembly (MCI for Al. Alloy. Cat nary).	-do-	469	A
248.	Span and stagger chart for composite OHE	-do-	375	A
249.	Double suspension clamp body for Al. Alloy. Cat nary.	-do-	1171-1	A

LIST OF STANDARD SPECIFICATIONS:

S. NO.	TITLE OF SPECIFICATION	SPECIFICATION NO.
1	2	3
1.	Annealed standard copper conductor for jumper wire.	ETI/OHE/3(2/94) with A&C slip No.1 of 4/95.
2.	Copper bus bar	RE/30/OHE/5(11/60)
3.	Structural steel tubes.	ETI/OHE/11(5/89)
4.	Hot dip zinc galvanization of steel mast (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 and 3 of 4/90.
5.	Stainless steel wire rope.	TI/SPC/OHE/WR/1060(06/06) with A&C slip No. 2 of 05/07
6.	Solid core porcelain insulators for 25 kV, 50 Hz Single phase overhead traction lines.	TI/SPC/OHE/INS/0070(04/07) with A & C Slip No. 1 & 2 (10/16)
7.	25 KV single and double pole isolators.	ETI/OHE/16(1/94) with A & C slip No. 1 & 2 (03/04)
8.	Steel Fasteners and Stainless Steel Fasteners for 25 kV AC Traction Steel Overhead Equipment	TI/SPC/OHE/FASTENERS/0120 with A & C slip No. 5 (03/13)
9.	Aluminum alloy section and tubes.	ETI/OHE/21(9/74).
10.	Principles for OHE Layout Plans and Sectioning Diagrams for 25 kV AC Traction	ETI/OHE/53 (6/88) with A & C slip no. 5 (11/06)
11.	Section insulators assembly.	TI/SPC/OHE/LWTSI/0060 (Rev. 1) with A & C slip no. 1 (07/16)
12.	Enameled steel plates	ETI/OHE/33(08/85).
13.	Retro-reflective Structure Number Plates	ETI/OHE/33A(12/97) with A & C Slip No. 1 to 8 (11/12)
14.	Galvanized steel wire Rope	ETI/OHE/36(12/73) with A&C slip No.1 of (5/98).
15.	Regulating equipment (a) winch type (5:1)	ETI/OHE/48(7/84), with A&C slip No.3 (12/04).
	(b) 3 pulley type (3:1)	TI/SPC/OHE/ATD/0060 Rev. 1 with A&C slip No. 1 (09/16)
16.	Fittings for 25 kV, 50 HZ, AC Overhead Traction equipment.	ETI/SPC/OHE/FITTINGS/0130 with A&C slip No.1 (10/13)
17.	Cadmium copper conductors for overhead Rly Traction	ETI/OHE/50(6/97) with A&C slip No. 1 to 5 (09/16)
18.	All Alu. Alloy, Stranded catenary wire 19/2.79 mm.	ETI/OHE/54 (2/85) with A&C slip No.2 (10/92)
19.	Bimetallic (AL/Cu) strip for 25 KV traction OHE.	ETI/OHE/55(4/90)
20.	Short neutral section assembly (phase Break).	TISPC/OHESNS/0000 (Rev. 1) with A&C slip No. 1 (01/16).
21.	Code for bonding and earthing for 25 kV, single phase, 50 Hz, AC Traction system.	ETI/OHE/71(11/90) with A&C slip No.2 (3/93)
22.	Insulated cadmium copper catenary 19/2.10 mm dia for provision under overline structures in the	TI/SPC/OHE/INSCAT/0000 with A & C slip No. 1 & 2 (09/16).

	25 kV, AC Electrical Traction.	
23.	Battery charger for 110 Volt, 40 A-h battery	ETI/PSI/1(6/81).
24.	Metal Oxyde gapless type lightening arrester for use on Railway Traction sub-stations and switching stations	ETI/PSI/MOGTLA/0101 (02/15).
25.	220 kV/132 kV/110 kV/66 kV/25 kV Potential transformers	TI/SPC/PSI/PTS/0990 (09/99) with A&C slip No.4(6/97).
26.	25 KV Drop out fuse switch and operating pole for use with 10 KVA and 100 KVA 25 KV/230 volt LT supply transformer.	ETI/PSI/14(1/86) with A&C slip No.5 (04/09)
27.	25 KV/240 V Auxiliary Transformer (5 kVA/ 10 KVA/ 25 kVA/ 50 kVA	ETI/PSI/15(08/2003)
28.	110 Volt, 40 A-h Lead Acid Batteries	ETI/PSI/21(6/81) with A&C slip No.1 of 7/81.
29.	25 kV/ 240 V Auxiliary Transformers, 100 kVA	ETI/PSI/15A (07/82) with A & C Slip No. 1 (09/89)
30.	25 KV single pole, double pole, pole mounted, outdoor vacuum circuit breaker (VCB) and vacuum Interrupter (BM)	TI/SPC/PSI/LVCBIN/0120 Rev.0 (12/13) with A & C slip No. 1 (10/16)

NOTE:

1) Above specifications can be purchased from RDSO/office of CAO/CORE/ALD on payment of their cost.

