



TENDER DOCUMENT

**FOR TENDER NO.
T-02-TRD-MB-26-27**

**DUE ON
07.07.2026 at 15:00 HRS.**

FOR THE WORK OF

***“TRD work i.c.w. interlocking of LC
gates with TUV>20000 over
Moradabad Division”***

INDEX

Para	Sub Para	Subject	Page No.
		TOP SHEET	6
PART - I		REGULATIONS FOR TENDERS AND CONTRACTS	7-48
1.0		Meaning of Terms	7
	1.01	Applicability	7
	1.02	Order of Precedence of documents	7
	1.1	Interpretation	7
	1.2	Definition	7
	1.3	Singular and Plural	8
2.0		Tenders for Works	8
	2.1	e-Publishing	8
	2.2	Validity of Tender	8
	2.3	Amendment of Tender Document	8
3.0		Care in Submission of Tenders	9
	3.1	Tenderer Constitution and Requirement of Authorized Signatory	10
	3.2	Cost of Tender Document	10
	3.3	Bid Security	10
	3.4	Similar Nature of Work	11
	3.5	Eligibility Criteria	12
	3.5.1	Technical Eligibility Criteria	12
	3.5.2	Financial Eligibility Criteria	13
	3.5.3	Special Eligibility Criteria	13
	3.5.4	Credential for works up to 50 lakhs	13
	3.5.5	Credentials if submitted in foreign currency	13
	3.5.6	Relaxation of Eligibility Criteria for 'Start-up' firms	15
	3.5.7	Eligibility criteria for bidder from a country sharing land border with India	15
	3.6	Bid Capacity	16
	3.7	Documents for Eligibility in case of constitution of firm by The Partnership firm/JV/Society/Companies etc.	16
	3.7.1	Sole Proprietor Firm	16
	3.7.2	HUF	16
	3.7.3	Partnership Firm	17
	3.7.4	Company registered under Companies Act- 2013	18
	3.7.5	LLP (Limited Liability Partnership)	19
	3.7.6	Registered Society & Registered Trust	19
	3.7.7	Joint Venture (JV)	19
		Guidelines regarding participation of Joint Venture (JV) Firms	19
	3.8	Test of Responsiveness	24
	3.9	Conflict of Interest	24
	3.10	Fraud & Corrupt Practice	25
	3.11	Confidentiality	26
	3.12	Employment/Partnership etc. of Retired Railway Employee	27
	3.13	Miscellaneous	27
	3.14	Preparation & Submission of Documents	28
	3.15	Credential/ Approved list of contractors	28
	3.16	Tenderer's Credentials	29

Para	Sub Para	Subject	Page No.
4.0		Consideration of Tenders	30
	4.1	Right of Railway to Deal with Tender	30
	4.1A	Two Packet system of Tendering	30
	4.2	Opening of Tender	31
	4.3	Conditional offer and alternative proposals by Tenderers	31
	4.4	Withdrawal of Offer	31
	4.5	Omissions, Discrepancies& Clarification	31
	4.6	Evaluation of Tender/ Bids	32
5.0		Contract Document	32
	5.1	Execution of Contract Document	32
	5.1A	Security Deposit	32
	5.1B	Performance Guarantee	33
	5.2	Form of Contract Document	34
	5.3	Applicable charges/recoveries/Advance etc.	35
	5.4	Special Conditions of Contract for mandatory updating of Labour data on Railway's Shramik Kalyan portal by Contractor	35
	5.5	Force Majeure Clause	35
	5.5A	Extension of Time in Contracts	36
	5.5B	Extension of Time with Liquidated Damages (LD) for delay due to Contractor	37
	5.5C	Bonus for Early Completion of Work	37
6.0		Applicability of PART-II of GCC-2022	37
	Annexure-I	Work Specific Tender Documents (Standard Tender) Documents	38-47
	SECTION 3	Scope of Work and Drawings	38
	SECTION 4.2	Tender Form-1 (Cover Letter)	39
	SECTION 4.3	Tender Form-2 (General information of the Tenderer)	40
	SECTION 4.4	Tender Form-3 (Power of Attorney)	41
	SECTION 4.5	Tender Form-4(A) Technical Eligibility & 4(B) Financial Eligibility	42
	SECTION 4.6	Tender Form-5 (Bill(s) of Quantities)	43-47
	PART-II	TECHNICAL SCOPE OF WORK	48-160
	SECTION-A	EXPLANATORY NOTES OF SCHEDULE	48-90
	CHAPTER-I	FOR OHE SWS BT STATION AND LT SUPPLY TRANSFORMER	48-88
	CHAPTER-II	FOR TSS WORKS	89
	CHAPTER-III	FOR 220 KV TSS	89
	CHAPTER-IV	FOR 220 KV TSS ITEMS	89
	CHAPTER-V	FOR NS ITEMS	89-90
	SECTION-B		91-157
	CHAPTER-I	GENERAL SPECIFICATIONS	91
	CHAPTER-II	FOUNDATIONS	109
	CHAPTER-III	STRUCTURES	113
	CHAPTER-IV	EQUIPMENTS, COMPONENTS AND MATERIALS	118
	CHAPTER-V	DESIGNS AND DRAWINGS	127
	CHAPTER-VI	ERECTION AND INSTALLATION OF EQUIPMENTS	140
	CHAPTER-VII	INSPECTIONS AND TESTING	150
	CHAPTER-VIII	SWITCHING STATION BUILDING	153
	SECTION-C	PARTICULAR SPECIFICATIONS	158-160
	PART-III	SPECIAL CONDITIONS OF THE CONTRACT	161-165
	PART-IV	PRICES AND PAYMENT	166-168
	PART-V	ANNEXURES	169-216
	Annexure-II	Agreement for Zone Contract	169

Annexure-III	Work Order Under Zone Contract	170
Annexure-IV	Form for Contract Agreement of Works	171
Annexure-V	Format for Certificate to be submitted/uploaded by tenderer along-with the tender documents	172-173
Annexure-V(A)	Format for Certificate is to be given by attorney/authorized signatory/each member of Partnership firm/Joint Venture (JV)/Hindu Undivided Family (HUF)/Limited Liability Partnership (LLP) etc.	174
Annexure-VI	Work order for works (Composite work)	175
Annexure-VII	Tenderer's Credentials (Bid Capacity)	176
Annexure-VIIA	Bid Security	177-178
Annexure-VIIB	FORMAT FOR DECLARATION OF AVERAGE ANNUAL TURNOVER	179
Annexure-VIII	Guidelines for submitting tender by Partnership Firm	180-181
Annexure-IX	Details of plant and machinery already available with the firm	182
Annexure-X	List of engineers/personal	182
Annexure-XI	Statement of works being executed in hand by contractor	182
Annexure-XII	Details of Beneficiary for Electronic transfer	183
Annexure-XIII	Applicable charges/ recoveries/Advances	184-185
Annexure-XIV	Proforma for time extension	186
Annexure-XV	Certificate of Fitness	187
Annexure-XVI	Proforma of 7 Days' Notice	188
Annexure-XVII	Proforma of 48 Hrs Notice	189
Annexure-XVIII	Proforma of Termination Notice	190
Annexure-XIX	Proforma of 48 Hrs Notice (Part Termination)	191
Annexure-XX	Proforma of termination Notice (Part Termination)	192
Annexure-XXI	Check list to be filled	193
Annexure-XXII	Final supplementary Agreement	194-195
Annexure-XXIII	Agreement toward Waiver	196
Annexure-XXIV	Certification by Arbitrators appointed under Clause 63 & 64 of Indian Railways General Conditions of Contract	197
Annexure-XXV	Format for Performance Guarantee Bond	198-199
Annexure-XXVI	Format for UNDERTAKING for Retired Railway Employee	200
Annexure-XXVII	Insurance Surety Bond for Performance Security	201-202
Annexure-XXVIII	LIST OF STANDARD DRAWINGS AND SPECIFICATIONS	203-216

DISCLAIMER

The information contained in this tender document or subsequently provided to the Tenderers, whether verbally or in documentary form by or on behalf of the Northern Railway, their employees, is provided to the Tenderers on the terms and conditions set out in the tender document and all other terms and conditions subjected to which such information is provided.

The purpose of the tender document is to provide the Tenderers with information to assist in the formulation of their Proposal. The tender document does not purport to contain all the information for all the persons, and it is not possible for Northern Railway, their employees to consider the business/investment objectives, financial situation and particular needs of each tenderer who reads or uses this tender document. Each tenderer should conduct its own investigations, inspection and analysis, and should check the accuracy, reliability and completeness of the information in the tender document and wherever necessary obtain independent advice from appropriate sources. Northern Railway, their employees make no representation or warranty and shall incur no liability under any law, statute, rule or regulation as to the accuracy, reliability or completeness of the tender document.

**NORTHERN RAILWAY
TOP SHEET**

(A) Details to be filled in by Railway

1.	Mode of Tender	e-Tendering (single packet)
2.	Tender Notice No. & date	Elect/TRD/MB/2026-27/TN-02 dt. 16.06.2026
3.	Tender No.	T-02-TRD-MB-26-27
4.	Name of the Work	TRD work i.c.w. interlocking of LC gates with TUV>20000 over Moradabad Division
5.	Approximate Cost of Work	₹ 1,69,25,435.10/- (Incl. GST @ 18%)
6.	Period of Completion	9 months
7.	Amount of Bid Security	₹ 3,38,500/-
8.	Tender Document can be obtained from website/office at	www.ireps.gov.in
9.	Validity of offers	60 Days
10.	Last date and time of sale/ downloading of Tender Document.	07.07.2026 up to 15:00 hrs
11.	Due date & time of submission of Tender Document	07.07.2026 up to 15:00 hrs
12.	Due date & time of opening of Tender	07.07.2026 up to 15:00 hrs
13.	Office of Tender Inviting Authority	Office of Sr. DEE/TRD/MB, DRM Campus, Moradabad

NOTE: If date of tender opening is declared as Holiday, the Tender will be opened at the same time on next working day.

(B) Details to be filled in by tenderer while uploading their offer:

1	Constitution of the firm/ Concern (Tick as applicable)	Sole Proprietorship/ Partnership Firm / Company/ JV/ Society
2	Full name of Sole Proprietorship/ Partnership firm/ Company/ JV/ Society (as the case may be)	
3	Year of formation/ incorporation	
4	PAN No.	
5	Registered Office Address	
6	Address on which correspondence regarding this tender should be done	
7	Names of the Proprietor/ Partners/ JV members etc.	

PART-I

REGULATIONS FOR TENDERS AND CONTRACTS FOR THE GUIDANCE OF ENGINEERS & CONTRACTORS FOR WORKS CONTRACTS

1.0 MEANING OF TERMS

1.01 Applicability: These instructions and conditions of contract shall be applicable for all the tenders and contracts of railways for execution of 'Works' as defined in GFR 2017.

1.02 Order of Precedence of Documents: In a tender/contract, in case of any difference, contradiction, discrepancy, with regard to Conditions of tender/contract, Specifications, Drawings, Bill of quantities etc., forming part of the tender/contract, the following shall be the order of precedence:

- (i) Letter of Award
- (ii) Bill(s) of Quantities
- (iii) Special Conditions of Contract
- (iv) Technical Specifications as given in tender documents
- (v) Drawings
- (vi) Indian Railways Standard General Conditions of Contract updated with correction slips issued up to date of inviting tender or as otherwise specified in the tender documents.
- (vii) CPWD Specifications 2019 Vol I & II updated with correction slips issued up to date of inviting tender or as otherwise specified in the tender documents, if applicable in the contract.
- (viii) Indian Railways Unified Standard Specification (IRUSS-2019) updated with correction slips issued up to date of inviting tender or as otherwise specified in the tender documents, if applicable in the contract.
- (ix) Indian Railways Unified Standard Specifications (Works and Material) 2010 updated with correction slips issued up to date of inviting tender or as otherwise specified in the tender documents, if applicable in the contract.
- (x) IR Specifications/Guidelines updated with correction slips issued up to date of inviting tender or as otherwise specified in the tender documents.
- (xi) Relevant B.I.S. Codes updated with correction slips issued up to date of inviting tender or as otherwise specified in the tender documents.

1.1 Interpretation: These Instructions to Tenderers (ITT) shall be read in conjunction with the **Standard General Conditions of Contract-2022** (path <http://www.indianrailways.gov.in/railwayboard> >> "About Indian Railways" >> "Railway Board directorates" >> "Civil Engineering" >> "2. IR General Conditions of Contracts" >> "IR General Conditions of Contract-2022") which are referred to herein and shall be subject to modifications additions or suppression by special conditions of contract and/or special specifications, if any, annexed to the Tender Forms.

1.2 Definition: In these Instructions to Tenderers (ITT), the following terms shall have the meanings assigned hereunder except where the context otherwise requires:

- (i) **"Railway"** shall mean the President of the Republic of India or the Administrative Officers of the Railway or Successor Railway authorized to deal with any matters, which these presents are concerned on his behalf.
- (ii) **"General Manager"** shall mean the Officer-in-Charge of the general superintendence and control of the Zonal Railway/Production Units and shall also include Addl. General Manager, the General Manager (Construction) and shall mean and include their successors, of the Successor Railway.
- (iii) **"Chief Engineer"** shall mean the Officer in charge of the Engineering Department of Railway and shall also include the Chief Engineer (Construction), Chief Electrical Engineer, Chief Electrical Engineer (Construction), Chief Signal & Telecom Engineer, Chief Signal & Telecom Engineer (Construction), Chief Mechanical Engineer and shall mean and include their successors of the Successor Railway.
- (iv) **"Divisional Railway Manager"** shall mean the Officer in charge of a Division of the Zonal Railway and shall mean and include the Divisional Railway Manager of the Successor Railway.