2) For structural steel (standard quantity) please refer IS:2062 – 1992.

3) Any amendment in specification and drawings subsequent to LOA, if required to be carried out shall need approval of DFCCIL duly considering the financial implication of the same either in upward or downward direction.

ANNEXURE-I

Performa for Experience Certificate. {on the letter head of the issuing department}

M/s……..... has executed the following workto thisdepartment and has completed the work successfully. The details are as under:

1. Name of work:

2. Agreement/contract number:

3. Date of start of work:

4. Date of completion of work:

5. Total value of work during the contract period (if completed):

6. In case of on-going work, please indicate the annual payment for
   a) F.Y. 2020-21
   b) F.Y. 2019 -20
   c) F.Y.2018-19

(Name and Signature of the officer with seal of the department and phone no.)

ANNEXURE-II

Performa for Affidavit. {on the letterhead of the bidder}

I _____ Proprietor/Director/Partner of the firm M/s._____ do hereby solemnly affirm that the firm M/s._____ has never been black listed/debarred by any organization/office and there has not been any work cancelled against them for poor performance in the last three years reckoned from the date of invitation of Tender.

Signature of
Proprietor/Director/Partner

ANNEXURE – III

CERTIFICATION OF FAMILIARISATION

A. I/We hereby solemnly declare that I/We have visited the site of work and have familiarized myself/ourselves of the working conditions there in all respects and in particular, the following:

a) Topography of the Area.
b) Climatic condition and law and order situation in project area.

B. I/We have kept myself/ourselves fully informed of the provisions of this tender document comprising Instructions to the Tenderers, General Conditions of the Contract, Special Conditions, special terms and conditions apart from information conveyed to me/us through various other provisions in this tender document.

C. I/We have quoted my / our rates as "Percentage above / below / at par" of costs as per Schedule of items Rates **in Offer Sheet,** taking into account all the factors given above.

(Signature of Tenderer/s)

ANNEXURE – IV

SUPPLEMENTARY AGREEMENT

Articles of Agreement made on this ……. in the year ……. and between DFCCIL acting through the Chief General Manager hereinafter called as one party and …….. of the second part.

Where the party hereto of the second part executed an agreement with the party hereto of the first part being agreement No. ……. dated ……. for the performance of ……. herein called the principal agreement.

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 and whereas the party hereto of the first part already made payments to the party hereto of the second part diverse sums from time to time aggregating to **Rs.** …….. including the final bill bearing voucher No.……dated……. (the receipt of which is hereby acknowledged by the party here to of the second part) in full and final settlement of all his claim under the 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 including / excluding security deposit, the party hereto of the second part have no further dues / claims against the party hereto of the first part under the said principal agreement.

It is further agreed by and between the parties that they 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.

It is further agreed and understood by and between the party that in consideration of the payment already made under the agreement the said principle agreement shall finally discharged and rescinded all the terms and conditions including the arbitration clause.

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 seems to be nonexistent for all purposes.

Signature of the Tenderer/s — For and on behalf of

Witness of the signatures — Witness ……..
……

1.

2.

ANNEXURE-V

AFFIDAVIT

FORMAT FOR AFFIDAVIT TO BE UPLOADED BY TENDERER ALONGWITH THE TENDER DOCUMENTS

(*To be executed in presence of Public notary on non-judicial* ***stamp paper of the value of Rs. 100/-.*** *The stamp paper has to be in the name of the tenderer*) **

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 **E- Tender No.: ------ Date----------** of (DFCCIL), 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 . 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 DFCCIL 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 undersigned that if the certificates regarding eligibility criteria submitted by us are found to be forged/false or incorrect at any time during process for evaluation of tenders, it shall lead to forfeiture of the tender EMD besides banning of business for five year on entire IR. Further, I/we (*insert name of the tenderer*)**……..and all my/our constituents understand that my/our offer shall be summarily rejected.
8) I/we also understand that if the certificates submitted by us are found to be false/forged or incorrect at any time after the award of the contract, it will lead to termination of the contract, along with forfeiture of EMD/SD and Performance guarantee besides any other action provided in the contract including banning of business for five year on entire IR.

DEPONENT
SEAL AND SIGNATURE
OF THE TENDERER

VERIFICATION

I/We above named tenderer do hereby solemnly affirm and verify that the contents of my/our above affidavit are true and correct. Nothing has been concealed and no part of it is false.

DEPONENT

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. Attestation before Magistrate/Notary Public .

ANNEXURE-VI

(Guarantee –Bond offered by bank to DFCC in connection with the execution ofContracts)
(SD)
GUARANTEE BOND FORMAT
(To be used by approved Schedule Banks)

1. In consideration of the Employer DFCCIL (herewith called " The Employer") having agreed to exempt_____(hereinafter called "The said Contractor(s)") from the demand, under the terms and conditions of an Agreement No……. dated_____made between _____and _____for_____(hereinafter called the "The Said Agreement") of **security deposit** for the due fulfillment by the said contractor(s) of the terms and conditions contained in the said Agreement,onproductionofaBankGuaranteefor Rs._____(Rupees_____only),we, _____(indicate the name of the bank) (hereinafter referred to as " The Bank") at the request of contractor(s) do hereby undertake to pay to the Employer an amount not exceeding Rs._____against any loss or damage caused to or suffered or would be caused to or suffered by the Employer by reason of any breach by the said contractor(s) of any of the terms and conditions contained in the said Agreement.