- (v) **“Engineer”** shall mean the Divisional Engineer or the Executive Engineer, Divisional Signal & Telecom Engineer, Divisional Electrical Engineer, Divisional Mechanical Engineer in executive charge of the works and shall include the superior officers of Open Line and Construction organizations on the Railway of the Engineering, Signal & Telecom, Mechanical and Electrical Departments, i.e. the Senior Divisional Engineer/Deputy Chief Engineer/Chief Engineer, Senior Divisional Signal & Telecom Engineer / Dy. Chief Signal & Telecom Engineer, Senior Divisional Electrical Engineer / Deputy Chief Electrical Engineer, Senior Divisional Mechanical Engineer and shall mean & include the Engineers of the Successors Railway.
- (vi) **“Tenderer”** shall mean the person / the firm / co-operative or company whether incorporated or not who tenders for the works with a view to execute the works on contract with the Railway and shall include their personal representatives, successors and permitted assigns.
- (vii) **“Limited Tenders”** shall mean tenders invited from all or some Contractors on the approved or select list of Contractors with the Railway.
- (viii) **“Open Tenders”** shall mean the tenders invited in open and public manner and with adequate notice.
- (ix) **“Works”** shall mean the works contemplated in the drawings and Bill(s) of Quantities set forth in the tender forms and required to be executed according to the specifications.
- (x) **“Specifications”** shall mean the Specifications for Materials and Works of the Railway as specified under the authority of the Ministry of Railways or Chief Engineer or as amplified, added to or superseded by special specifications if any, appended to the Tender Forms.
- (xi) **“Standard Schedule of Rates (SSOR)”** shall mean the schedule of Rates adopted by the Railway, which includes-
1. “Unified Standard Schedule of Rates of the Railway (USSOR)” i.e., the Standard Schedule of Rates of the Railway issued under the authority of the Chief Engineer from time to time, updated with correction slips issued up to date of inviting tender or as otherwise specified in the tender documents;
 2. “Delhi Schedule Of Rates (DSR)” i.e., the Standard Schedule of Rates published by Director General/ Central Public Works Department, Government of India, New Delhi, as adopted and modified by the Railway under the authority of the Chief Engineer from time to time, updated with correction slips issued up to date of inviting tender or as otherwise specified in the tender documents.
- (xii) **“Drawings”** shall mean the maps, drawings, plans and tracings or prints thereof annexed to the Tender Forms.
- (xiii) **“Contractor’s authorized Engineer”** shall mean a graduate Engineer having more than 3 years’ experience in the relevant field of construction work involved in the contract, duly approved by the Engineer.
- (xiv) Date of inviting tender shall be the date of publishing tender notice on IREPS website if tender is published on website or the date of publication in newspaper in case tender is not published on website.
- (xv) **“Bill of Quantities”** shall mean Schedule of Item(s) included in the tender document along with respective quantities and rates, accepted by the Railway.

1.3 Singular and Plural: Words importing the singular number shall also include the plural and vice versa where the context requires.

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

2.1 e-Publishing: Tender notice and Tender Documents for open Tenders are being published on Northern Railway website www.ireps.gov.in for general information purpose in terms of **Railway Board letter no: 2014/CE-I/WP/5 Dated: 05.02.2016 & 18.10.2016**.

2.2 Validity of Tender: Tender must be open for the period as **mentioned in cover letter** of Tender Document. Validity of tender for **single packet = 60 days & for two packet = 90 days**.

2.3 Amendment of Tender Document: Before the deadlines for the submission of Tender Document, Railway may modify the Tender Document by issuing Addendum/Corrigendum. Tenderers are

advised to download Tender Documents well in advance to submit the Tender before the stipulated time. However, it is the responsibility of the Tenderer to check any correction or any modifications (Addendum/Corrigendum) published subsequently in newspapers as well as on website and same shall be taken in to account while submitting the Tender. Tenderer shall download corrigendum (if any) print it out, sign and attach it with main Tender Document. **Railway will not be responsible for any network error or internet connection as there would be sufficient time to submit the tender through e-Tendering.**

3.0 Care in Submission of Tenders:

- (a) (i) Before submitting a tender, the tenderer will be deemed to have satisfied himself by actual inspection of the site and locality of the works, that all conditions liable to be encountered during the execution of the works are taken into account and that the rates he enters in the tender forms are adequate and all-inclusive to accord with the provisions in **Clause-37 of PART-II of the Standard General Conditions of Contract** for the completion of works to the entire satisfaction of the Engineer.
- (a)(ii) Tenderers will examine the various provisions of The Central Goods and Services Tax Act, 2017 (CGST)/ Integrated Goods and Services Tax Act, 2017 (IGST)/ Union Territory Goods and Services Tax Act, 2017 (UTGST)/ respective state's State Goods and Services Tax Act (SGST) also, as notified by Central/State Govt. & as amended from time to time and applicable taxes before bidding. Tenderers will ensure that full benefit of Input Tax Credit (ITC) likely to be availed by them is duly considered while quoting rates.
- (a)(iii) The successful tenderer who is liable to be registered under CGST/IGST/UTGST/SGST Act shall submit GSTIN along with other details required under CGST/IGST/UTGST/SGST Act to railway immediately after the award of contract, without which no payment shall be released to the Contractor. The Contractor shall be responsible for deposition of applicable GST to the concerned authority.
- (a)(iv) In case the successful tenderer is not liable to be registered under CGST/IGST/UTGST/SGST Act, the railway shall deduct the applicable GST from his/their bills under reverse charge mechanism (RCM) and deposit the same to the concerned authority.
- (a)(v) Contractor shall be liable to pay/refund the amount collected as GST to the Indian Railways along with interest and penalties, if any imposed by the authorities, in case GST input tax credit of Indian Railways is denied/rejected by the tax authorities due to reasons mentioned below but not limited to:
 - Wrong/incorrect invoices issued by Contractor;
 - Non-filing of GST returns;
 - Non-payment of GST collected from Indian Railways to the authorities;
 - Any other non-compliance done by Contractor;

General Indemnity: Contractor hereby agrees to indemnify and hold harmless the Indian Railways from and against any and all losses, including loss on account of Input Tax Credit and all losses incurred by the Indian Railways relating to or arising out of or in connection with any actual or threatened claim, legal action, proceedings, prosecution or inquiry by or against the Indian Railways arising out, directly or indirectly, of failure by the contractor to comply with the provisions of GST and related laws, or based upon or arising from any failure by the Contractor.

Retention Money: Any payment liable to be paid by Indian Railways to contractor against the goods or services or both supplied by such contractor to Indian Railways shall be kept on hold in case supplier makes any non-compliance of any of the GST law provisions including non-reporting of invoices in GST returns. Such payment shall be released after proper verification of records and availability of ITC to Indian Railways as per provisions of GST Law.

- (b) When work is tendered for by a firm or company, the tender shall be signed by the individual legally authorized to enter into commitments on their behalf.
- (c) The Railway will not be bound by any power of attorney granted by the tenderer or by changes in the composition of the firm made subsequent to the execution of the contract. It

may, however, recognize such power of attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the Contractor.

- 3.01** A copy of **Certificate** stating that they are not liable to be disqualified and all their statements/documents submitted along with bid are true and factual. Standard format of certificate to be submitted by the bidder is enclosed as **Annexure-V**. In addition to Annexure-V, in case of other than Company/ Proprietorship Firm, **Annexure-V(A)** shall also be submitted by each member of a Partnership Firm/ Joint Venture (JV)/ Hindu Undivided Family (HUF)/ Limited Liability Partnership (LLP) etc., as the case may be. **Non submission** of above certificate(s) by the bidder shall result in **Summarily Rejection** of his/their bid. It shall be mandatorily incumbent upon the tenderer to identify, state and submit the supporting documents duly self-attested/digitally signed by which they / he is qualifying the Qualifying Criteria mentioned in the Tender Document.

NOTE:

1. Submission of copy of certificate as per **Annexure-V** is **not mandatory** if the bidder has **confirmed and certified the same online** at the time of submission of bids.
2. Submission of copy of certificate as per **Annexure-V(A)** is **mandatory** for each member of a Partnership Firm/ Joint Venture (JV)/ Hindu Undivided Family (HUF)/ Limited Liability Partnership (LLP) etc., as the case may be.

- 3.1 Tenderer Constitution and requirement of Authorized Signatory:** The tenderer/s who are constituents of firm, company, Joint Venture (JV) association or society must forward attested copies of the constitution of their concern, partnership deed and power of attorney with their tender as per **TENDER FORM-3** of Tender Document. Tender documents in such cases are to be signed by such persons (as may be legally competent to sign them on behalf of the firm, company, JV association or society as the case may be). The Railway will not be bound by any power of attorney granted by the tenderer/s or by changes in the composition of the firm made subsequent to the award of the contract. Para 5 of **Annexure-VIII** specifies the action to be taken in such matters. The cost of such action, including legal advice will be chargeable to the Tenderer/ contractor. The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executants(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure. **(Please refer Clause 3.7 of PART-I and Annexure-VIII of PART-V).**

- 3.2 Cost of Tender Document:** e-Tender Forms (document) shall be issued free of cost to all tenderers.