2. We_____(indicate the name of the Bank) do hereby undertake to pay the amounts due and payable under this Guarantee without any demur merely on a demand from the DFCCIL stating that the amount claimed is due by way of loss or damages caused to or would be caused to or suffered by the DFCCIL by reason of any breach by the said Contractor(s)of any of the terms or conditions contained in the said Agreement or by reason of the Contractor(s) failure to perform the said Agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this Guarantee. However, our liability under this Guarantee shall be restricted to an amount not exceeding Rs. _____.

3. We undertake to pay to the Employer any money so demanded not withstanding any dispute or disputes raised by the Contractor(s)/ Supplier(s) in any suit or proceeding pending before any Court or Tribunal relating thereto our liability under this present is being absolute and unequivocal. The payment so made by us under this Bond shall be valid discharges of our liability for payment hereunder the Contractor(S)/Supplier(s) shall have no claim against us for making such payment.

4. We _____(indicate the name of Bank) 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 Employer under or by virtue of the said Agreement have been fully paid and its claims satisfied

or discharged or till _____the Employer/DFCCIL certify that terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges the Guarantee. Unless a demand or claim under this Guarantee is made on us in writing on or before the _____, we shall be discharged from all liability under this Guarantee thereafter.

5. At any time during the period in which this guarantee is valid the Employer may request for its extension and the Bank will extend this guarantee under the same condition for the required time at the cost of the Contractor.

6. We_____(indicate the name of Bank) further agree with the DFCC that the DFCC shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extent time of performance by the said Contractor(s) from time to time any of the powers exercisable by the DFCCIL against the said Contractor(s) and to forbear or enforce any of terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said Contractor(s) or for any forbearance, act or omission on the part of the DFCCIL or any indulgence by the DFCCIL 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 relieve us from the liability.

7. This Guarantee will not be discharged due to the change in the constitution of the Bank or the contractor(s)/Supplier(s).

8. We_____, (indicate the name of Bank) lastly undertake not to revoke this Bank Guarantee during its currency except with the previous consent of the DFCCIL in writing.

IN WITNESS WHEREOF we of the Bank have signed and stamped this guarantee on this day of…….. being herewith duly authorized.

Bank Seal Signature of Bank Authorize Official with Seal

Name: ----------
Designation: ----------
Address:

Witness:

1. Name:……..
   Designation:……..
   Address:

2. Name:…….
   Designation:…….
   Address:……

ANNEXURE-VII

Format of Bank Guarantee for Performance Security

Bank Guarantee No. :…… Dated :……

To,
Chief General Manager Tundla
Mayur Complex, Nagla Padi,
Near Tulsi Cinema, NH-02
Agra - 282002

Reference: - Contract No. ----------, Awarded on ----------

This deed of guarantee made this day of _____ Between_____ (Name of Bank) having registered office at _____ (hereinafter referred to as "Bank") of the one part, and Dedicated Freight Corridor Corporation of India Limited (hereinafter called the "Client") of the other part.

Whereas Dedicated Freight Corridor Corporation of India Limited has awarded the contract no. _____ for _____ (hereinafter called "the Contract") to _____ (Name of the Firm/ Consultant) having its registered office at_____ (hereinafter called the Firm/ Consultant).

AND WHEREAS the Firm/ Consultant is bound by the said Contract to submit to the Client an irrevocable performance security guarantee bond for a total amount of Rs. _____(Rupees Amount in words).

Now, we the undersigned (name of the Bank official), of the Bank being fully authorized to sign and to incur obligations for and on behalf of the Bank hereby declare that the said Bank will guarantee the Employer the full amount of Rs.---------- ----------(Rs. In words) as stated above.

After the Contractor has signed the aforesaid contract with the Employer, the Bank further agrees and promise to pay the amount due and payable under this guarantee without any demure merely on a demand from the Employer stating that the amount claimed is due by way of loss or damage cause to or would be caused or suffered by the Employer by reason of any breach by the said contractor of any of the terms or 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. --------- (in words) only.

We ----------(indicate the name of Bank), further undertake to pay to the Employer any money so demanded not withstanding any dispute or dispute raised by the contractor in any suit or proceeding pending before any court or Tribunal relating to liability under this present being absolute and unequivocal.
The Payment so made by us (name of Bank) under this bond shall be a valid discharges of our liability for payment there under and the Contractor shall have no claim against us for making such payment.

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 at all the dues of the Employer under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged by ------
(Designation and address of contract signing authority) on behalf of Employer certify that the terms and conditions of the said agreement have been fully and properly carried out by the said contractor and accordingly discharges this guarantee.

Not with standing 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 Employer or until (date of validity/extended validity) whichever is earlier and no claim shall be valid under the guarantee unless notice in writing , thereof is given by the Employer within validity/extended validity period of guarantee from the date aforesaid.

Provided always that we …….(name of bank) un conditionally undertakes to renew this guarantee or to extend the period of guarantee from year to year before the expiry of the period or the extended period of guarantee, as the case may be on being called upon to do so by the Employer. If the guarantee is not renewed or the period extended on demand, we ------ (name of bank) shall pay the Employer the full amount of the guarantee on demand without demur.

We----------(indicate the name of Bank), to further agree with the Employer that the Employer shall have the fullest liberty without our consent and without effecting in any manner out of obligation 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 power exercisable by the Employer against the said contractor and to forbear or enforce any of the terms and conditions of the said agreement and we shall not be relieved from our liabilities by reason of such variation, or extension being granted to the said contractor for any forbearance act or omission on the part of the Employer or any indulgence by the Employer to the said contractor or by any such matter or thing whatsoever which under the law relating to sureties for the said reservation would relieve us from the liability.

The Guarantee hereinbefore contained shall not be affected by any change in the constitution of Bank or of the Contractor.

The expression “The Employer”, “The Bank” and “The Contractor” hereinbefore used shall include their respective successors and assigns.

We---------- (name of the bank lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing. Notwithstanding anything to the contrary contained hereinbefore:

i) Our liability under this Bank Guarantee shall not exceed and restricted to Rs. ---------- (in words).

ii) This Bank Guarantee shall be valid up to ----------, unless extended on demand by Employer.

iii) The Bank is liable to pay the Guaranteed amount or any part thereof under this Bank Guarantee only if Employer serve a written claim or demand on or before----------

IN WITNESS WHEREOF we of the Bank have signed and stamped this guarantee on this day of ---------- being herewith duly authorized.

Bank Seal

Signature of Bank Authorize Official with Seal

Name :----------
Designation:----------
Address :

Witness:

1. Name :……..
   Designation :……..
   Address :

2. Name
   :…….
   Designation:…….
   Address :……

ANNEXURE-VIII

FORM OF AGREEMENT

(To be executed on requisite value of stamp Papers)

AGREEMENT

THIS AGREEMENT made on _____ day of _____ (Month/year) between, DFCCIL , _____ (*address*). (Hereinafter called "the Employer")of the one part and _____ (name and address of the Contractor) (hereinafter called "the Contractor") of the other part.

WHEREAS the Employer is desirous that certain works should be executed by the Contractor viz. **Contract No._____ _____** (hereinafter called "the works, and has accepted a Bid by the Contractor for the execution and completion of such works and the remedying of any defects therein.

NOW THIS AGREEMENT WITNESSETH as follows:

1.0 In this Agreement, words and expressions shall have the same meaning as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2.0 The following documents shall be deemed to form and be read and construed as part of this Agreement: -

i) The Contract Agreement.
ii) Letter of Acceptance.
iii) Tender Form
iv) General Information
v) Notice Inviting Tender (with Annexes)
vi) Instructions to Tenderers
vii) Special Conditions of Contract
viii) Annexures
ix) Bill of Quantities (BOQ)/Schedule of Rates
x) General Terms and Conditions of Contract

3.0 In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the works and remedy any defects therein in conformity in all respects with the provisions of the Contract.

4.0 The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the works and the remedying of defects therein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement executed the day and year first before written.

(Name, Designation and address of the authorized signatory)	(Name, Designation and address of the authorized signatory)
Signed for and on behalf of the Contractor in the presence of:	Signed for and on behalf of the Employer in the presence of:
Witness:	*Witness:*
1.	1.
2.	2.

ANNEXURE -IX

PRE CONTRACT INTEGRITY PACT

General

This pre-bid pre-contract Agreement (hereinafter called the Integrity Pact) is made on------ ----------day of the month of---------- 20xx, between, on one hand, the DFCCIL acting through Shri ---------- Designation of the officer, (hereinafter called the CLIENT, which expression shall mean and include, unless the context otherwise requires, his successors in office and assigns) of the First Part and M/s---------- -------- represented by Shri ----------Chief Executive Officer (hereinafter called the "BIDDER/SELLER" which expression shall mean and include, unless the context otherwise requires, his successors and permitted assigns) of the Second part.

WHEREAS the CLIENT proposes to procure (Name of the Stores/Equipment/Item, Name of the Consultancy Service, Name of Works Contract, Name of Services) and the [A] is willing to Offer/has offered for stores or works.

WHEREAS the [A] is a private company/ public company/ Government undertaking/ partnership/ registered export agency, constituted in accordance with the relevant law in the matter and the CLIENT is a PSU performing its functions or behalf of the President of India.

NOW, THEREFOR,

To avoid all forms of corruption by following a system that is fair, transparent and free from any influence/prejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to:-

Enabling the CLIENT to obtain the desired said (Name of the Stores/Equipment/Item, Name of the Consultancy Service, Name of Works Contract, Name of Services) at a competitive price in conformity with the defined specifications by avoiding the high cost and the distortionary impact of corruption on public procurement, and

Enabling BIDDERs to abstain from bribing or indulging in any corrupt practice in order to secure [B] by providing assurance to them that their competitors will also abstain from bribing and other corrupt practices and the CLIENT will commit to prevent corruption, in any form, by its Officials by following transparent procedures.