3.3 Bid Security:

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

Value of the Work	Value of the Bid Security
For all works	2% of the estimated cost of the work

- i) The Bid Security shall be rounded off to the nearest ₹ 100/-. This Bid Security shall be applicable for all modes of tendering.
- ii) Any firm recognized by Department of Industrial Policy and Promotion (DIPP) as '**Startups**' shall be exempted from payment of Bid Security detailed above.
- iii) **Labour Cooperative Societies** shall submit only 50% of above Bid Security detailed above.

Note:- Bid Security will be acceptable online through net banking/payment gateway. Bid Security will be accepted in form of Term Deposit Receipt/Bank Guarantee (issued from a scheduled commercial bank of India), **only in favor of Sr. DFM/NR Moradabad Division or FA&CAO/NR**. The scanned copy of Term Deposit Receipt/Bank Guarantee shall be attached online while submission of bids. The cost of tender documents (if any) is not refundable and

should not be included with Bid Security.

- 3.3.2 It shall be understood that the tender documents have been issued to the tenderer and the tenderer is permitted to tender in consideration of stipulation on his part, that after submitting his tender he will not resile from his offer or modify the terms and conditions thereof in a manner not acceptable to the Engineer. Should the tenderer fail to observe or comply with the said stipulation, the aforesaid amount shall be forfeited to the Railway.
- 3.3.3 If his tender is accepted, this Bid Security mentioned in sub clause 3.3.1(a) above will be retained as part security for the due and faithful fulfillment of the contract in terms of Clause 16 of the Standard General Conditions of Contract 2022 Part-II. The Bid Security of other Tenderers shall, save as herein before provided, be returned to them, but the Railway shall not be responsible for any loss or depreciation that may happen thereto while in their possession, nor be liable to pay interest thereon.
- 3.3.4 In case, contractor submits the term deposit receipt/bank guarantee bond towards full security deposit, the railway shall return the Bid Security so retained to the contractor.
- 3.3.5 The Bid Security shall be deposited either in cash through e-payment gateway or submitted as Bank Guarantee bond from a scheduled commercial bank of India or as mentioned in tender documents. The Bank Guarantee bond shall be as per **Annexure-VIIA** and shall **be valid for a period of 90 days** beyond the bid validity period.
- 3.3.6 In case of submission of **Bid Security in form of Bank Guarantee**, following shall be ensured:
- A scanned copy of the Bank Guarantee shall be uploaded on e-Procurement Portal (IREPS) while applying to the tender.
 - The **original Bank Guarantee** should be delivered in person to the official nominated as indicated in the tender document **before closing date for submission of bids** (i.e., excluding the last date of submission of bids).
 - Non submission of scanned copy of Bank Guarantee with the bid on e-tendering portal (IREPS) and/or **non-submission** of original Bank Guarantee **within the specified period** shall lead to **summary rejection** of bid.
 - The Bid Security shall remain valid for a period of 90 days beyond the validity period for the Tender.
 - The details of the Bank Guarantee, physically submitted should match with the details available in the scanned copy and the data entered during bid submission time, failing which the bid will be rejected.
 - The Bank Guarantee shall be placed in an envelope, which shall be sealed. The envelope shall clearly bear the identification "Bid for the ***** Project" and shall clearly indicate the name and address of the Bidder. In addition, the Bid Due Date should be indicated on the right-hand top corner of the envelope.
 - The envelope shall be addressed to the officer and address as mentioned in the tender document.
 - If the envelope is not sealed and marked as instructed above, the Authority assumes no responsibility for the misplacement or premature opening of the contents of the Bid submitted and consequent losses, if any, suffered by the Bidder.

3.4 Similar Nature of Work: The Similar nature of work should be defined in tender notice & Section 3 of Tender Document in accordance with **NR/HQ letter no. -181-Elect/TRD/189/Pt. II, Dated-29.07.2021 or as amended from time to time.**

Definition of Similar Nature of work:

Supply, erection, testing & commissioning of 25kV/240V, 5 kVA, 10 kVA & above LT supply transformer, or Design, supply, erection, testing & commissioning of 50 Hz, single phase 25 kV AC OHE, or Design, supply, erection, testing & commissioning of 66 kV or higher voltage 3-phase grid substation, or Design, supply, erection, testing & commissioning of 50 Hz, single phase, 25 kV switching station (SP, SSP).

3.5 Eligibility Criteria: The Tenderer will be required to meet the following eligibility criteria for which credentials to be submitted by Tenderer, along with Tender Documents

3.5.1 Technical Eligibility Criteria:

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

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

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

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

Note- Similar nature of work is defined in Para 3.4 above.

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

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

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

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

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

- (b) (ii) In such cases, what constitutes a component in a composite work shall be clearly predefined with estimated tender cost of it, as part of the tender documents without any ambiguity. Any work or set of works shall be considered to be a separate component, only when cost of the component is more than ₹ 2 crore each.
- (b) (iii) To evaluate the technical eligibility of tenderer, only components of work as stipulated in tender documents for evaluation of technical eligibility, shall be considered. The scope of work covered in other remaining components shall be either executed by tenderer himself if he has work experience as mentioned in clause 7 of the Standard General Conditions of Contract or through subcontractor fulfilling the requirements as per clause 7 of the Standard General Conditions of Contract Part-II of GCC or jointly i.e., partly himself and remaining through subcontractor, with prior approval of Chief Engineer in writing.

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

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

Note: for subletting of work costing up to Rs 50 lakh, no previous work experience of subcontractor shall be asked for by the Railway.

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

Note for Item 3.5.1:

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

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

3.5.2 Financial Eligibility Criteria:

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

V= Advertised value of the tender in crores of Rupees

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

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

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

3.5.3 Special Eligibility Criteria:

Tenderer shall have a **valid A class Electrical Contractor's License** (at the time of opening of tender and also uploaded on IREPS) issued in the name of the firm by any State Government and shall furnish all the particulars of the electrical license held by him along with the bid otherwise offer of the tenderer shall be **Summarily Rejected**.

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

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

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

Explanation for clause 3.5 (including clause 3.5.1 to 3.5.5) - Eligibility Criteria:

1. Substantially Completed Work means an ongoing work in which payment equal to or more than 90% of the present contract value (excluding the payment made for adjustment of Price variation (PVC), if any) has been made to the contractor in that ongoing contract and no proceedings of termination of contract

on Contractor's default has been initiated. The credential certificate in this regard should have been issued not prior to 60 days of date of invitation of present tender.

2. In case a work is started prior to 07 (seven) years, ending last day of month previous to the one in which tender is invited, but completed in last 07 (seven) years, ending last day of month previous to the one in which tender is invited, the completed work shall be considered for fulfillment of credentials.

3. If a work is physically completed and completion certificate to this extent is issued by the concerned organization but final bill is pending, such work shall be considered for fulfillment of credentials.

4. In case of completed work, the value of final bill (gross amount) including the PVC amount (if paid) shall be considered as the completion cost of work. In case final bill is pending, only the total gross amount already paid including the PVC amount (if paid) shall be considered as the completion cost of work.

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

5. If a bidder has successfully completed a work as subcontractor and the work experience certificate has been issued for such work to the subcontractor by a Govt. Organization or public listed company as defined in **Note for Item 3.5.1** above, the same shall be considered for the purpose of fulfillment of credentials.

6. In case a work is considered similar in nature for fulfillment of technical credentials, the overall cost including the PVC amount (if paid) of that completed work or substantially completed work, shall be considered and no separate evaluation for each component of that work shall be made to decide eligibility.

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

8. In case of existing partnership firm, if any one or more partners quit the partnership firm, the credentials of remaining partnership firm shall be re-worked out i.e., the quitting partner(s) shall take away his credentials to the extent of his share on the date of quitting the partnership firm (e.g. in a partnership firm of partners A, B & C having share 30%, 30% & 40% respectively and credentials of Rs 10 crore; in case partner C quits the firm, the credentials of this partnership firm shall remain as Rs 6 crore). For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deed(s), dissolution deed(s) and proof of surrender of PAN No.(s) in case of dissolution of partnership firm(s) etc.

9. In case of existing partnership firm if any new partner(s) joins the firm without any modification in the name and PAN/TAN no. of the firm, the credentials of partnership firm shall get enhanced to the extent of credentials of newly added partner(s) on the same principles as mentioned in item 6 above. For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deeds, dissolution/splitting deeds and proof of surrender of PAN No.(s) in case of dissolution of partnership firm etc.

10. Any partner in a partnership firm cannot use or claim his credentials in any other firm without leaving the partnership firm i.e., In a partnership firm of A&B partners, A or B partner cannot use credentials of partnership firm of A&B partners in any other partnership firm or proprietary firm without leaving partnership firm of A&B partners.

11. In case a partner in a partnership firm is replaced due to succession as per succession law, the proportion of credentials of the previous partner will be passed on to the successor.

12. If the percentage share among partners of a partnership firm is changed, but the partners remain the same, the credentials of the firm before such modification in the share will continue to be considered for the firm as it is without any change in their value. Further, in case a partner of partnership firm retires

without taking away any credentials from the firm, the credentials of partnership firm shall remain the same as it is without any change in their value.

13. In a partnership firm "AB" of A&B partners, in case A also works as propriety firm "P" or partner in some other partnership firm "AX", credentials of A in propriety firm "P" or in other partnership firm "AX" earned after the date of becoming a partner of the firm AB shall not be added in partnership firm AB.

14. In case a tenderer is LLP, the credentials of tenderer shall be worked out on above lines similar to a partnership firm.

15. In case company A is merged with company B, then company B would get the credentials of company A also.

3.5.6 Relaxation of Eligibility Criteria for 'Start-up' firms: Technical and financial eligibility criteria mentioned in GCC 2022 shall normally apply to all firms including 'Start-up' firms (recognized by Department of Industrial Policy and Promotion, Ministry of Commerce and Industry). However, before inviting tender, General Manager, on the recommendation of PHOD/CHOD of the department inviting tender and associate finance, can relax the applicability of eligibility criteria to 'Start-up' firms (recognized by Department of Industrial Policy and Promotion, Ministry of Commerce and Industry) on case-to-case basis.

3.5.7 Eligibility criteria for bidder from a country sharing land border with India:

- I. Any bidder from a country which shares a land border with Indian will be eligible to bid in any tender only if the bidder is registered with the Competent Authority.
- II. "Bidder" (including the term 'tenderer', 'consultant; or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated herein before, including any agency branch or office controlled by such person, participating in a procurement process.
- III. "Bidder from a country which shares a land border with Indian" for the purpose of this Order means:-
 - a. An entity incorporated, established or registered in such a country, or
 - b. A subsidiary of an entity incorporated, established or registered in a such a country; or
 - c. An entity substantially controlled through entities incorporated, established or registered in such a country ; or
 - d. An entity whose beneficial owner is situated in such a country; or
 - e. An Indian (or other) agent of such an entity; or
 - f. A natural person who is a citizen of such a country; or
 - g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above.
- IV. The beneficial owner of the purpose of (iii) above will be as under:
 1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting along or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.

Explanation-

 - a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five percent of share or capital or profits of the company,
 - b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements.
 2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership.
 3. In case of an unincorporated association or body of individuals, the beneficial owner is

the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;

4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;
5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.

VI. The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.

3.5.8 A certificate shall be taken from bidders in the tender documents regarding their compliance with this order (Annexure-XXVII). If such certificate given by a bidder whose bid is accepted is found to be false, this would be a ground for immediate termination and further legal action in accordance with law.

3.5.9 In respect of tenders, registration should be valid at the time of submission of bids and at the time of acceptance of bids. In respect of supply otherwise than by tender, registration should be valid at the time of placement of order. If the bidder was validly registered at the time of acceptance/ placement of order, registration shall not be a relevant consideration during contract execution.

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

NOTE (A): For judging the technical eligibility, financial capability and available bid capacity only those works which had been executed for the under Government/Semi Government/PSU shall be considered and the tenderer(s) will submit the certificate to this effect from the Officer concerned duly signed under the official seal. **It should be noted that credentials for the works executed for Private Individual/Private Organization except as mentioned in note for 3.5.1 shall not be considered.**

3.7 Documents to be submitted Along with Tender

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

3.7.1 Sole Proprietorship Firm:

- (i) An undertaking that he is not blacklisted or debarred by Railways or any other Ministry/ Department of Govt. of India from participation in tender on the date of opening of bids, either in individual capacity or as a member of the partnership firm or JV in which he was / is a partner/member. Concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the General Conditions of Contract.
- (ii) All other documents in terms of **clause 3.5 (Eligibility Criteria) of PART-I** of Tender document.

3.7.2 HUF:

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

- (ii) An undertaking that the HUF is not blacklisted or debarred by Railways or any other Ministry / Department of Govt. of India from participation in tender on the date of opening of bids, either in individual capacity or as a member of the partnership firm or JV in which HUF was / is a partner/member. Concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the General Conditions of Contract.
- (iii) All other documents in terms of **clause 3.5 (Eligibility Criteria) of PART-I** of Tender document.

3.7.3 Partnership Firm:

3.7.3.1 The Tenderer shall submit self-attested copies of-

- (i) A notarized copy of the Partnership Deed or a copy of the Partnership deed registered with the Registrar
- (ii) A notarized or registered copy of Power of Attorney in favour of the individual to tender for the work, sign the agreement etc. and create liability against the firm.
- (iii) An undertaking by all partners of the partnership firm that they are not blacklisted or debarred by Railways or any other Ministry / Department of the Govt. of India from participation in tenders / contracts as on the date of submission of bids, either in their individual capacity or in any firm/LLP in which they were / are partners/members. Any Concealment / wrong information in regard to above shall make the bid ineligible or the contract shall be determined under Clause 62 of PART-II of the General Conditions of Contract.
- (iv) All other documents in terms of **clause 3.5 (Eligibility Criteria) of PART-I** of Tender document.

Stipulation regarding tenders by Partnership Firms and their Eligibility Criteria reproduce as Annexure-VIII of Tender Document.

3.7.3.2 “Any tender submitted by a partnership firm without enclosing self-attested copy of registered/notarized partnership deed or power of attorney duly authorizing the signatory as noted above shall be treated as having been submitted by individual signing the tender documents. The railway will not be bound by any power of attorney granted by the tenderer or by changes in the composition of the firm made subsequent to the execution of the contract. It may, however, recognize such power of attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the contractor.”

3.7.3.3 The Partnership Firms participating in the tender should be legally valid under the provisions of the Indian Partnership Act.