The parties hereto hereby agree to enter into this Integrity Pact and agree as follows:

Commitments of the CLIENT

1.1 The CLIENT undertakes that no official of the CLIENT, connected directly or indirectly with the [B], will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage from the [A] either for themselves or for any person, organization or third party related to the [B], in exchange for an advantage in the bidding process, bid evaluation, contracting or implementation process related to the [B].

1.2 The CLIENT will, during the pre-contract stage, treat all BIDDERs alike, and will provide to all BIDDERs the same information and will not provide any such information to any particular BIDDER which could afford an advantage to that particular [A] in comparison to other BIDDERs.

1.3 All the officials of the CLIENT will report to the appropriate Government office any attempted or completed breaches of the above commitments as well as any substantial suspicion of such a breach.

2. In case any such preceding misconduct on the part of such official(s) in reported by the [A] to the CLIENT with full, and verifiable facts and the same is prima facie found to be correct by the CLIENT, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the CLIENT and such a person shall be debarred from further dealings related to the [B] process. In such a case while an enquiry is being conducted by the CLIENT the proceedings under the [B] would not be stalled.

Commitments of BIDDERS

3. The [A] commits itself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of its bid or during any pre-contract or post-contract stage) in order to secure the [B] contract or in furtherance to secure it and in particular committee itself to the following:-

3.1 The [A] will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission fees, brokerage or inducement to any official of the CLIENT, connected directly or indirectly with the bidding process, or to any person, organization or third party related to the (B] in exchange for any advantage in the bidding, evaluation, contracting and implementation of the [B].

3.2 The (A] further undertakes that it has not given, offered or promised to give, directly or indirectly any bribe, gift, consideration, reward, favour, any Material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the CLIENT or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or execution of the [B] or any other [B] with the Government for showing or forbearing to show favour or disfavor to any person in relation to the [B] or any other [B] with the Government.

3.3 * [A] shall disclose the name and address of agents and representatives and Indian [A] shall disclose their foreign principals or associates.

3.4 * [A] shall disclose the payments to be made by them to agents/brokers or any other intermediary, in connection with this bid/contract.

3.5 The [A] further confirms and declares to the CLIENT that the [A] is the original manufacturer/integrator/authorized government sponsored export entity of the defense stores and has not engaged any individual or firm orcompany whether Indian or foreign to intercede, facilitate or in any way to recommend to the CLIENT or any of its functionaries, whether officially or unofficially to the award of the [B] to the [A] nor has any amount been paid, promised or intended to be paid to any such individual, firm or company in respect of any such intercession, facilitation or recommendation.

3.6 The [A] either while presenting the bid or during pre-contract negotiations or before signing the [B] shall disclose any payments he has made, is committed to or intends to make to officials of the CLIENT or their family members, agents, brokers or any other intermediaries in connection with the [B] and the details of services agreed upon for such payments.

3.7 The [A] will not collude with other parties interested in the [B] to impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the [B].

3.8 The [A] will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.

3.9 The [A] shall not use improperly, for purposes of competition or personal gain, or pass on to others, any information provided by the CLIENT as part of the business relationship, regarding plans, technical proposals and business details, including information contained in any electronic data carrier. The [A] also undertakes to exercise due and adequate care lest any such information is divulged.

3.10 The [A] commits to refrain from giving any complaint directly or through any other manner without supporting it with full and verifiable facts.

3.11 The [A] shall not instigate or cause to instigate any third person to commit any of the actions mentioned above.

3.12 If the, [A] or any employee of the [A] or any person acting on behalf of the [A], either directly or Indirectly, is a relative of any of the officers of the CLIENT, or alternatively, if any relative of an officer of the CLIENT has financial. Interest/stake in the Bidder‟s firm, the same shall be disclosed by the [A] at the time of filling of tender.

The term „relative‟ for this purpose would be as defined in section 6 of the companies act 1956.

3.13 The [A] shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of the CLIENT.

4. Previous Transaction

4.1 The [A] declares that no previous transgression occurred in the last three years immediately before signing of this integrity Pact, with any other company in any country in respect of any corrupt practices envisage hereunder or with any public sector enterprise in India or any Government department in India that could justify BIDDER‟s from the tender process.

4.2 The [A] agrees that if it makes incorrect statement on this subject, [A] can be disqualified from the ender process or the contact, if already awarded, can be terminated for such reason.

5. Earnest Money (Security Deposit)

5.1 While submitting commercial bid, the [A] shall deposit an amount __ (to be specified in RFP) as Earnest Money/Security Deposit, with the CLIENT through any of the following instruments:-

i. Bank draft or a pay order in favor of _____.

ii. A confirmed guarantee by an Indian nationalized bank, promising payment of the guaranteed sum to the CLIENT on demand within three working days without any demur whatsoever and without seeking any reasons whatsoever. The demand for payment by the CLIENT shall be treated as conclusive proof or payment.

iii. Any other mode or through any other instrument (to be specified in the RFP).