3.7.3.4 The partnership firm should have been in existence or should have been formed prior to submission of tender. Partnership firm should have either been registered with the Registrar or the partnership deed should have been notarized as per the Indian Partnership Act, prior to submission of tender.

3.7.3.5 Separate identity / name should be given to the partnership firm. The partnership firm should have PAN / TAN number in its own name and PAN / TAN number in the name of any of the constituent partners shall not be considered. The valid constituents of the firm shall be called partners.

3.7.3.6 Once the tender has been submitted, the constitution of the firm shall not normally be allowed to be modified / altered / terminated during the validity of the tender as well as the currency of the contract except when modification becomes inevitable due to succession laws etc., in which case prior permission should be taken from Railway and in any case the minimum eligibility criteria should not get vitiated. The re-constitution of firm in such cases should be followed by a notary certified Supplementary Deed. The approval for change of constitution of the firm, in any case, shall be at the sole discretion of the Railways and the tenderer shall have no claims whatsoever. Any change in the constitution of Partnership firm after submission of tender shall be with the consent of all partners and with the signatures of all partners as that in the Partnership Deed. Failure to observe this requirement shall render the offer invalid and full Bid Security shall be forfeited.

If any Partner/s withdraws from the firm after submission of the tender and before the award of

the contract, the offer shall be rejected and Bid Security of the tenderer will be forfeited. If any new partner joins the firm after submission of tender but prior to award of contract, his / her credentials shall not qualify for consideration towards eligibility criteria either individually or in proportion to his share in the previous firm. In case the tenderer fails to inform Railway beforehand about any such changes / modification in the constitution which is inevitable due to succession laws etc. and the contract is awarded to such firm, then it will be considered a breach of the contract conditions liable for determination of the contract under Clause 62 of the Standard General Conditions of Contract.

3.7.3.7 A partner of the firm shall not be permitted to participate either in his individual capacity or as a partner of any other firm in the same tender.

3.7.3.8 The tender form shall be submitted only in the name of partnership firm. The Bid Security shall be submitted by partnership firm. The Bid Security submitted in the name of any individual partner or in the name of authorized partner (s) shall not be considered.

3.7.3.9 On issue of Letter of Acceptance (LOA) to the partnership firm, all the guarantees like Performance Guarantee, guarantee for various Advances to the Contractor shall be submitted only in the name of the partnership firm and no splitting of guarantees among the partners shall be acceptable.

3.7.3.10 On issue of Letter of Acceptance (LOA), contract agreement with partnership firm shall be executed in the name of the firm only and not in the name of any individual partner.

3.7.3.11 In case the Letter of Acceptance (LOA) is issued to a partnership firm, the following undertakings shall be furnished by all the partners through a notarized affidavit, before signing of contract agreement.

(a) Joint and several liabilities:

The partners of the firm to which the Letter of Acceptance (LOA) is issued, shall be jointly and severally liable to the Railway for execution of the contract in accordance with General and Special Conditions of the Contract. The partners shall also be liable jointly and severally for the loss, damages caused to the Railway during the course of execution of the contract or due to non-execution of the contract or part thereof.

(b) Duration of the partnership deed and partnership firm agreement:

The partnership deed/partnership firm agreement shall normally not be modified/altered/terminated during the currency of contract and the maintenance period after the work is completed as contemplated in the conditions of the contract. Any change carried out by partners in the constitution of the firm without permission of Railway, shall constitute a breach of the contract, liable for determination of the contract under Clause 62 of the Standard General Conditions of Contract.

(c) Governing laws: The partnership firm agreement shall in all respect be governed by and interpreted in accordance with the Indian laws.

(d) No partner of the firm shall have the right to assign or transfer the interest right or liability in the contract without the written consent of the other partner/s and that of the Railway.

3.7.3.12 The tenderer shall clearly specify that the tender is submitted on behalf of a partnership firm. The documents as stated in clause 3.7.3.1 above shall be submitted along with the tender:

3.7.3.13 **Evaluation of eligibility of a partnership firm:**

Technical and financial eligibility of the firm shall be adjudged based on satisfactory fulfillment of the eligibility criteria laid down in Para 3.5 above.

3.7.4 Company registered under Companies Act 2013:

(i) The copies of MOA (Memorandum of Association) / AOA (Articles of Association) of the company

(ii) A copy of Certificate of Incorporation

(iii) A copy of Authorization/Power of Attorney issued by the Company (backed by the resolution of Board of Directors) in favour of the individual to sign the tender on behalf of the company and create liability against the company.

- (iv) An undertaking that the Company is not blacklisted or debarred by Railways or any other Ministry / Department of Govt. of India from participation in tender on the date of opening of bids, either in individual capacity or as a member of the partnership firm or JV in which the Company was / is a partner/member. Concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the General Conditions of Contract.
- (v) All other documents in terms of **clause 3.5 (Eligibility Criteria) of PART-I** of Tender document.

3.7.5 LLP (Limited Liability Partnership): If the tender is submitted on behalf of an LLP registered under LLP Act-2008, the tenderer shall submit along with the tender:

- (i) A copy of LLP Agreement
- (ii) A copy of Certificate of Incorporation
- (iii) A copy of Power of Attorney/Authorization issued by the LLP in favour of the individual to sign the tender on behalf of the LLP and create liability against the LLP.
- (iv) An undertaking by all partners of the LLP that they are not blacklisted or debarred by Railways or any other Ministry / Department of the Govt. of India from participation in tenders / contracts as on the date of submission of bids, either in their individual capacity or in any firm/LLP or JV in which they were / are partners/members. Concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the Standard General Conditions of Contract.
- (v) All other documents in terms of **clause 3.5 (Eligibility Criteria) of PART-I** of Tender document.

3.7.6 Registered Society & Registered Trust:

The tenderer shall submit:

- (i) A copy of Certificate of Registration
- (ii) A copy of Memorandum of Association of Society/Trust Deed
- (iii) A copy of Power of Attorney in favour of the individual to sign the tender documents and create liability against the Society/Trust.
- (iv) A copy of Rules & Regulations of the Society
- (v) All other documents in terms of **clause 3.5 (Eligibility Criteria) of PART-I** of Tender document.

3.7.7 Joint Venture (JV): Documents are mentioned in clause 3.7 below

Guidelines regarding for Participation of Joint Venture Firms in Works Tender are as detailed below and as amended from time to time.

This Clause shall be applicable for works tenders of value as approved and communicated by Railway Board from time to time. **(The JV firms are allowed to participate only in the tenders of value more than Rs. 10 crores).**

3.7.7.1 Separate identity/name shall be given to the Joint Venture.

3.7.7.2 Number of members in a JV shall not be more than three, if the work involves only one department (say Civil or S&T or Electrical or Mechanical) and shall not be more than five, if the work involves more than one Department. One of the members of the JV shall be its Lead Member who shall have a majority (at least 51%) share of interest in the JV. The other members shall have a share of not less than 20% each in case of JV with up to three members and not less than 10% each in case of JV with more than three members. In case of JV with foreign member(s), the Lead Member has to be an Indian firm/company with a minimum share of 51%.

3.7.7.3 A member of JV shall not be permitted to participate either in individual capacity or as a member of another JV in the same tender.

3.7.7.4 The tender form shall be purchased and submitted only in the name of the JV and not in the name of any constituent member. The tender form can however be submitted by JV or any of its constituent member or any person authorized by JV through Power of Attorney to submit tender.