5.2 The earnest money/Security deposit shall be valid up to a period of five years or the contractual obligations to the complete satisfaction of both the BIDDER and the CLIENT, including warranty period, whichever is later.

5.3 In case of the successful [A] a clause would also be incorporated in the article pertaining to performance Guarantee in the [B] that the provisions of sanctions for violation shall be applicable for forfeiture of performance bond in case of a decision by client to forfeit the same without assigning any reason for imposing sanction for violation of this pact.

5.4 No interest shall be payable by CLIENT to the [A] on earnest Money/Security Deposit for the period of its currency.

6. Sanctions for Violations

6.1 Any breach of the aforesaid provisions by the [A] or any one employed by it or acting on its behalf (whether with or without the knowledge of the [A] shall entitle the CLIENT to take all or any one of the following actions, wherever required :-

(i) To immediately call off the pre-contract negotiations without assigning any reason or giving any compensation to the [A]. However, the proceedings with the other BIDDER(s) would continue.

(ii) The earnest money deposit (in pre-contract stage) and/or security Deposit/performance Bond (after the [B] is signed) shall stand forfeited fully and the CLIENT shall not be required to assign any reason therefore.

(iii) To immediately cancel the [B], if already signed, without giving any compensation to the [A].

(iv) To recover all sums already paid by the CLIENT, and in case of an Indian [A] with interest thereon at 2% higher that the prevailing prime lending rate of state bank of India, while in case of a [A] from the country other that India with interest thereon at 2% higher than the LIBOR. If any outstanding payment is due to [A] from the CLIENT in connection with any other [B], such outstanding payment could also be utilized to recover the aforesaid sum and interest.

(v) To encash the advance bank guarantee and performance bond, if furnished by the [A], in order to recover the payments, already made by CLIENT, along with interest.

(vi) To cancel all or any other contracts with the [A]. The [A] shall be liable to pay compensation for any loss or damage to the Client resulting from such cancellation/rescission and the client shall be entitled to deduct the amount so payable from the money(s) due to the [A].

(vii) To debar the [A] from participating in future bidding processes of the Government of India for a minimum period of five years, which may be further extended at the discretion of the CLIENT.

(viii) To recover all sums paid in violation of this pact by [A]) to any middleman or agent or broker with a view a view to securing [B] the contract.

(ix) In cases where irrevocable letters of credit have been received in respect of any [B] signed by the client with the [A], the shall not be opened.

(x) Forfeiture of Performance Bond in case of a decision by the client to forfeit the same without assigning any reason for imposing sanction for violation of this pact.

6.2 The client will entitled to take all or any of the actions mentioned at para 6.1(i) to (x) of this pact also on the commission by the [A] or any one employed by it or acting on its behalf (whether with or without the knowledge of the [A], of an offence as defined in chapter IX of the Indian penal code, 1860 or prevention of Corruption Act, 1988 or any other statute enacted for prevention of corruption.

6.3 The decision of the CLIENT to the effect that a breach of the provisions of this pact has been committed by the [A] shall be final and conclusive on the [A].

However, the [A] can approach the Independent Monitor(s) appointed for thepurposes of this Pact.

7. Fall Clause

7.1 The [A] undertakes that it has not supplied/is not supplying similar product/systems or subsystems at a price lower than that offered in the present bid in respect of any other Ministry/Department of the Government of India or PSU and if it is found at any stage that similar product/system or sub systems way supplied by [A] to any other Ministry/Department of the Government of India or a PSU at a lower price, then that very price, with due allowance for elapsed time, will be applicable to the present case and the difference in the cost would be refunded by the [A] to the CLIENT, if the [B] has already been concluded

8. Independent Monitors

8.1 The CLIENT has appointed Independent Monitors (hereinafter referred to as Monitors) for this pact in consultant with the central vigilance commission (Names and addresses of the Monitors to be given)

8.2 the task of the Monitors shall be to review independently and objectively, whether and to what extent the parties comply with the obligations under this pact.

8.3 The monitors shall not be subject to instructions by the representatives of the parties and perform their functions neutrally and independently.

8.4 Both the parties accept that the Monitors have the right to access all the documents relating to the project/procurement, including minutes of meetings.

8.5 As soon as the Monitor notices, or has reason to believe, a violation of this Pact, he will so inform the Authority designated by the CLIENT.

8.6 The BIDDER(s) accepts that the Monitor has the right to access without restriction to all Project documentation of the CLIENT including that provided by the BIDDER. The [A] will also grant the Monitor, upon his request and demonstration of a valid Interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The Monitor shall be und contractual obligation to treat the information and documents of the [A] with confidentiality.

8.7 The client will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the parties. The parties will offer to the Monitor the option to participate in such meetings.

8.8 The monitor will submit a written report to the MD/DFCCIL within 8 to 10 weeks from the date of reference or intimation to him by theCLIENT/BIDDER and, should the occasion arise, submit proposal for correcting problematic situations.

9. **Facilitation of Investigation**

In case of any allegation of violation of any provisions of this Pact or payment of commission, the CLIENT or its agencies shall be entitled to examine all the documents including the Books of Accounts of the [A] and the [A] shall provide necessary information and documents in English and shall exte4nd all possible help for the purpose of such examination.

10. **Law and Place of Jurisdiction**

This pact is subject to Indian law. The place of performance and jurisdiction is the seat of the CLIENT.

11. **Other Legal Actions**

The actions stipulated in this integrity pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

12. **Validity**

12.1 The validity of this integrity pact shall be from date of its signing and extend upto 5 years or the complete execution of the [B] to the satisfaction of both the CLIENT and the [A] including warranty period, whichever is later. In case [A] is unsuccessful, this integrity pact shall expire after six months from the date of the signing of the [B].

12.2 Should one or several provisions of this pact turn out to be invalid; the remainder of this pact shall remain valid. In this case, the parties will strive to come to an agreement to their original intentions.

13. The parties hereby sign this integrity pact at …….. on …….

CLIENT	BIDDER
Name of the officer	CHIEF EXEUCTIVE OFFICER
Designation	
Deptt./Ministry/PSU	

Witness	Witness
1. …….	2. …….

Note:

[A]- To be replaced by BIDDER/Seller/Consultant/Consultancy firm/Service provider as the case was may be

[B]- To be replaced by contract/supply contract/consultancy contract/works contract as the case was may be.

SCHEDULE OF RATES									
DETAIL ESTIMATE FOR OHE WORK IN CONNECTION OF ISOLATION OF LOOP LINES AT VARIOUS STATIONS OF NEW BHAUPUR - NEW KHURJA SECTION OF DFCCIL									
SN	ITEM NO	DESCRIPTION OF ITEM	UNIT	TOTAL QTY	UNIT RATE		TOTAL AMOUNT		TOTAL AMOUNT (8+9)
					SUPPLY	ERECTION	SUPPLY	ERECTION	
1	2	3	4	5	6	7	8	9	10
		Sub-Section -1 (General)							
1	1	Fabrication , development and supply of sectioning diagram, schematic and TSWR board for all stations- Fabrication and supply of pre compressed particle laminated boards white in colour with aluminum beadings 1/2"x1/2" on all around the board and an arrangement of fixing/ hanging on wall of adequate strength on top boards as required.	Square foot	100	79.34	0	7934.4	0.00	7934.40
2	2	Fabrication , development and supply of sectioning diagram, schematic and TSWR board for all stations- Developing the sectioning diagram, schematic diagram & TSWR diagram with computerised digital printing on adhesive vinyle of adequate size as required.	Square foot	100	535.57	0	53557.2	0.00	53557.20
3	3	Supply without insulator and erection of 25KV Post Insulator	Each	100	1114.75	251.85	111475	25185.00	136660.00
4	4	Supply without insulator and erection of a suspension (9ton) Insulator	Each	24	1543.33	377.77	37039.92	9066.48	46106.40

5	5	Adjustment on bracket assemblies for lowering/raising the height of contact & catenary wire where encumbrance is changed.	Each	46	0	2122.05	0	97614.30	97614.30
6	6	Extra on erection under power block @100% for item no 3	Each	46	0	2122.05	0	97614.30	97614.30
7	7	Turnout adjustment	Each	25	0	2006.62	0	50165.50	50165.50
8	8	100% Extra for turnout adjustment	Each	25	0	2006.62	0	50165.50	50165.50
								TOTAL (Sub - section-1)	**539817.60**
		Sub-Section-2 (Concrete)							
9	1	Concreate for Foundation and Plinth:- In other than Hard Soil & Rock (supply)	Cum	145	6353.29	1752	921227.05	254040	1175267.05
								TOTAL (Sub - section-2)	**1175267**
		Sub-Section-3 (Ferrous)							
10	1	Supply and erection of of steel structure (traction mast) Galvanised and fabricated type B - series (B-150,B-175,B-200 etc.)	MT	8	106124.66	2503.11	848997.28	20024.88	869022.16
11	2	Supply & erection of Fabricated and galvanised structure.(O,N,R type portal, TTC) with necessary component other than masts.	MT	15	125822.54	8559.33	1887338.1	128389.95	2015728.05
12	3	Supply & Erection of Fabricated and Galvanised Steel other than Portal & Traction masts (SPS)	MT	3	120341.79	10384.98	361025.3829	31154.95	392180.33
13	4	Supply & Erection of of Structure bond size	Each	30	1233.6	316.21	37008	9486.30	46494.30
14	5	Supply & Erection of Single Earth Electrode	Each	30	2782.6	1202.07	83478	36062.1	119540.1