3.7.7.5 Bid Security shall be submitted by JV or authorized person of JV either as:

1. Cash through e-payment gateway or as mentioned in tender document, or
 2. Bank Guarantee bond either in the name of JV, or in the name of all members of JV as per MOU irrespective of their share in the JV if the JV has not been constituted legally till the date of submission of tender.
- 3.7.7.6 A copy of Memorandum of Understanding (MoU) duly executed by the JV members on a stamp paper, shall be submitted by the JV along with the tender. The complete details of the members of the JV, their share and responsibility in the JV etc. particularly with reference to financial, technical and other obligations shall be furnished in the MoU. (The MoU format for this purpose shall be finalized by the Railway in consultation with their Law Branch and shall be enclosed along with the tender).
- 3.7.7.7 Once the tender is submitted, the MoU shall not be modified / altered / terminated during the validity of the tender. In case the tenderer fails to observe/comply with this stipulation, the full Bid Security shall be liable to be forfeited.
- 3.7.7.8 Approval for change of constitution of JV shall be at the sole discretion of the Railway. The constitution of the JV shall not normally be allowed to be modified after submission of the tender bid by the JV, except when modification becomes inevitable due to succession laws etc. and in any case the minimum eligibility criteria should not get vitiated. However, the Lead Member shall continue to be the Lead Member of the JV. Failure to observe this requirement would render the offer invalid.
- 3.7.7.9 Similarly, after the contract is awarded, the constitution of JV shall not normally be allowed to be altered during the currency of contract except when modification become inevitable due to succession laws etc. and minimum eligibility criteria should not get vitiated. Failure to observe this stipulation shall be deemed to be breach of contract with all consequential penal action as per contract conditions.
- 3.7.7.10 On award of contract to a JV, a single Performance Guarantee shall be submitted by the JV as per tender conditions. All the Guarantees like Performance Guarantee, Bank Guarantee for Mobilization Advance, Machinery Advance etc. shall be accepted only in the name of the JV and no splitting of guarantees amongst the members of the JV shall be permitted.
- 3.7.7.11 On issue of LOA (Letter of Acceptance), the members of the JV entity to whom the work has been awarded, shall form a legal entity if not already formed, which shall have the same shareholding pattern, as was declared in the MOU/JV Agreement submitted along-with the tender. This entity shall be got registered before the Registrar of the Companies under 'The Companies Amendment Act -2013' (in case of case JV entity is to be registered as Company) or before the Registrar/Sub-Registrar under the 'The Indian Partnership Act, 1932' ((in case JV entity is to be registered as Partnership Firm)) or under 'The LLP Act 2008' ((in case JV entity is to be registered as LLP). A separate PAN shall be obtained for this entity. The documents pertaining to this entity including its PAN shall be furnished to the Railways before signing the contract agreement for the work. In case the tenderer fails to observe/comply with this stipulation within 60 days of issue of LOA, contract is liable to be terminated. In case contract is terminated railway shall be entitled to forfeit the full amount of the Bid Security and other dues payable to the Contractor under this contract. The entity so registered, in the registered documents, shall have, inter-alia, following Clauses:
- 3.7.7.11.1 Joint and Several Liability - Members of the entity to which the contract is awarded, shall be jointly and severally liable to the Railway for execution of the project in accordance with General and Special Conditions of Contract. The members of the entity shall also be liable jointly and severally for the loss, damages caused to the Railways during the course of execution of the contract or due to non-execution of the contract or part thereof.
- 3.7.7.11.2 Duration of the Registered Entity - It shall be valid during the entire currency of the contract including the period of extension, if any and the maintenance period after the work is completed.
- 3.7.7.11.3 Governing Laws - The Registered Entity shall in all respect be governed by and interpreted in accordance with Indian Laws.
- 3.7.7.12 Authorized Member - Joint Venture members in the JV MoU shall authorize Lead member on

behalf of the Joint Venture to deal with the Contract, sign the agreement or enter into contract in respect of the said tender, to receive payment, to witness joint measurement of work done, to sign measurement books and similar such action in respect of the said tender/contract. All notices/correspondences with respect to the contract would be sent only to this authorized member of the JV.

3.7.7.13 No member of the Joint Venture shall have the right to assign or transfer the interest right or liability in the contract without the written consent of the other members and that of the Railway in respect of the said tender/contract.

3.7.7.14 **Documents to be enclosed by the JV along-with the tender:**

3.7.7.14.1 In case one or more of the members of the JV is/are partnership firm(s), following documents shall be submitted:

- (i) A notarized copy of the Partnership Deed or a copy of the Partnership deed registered with the Registrar.
- (ii) A copy of consent of all the partners or individual authorized by partnership firm, to enter into the Joint Venture Agreement on a stamp paper,
- (iii) A notarized or registered copy of Power of Attorney (duly registered as per prevailing law) in favor of the individual to sign the MOU/JV Agreement on behalf of the partnership firm and create liability against the firm.
- (iv) An undertaking by all partners of the partnership firm that they are not blacklisted or debarred by Railways or any other Ministry / Department of the Govt. of India from participation in tenders / contracts as on the date of submission of bids, either in their individual capacity or in any firm/LLP in which they were / are partners/members. Any Concealment / wrong information in regard to above shall make the bid ineligible or the contract shall be determined under Clause 62 of the Standard General Conditions of Contract.
- (v) All other documents in terms of explanatory notes in clause 3.5 above.

3.7.7.14.2 In case one or more members is/are Proprietary Firm or HUF, the following documents shall be enclosed:

- (i) A copy of notarized affidavit on Stamp Paper declaring that his Concern is a proprietary Concern and he is sole proprietor of the Concern OR he who is signing the affidavit on behalf of HUF is in the position of 'Karta' of Hindu Undivided Family (HUF) and he has the authority, power and consent given by other members to act on behalf of HUF.
- (ii) All other documents in terms of explanatory notes in clause 3.5 above.

3.7.7.14.3 In case one or more members of the JV is/are companies, the following documents shall be submitted:

- (i) A copy of resolutions of the Directors of the Company, permitting the company to enter into a JV agreement,
- (ii) The copies of MOA (Memorandum of Association) / AOA (Articles of Association) of the company
- (iii) A copy of Certificate of Incorporation
- (iv) A copy of Authorization/copy of Power of Attorney issued by the Company (backed by the resolution of Board of Directors) in favour of the individual to sign the tender, sign MOU/JV Agreement on behalf of the company and create liability against the company.
- (v) All other documents in terms of explanatory notes in clause 3.5 above.

3.7.7.14.4 In case one or more members of the JV is/are LLP firm/s, the following documents shall be submitted:

1. A copy of LLP Agreement
2. A copy of Certificate of Incorporation of LLP
3. A copy of resolution passed by partners of LLP firm, permitting the Firm to enter into a JV agreement