15	6	Supply & Erection of material for earthing of each mast as per DFCCIL drawing & specification.	Each	14	3562.8	178.14	49879.2	2493.96	52373.16
								TOTAL (Sub - section-3)	**3495338.10**
		Sub-Section-4 (Non- Ferrous)							
16	1	Supply & Erection of 25KV Light weight Section Insulator assembly with suspension (as per DFCCIL drawing & specification) (Imported item)	Each	26	217735.27	3836.38	5661117.02	99745.88	5760862.9
17	2	Supply with out insulator & Erection of 25 KV 1600 Amp Single pole isolator (manually operated) with out earth contact assembly	Each	14	38634	2981	540876	41734	582610
18	3	Extra for supply & Erection of an earth contact assembly in an insulator	Each	14	12857.35	343.43	180002.9	4808.02	184810.92
19	4	Supply & Erection of large copper jumper wire	Each	30	5352.07	540.33	160562.1	16209.9	176772
20	5	Supply & Erection of small copper jumper wire	Each	10	627.4	540.33	6274	5403.3	11677.3
21	6	Supply & Erection of solid copper bus bar 18mm	Meter	180	1875.78	100.73	337640.4	18131.4	355771.8
22	7	Supply & erection of solid copper bus bar connectors : Bus terminal (6310)	Each	14	1895	43.5	26530	609	27139
23	8	Supply & Erection of solid copper bus bar connectors : Bus terminal (6320)	Each	14	2091.32	43.5	29278.48	609	29887.48
								TOTAL (Sub - section-4)	**7129531.4**
		Sub-Section-5 (Insulator)							
24	1	Supply of 25 kV post insulator	Each	100	9669.66	0	966966	0	966966
25	2	Supply of 25 kV 9 tonne porcelain insulators (CD-1050)	Each	24	4793.42	0	115042.08	0	115042.08

26	3	Supply of 25 kV operating rod insulator & post insulator for 25 KV single pole isolator.	set	14	25138.04	0	351932.56	0	351932.56
								TOTAL (Sub - section-5)	**1433940.64**
		Section -6 - 100 % EXTRA ON ERECTION RATE FOR WORK DONE UNDER POWER BLOCK							
27	1	Extra on erection of steel structure (traction mast) Galvanised and fabricated type B-150,B-175,B-200 etc.under power block.	MT	8	0	2503.11	0	20024.88	20024.88
28	2	Extra on Erection of Fabricated and galvanised structure.(O,N,R type portal, TTC) with necessary component other than masts.	MT	15	0	8559.33	0	128389.95	128389.95
29	3	Extra on erection of Special Fabricated and Galvanised Steel Structure (SPS)other than Portal & Traction masts etc. under power block	MT	3	0	10384.98	0	31154.95	31154.95
30	4	Extra on erection of 25KV Light weight Section Insulator assembly with suspension (ALSTOM 7002102) under power block	Each	26	0	3836.38	0	99745.88	99745.88
31	5	Extra on erection of 25KV single pole Isolator with out earth contact assembly under power block.	Each	14	0	2981	0	41734	41734
32	6	Extra on erection of large copper jumper wire under power block.	Each	30	0	540.33	0	16209.9	16209.9
33	7	Extra on erection of small copper jumper wire under power block.	Each	10	0	540.33	0	5403.3	5403.3
34	8	Extra on Erection of solid copper bus bar 18mm.	meter	180	0	100.73	0	18131.4	18131.4

35	9	Extra on Erection of solid copper bus bar connectors : Bus terminal (6310) under power block.	Each	14	0	43.5	0	609	609
36	10	Extra on Erection of solid copper bus bar connectors : Bus terminal (6320) under power block.	Each	14	0	43.5	0	609	609
								TOTAL (Sub - section-6)	**362012.26**
		Sub-Section-7 (TRANSPORTATION OF MATERIAL)							
37	1	Handling /Loading , unloading and transportation of DFC supply/Released OHE/PSI/GPS/Material such as mast, Bus bar,AT,Brackets, Fittings, contact / catenary wire from IMD/IMSD to site & release material from site to IMD/IMSD.	MT	30	0	3366.3	0	100989	100989
								TOTAL (Sub - section-7)	**100989.00**
								Grand Total	**14236896.06**
								SAY	**14236896**
Total estimated amount Rs. 1,42,36,896.00 (Rs. One Crore Forty Two Lakh Thirty Six Thousand Eight Hundred Ninety Six only.)									

Note: The dia. of contact wire is 150 sqmm and dia. of catenary wire is 120 sqmm.

OFFER SHEET						
Offer to be filled up by Tenderer(s) in below table						
SNo	**Scope of work**	**Estimated cost**	**Below/Above/At par**	**% quoted by bidder**	**% quoted by bidder in words**	**Total cost**
Colum 1	Colum-2	Colum -3	Colum-4	Colum-5	Colum -6	Colum-7
1	Sub- section -1 General)	539817.60				
2	Sub –section -2 (Concrete)	1175267.00				
3	Sub-section -3 (Ferrous)	3495338.10				
4	Sub-section -4 (Non Ferrous)	7129531.40				
5	Sub-section -5 (Insulator)	1433940.64				
6	Sub- section -6 (work under power block)	362012.26				
7	Sub- section -7 (Transportation of material)	100989.00				

Quoting of rates

1. The above price are inclusive of GST.
2. Tenderer is to quote for individual section(s).
3. Tenderer should offer rate in above table in % below, above and at par in figures as well as in words.
4. Tenderer must sign the following certificate.

I/We offer and agree to execute the above work at rate uploaded online at www.ireps.gov.in through digital Signature.

Signature of tenderer with seal

End of Document

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