4. A copy of Authorization /copy of Power of Attorney issued by the LLP firm (backed by resolution passed by the Partners) in favour of the individual, to sign the tender and/or sign the MOU/ JV agreement on behalf of the LLP and create liability against the LLP.
 5. An undertaking by all partners of the LLP that they are not blacklisted or debarred by Railways or any other Ministry / Department of the Govt. of India from participation in tenders / contracts as on the date of submission of bids, either in their individual capacity or in any firm/LLP or JV in which they were / are partners/members. Any Concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the Standard General Conditions of Contract.
 6. All other documents in terms of explanatory notes in clause 3.5 above.
- 3.7.7.14.5 In case one or more members of the JV is/are Society/s or Trust/s, the following documents shall be submitted:
1. A copy of Certificate of Registration
 2. A copy of Memorandum of Association of Society/Trust Deed
 3. A copy of Rules & Regulations of the Society
 4. A copy of Power of Attorney, in favour of the individual to sign the tender documents and create liability against the Society/Trust.
 5. All other documents in terms of explanatory notes in clause 3.5 above.
- 3.7.7.14.6 A Power of Attorney executed and issued overseas, the document will also have to be legalized by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney is being issued. However, the Power of Attorney provided by Bidders from countries that have signed the Hague Legislation Convention 1961 are not required to be legalized by the Indian Embassy if it carries a conforming Apostille certificate.
- 3.7.7.15 Credentials & Qualifying Criteria: Technical, financial eligibility and Bid capacity of the JV shall be adjudged based on satisfactory fulfillment of the following criteria:
- 3.7.7.15.1 **Technical Eligibility Criteria ('a' or 'b' mentioned hereunder):**
- (A) For Works without composite components
- The technical eligibility for the work as per para 3.5.2 above, shall be satisfied by either the 'JV in its own name & style' or 'Lead member of the JV'.
- Each other (non-lead) member(s) of JV, who is/ are not satisfying the technical eligibility for the work as per para 10.1 above, shall have technical capacity of minimum 10% of the cost of work i.e., each non-lead member of JV member must have satisfactorily completed or substantially completed during the last 07 (seven) years, ending last day of month previous to the one in which tender is invited, one similar single work for a minimum of 10% of advertised value of the tender.
- (B) For works with composite components
- The technical eligibility for major component of work as per para 3.5.2 above, shall be satisfied by either the 'JV in its own name & style' or 'Lead member of the JV' and technical eligibility for other component(s) of work as per para 10.1 above, shall be satisfied by either the 'JV in its own name & style' or 'any member of the JV'.
- Each other (non-lead) member(s) of JV, who is/ are not satisfying the technical eligibility for any component of the work as per para 3.5.2 above, shall have technical capacity of minimum 25% of the cost of any component of work mentioned in technical eligibility criteria. i.e., each other (non-lead) member of must have satisfactorily completed or substantially completed during the last 07 (seven) years, ending last day of month previous to the one in which tender is invited, one similar single work for a minimum of 10% of cost of any component of work mentioned in technical eligibility criteria.
- Note for Clause 3.7.4.15.1:
- 1) *The Major component of the work for this purpose shall be the component of work having highest value. In cases where value of two or more component of work is same, any one*

work can be classified as Major component of work.

- 2) *Value of a completed work done by a Member in an earlier JV shall be reckoned only to the extent of the concerned member's share in that JV for the purpose of satisfying his/her compliance to the above-mentioned technical eligibility criteria in the tender under consideration.*

3.7.7.15.2 Financial Eligibility Criteria: The JV shall satisfy the requirement of “Financial Eligibility” mentioned at para 3.5.2 above. The “financial capacity” of the lead partner of JV shall not be less than 51% of the financial eligibility criteria mentioned at para 3.5.2 above. The “financial capacity” of each of other partners (excluding lead partner) shall not be less than 10% of the financial eligibility criteria mentioned at para 3.5.3 above.

The arithmetic sum of individual “financial capacity” of all the members shall be taken as JV’s “financial capacity” to satisfy this requirement.

Note: Contractual payment received by a Member in an earlier JV shall be reckoned only to the extent of the concerned member’s share in that JV for the purpose of satisfying compliance of the above-mentioned financial eligibility criteria in the tender under consideration.

3.7.7.15.3 Bid Capacity: The JV shall satisfy the requirement of “Bid Capacity” requirement mentioned at para 3.5.4 above. The arithmetic sum of individual “Bid capacity” of all the members shall be taken as JV’s “Bid capacity” to satisfy this requirement.

- (iii) If it is NOT mentioned in the submitted tender that tender is being submitted on behalf of a Sole Proprietorship firm / Partnership firm / Joint Venture / Registered Company etc., then the tender shall be treated as having been submitted by the individual who has signed the tender.
- (iv) After opening of the tender, any document pertaining to the constitution of Sole Proprietorship Firm / Partnership Firm / Registered Company/ Registered Trust / Registered Society / HUF/ LLP etc. shall be neither asked nor considered, if submitted. Further, no suo moto cognizance of any document available in public domain (i.e., on internet etc.) or in Railway’s record/office files etc. will be taken for consideration of the tender, if no such mention is available in tender offer submitted.
- (v) A tender from JV / Partnership firm etc. shall be considered only where permissible as per the tender conditions.
- (vi) The Railway will not be bound by any change of power of attorney or in the composition of the firm made subsequent to the submission of tender. Railway may, however, recognize such power of attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the Contractor.
- (vii) The tenderer whether sole proprietor / a company or a partnership firm / Joint Venture (JV) / registered society / registered trust / HUF/ LLP etc. if they want to act through agent or individual partner(s), should submit along with the tender, a copy of power of attorney duly stamped and authenticated by a Notary Public or by Magistrate in favour of the specific person whether he/they be partner(s) of the firm or any other person, specifically authorizing him/them to sign the tender, submit the tender and further to deal with the Tender/ Contract up to the stage of signing the agreement except in case where such specific person is authorized for above purposes through a provision made in the partnership deed / Memorandum of Understanding / Article of Association / Board resolution, failing which tender shall be **summarily rejected**.

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

Note: A Power of Attorney executed and issued overseas, the document will also have to be legalized by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney is being issued. However, the Power of Attorney provided by Bidders from countries that have signed

the Hague Legislation Convention 1961 are not required to be legalized by the Indian Embassy if it carries a conforming Apostille certificate.

3.8 Test of Responsiveness: Railway will determine whether each such proposal is 'responsive to the requirement of the Tender Documents. A Tender/Proposal shall be considered 'responsive' if only:

- (i) Tender Document accompanied by required **Bid Security**.
- (ii) Tender Document accompanied with Power(s) of Attorney(ies).
- (iii) Cover Letter (Tender Form-1) signed by Authorized Signatory.
- (iv) Tender Documents shall be submitted in bound and sealed condition (in exceptional cases where manual tendering is being adopted).
- (v) The tenderers shall submit a copy of **Certificate** stating that all their statements/documents submitted along with bid are true and factual. Standard format of certificate to be submitted by the bidder is enclosed as **Annexure-V**. In addition to Annexure-V, in case of other than Company / Proprietorship Firm, **Annexure-V(A)** shall also be submitted by each member of a Partnership Firm / Joint Venture (JV)/ Hindu Undivided Family (HUF)/ Limited Liability Partnership (LLP) etc., as the case may be. **Non submission** of above certificate(s) by the bidder shall result in **Summarily Rejection** of his/their bid. It shall be mandatorily incumbent upon the tenderer to identify, state and submit the supporting documents duly self-attested/digitally signed by which they / he is qualifying the Qualifying Criteria mentioned in the Tender Document.

NOTE:

- 1. Submission of copy of certificate as per **Annexure-V** is **not mandatory** if the bidder has **confirmed and certified the same online** at the time of submission of bids.
- 2. Submission of copy of certificate as per **Annexure-V(A)** is **mandatory** for each member of a Partnership Firm/ Joint Venture (JV)/ Hindu Undivided Family (HUF)/ Limited Liability Partnership (LLP) etc., as the case may be.

Tenderer may please note that tender **not accompanying Item (i) & (v) above shall be Summarily Rejected.**

Any of the above criteria is not fulfilled, in any manner whatsoever, the Tender shall be treated as non-responsive. The Decision of Railway Administration on the responsiveness of Tender shall be final, conclusive and binding on the Tenderer and shall not be called into question by any Tenderer on any ground whatsoever. **Any Tender which is not responsive shall be rejected.**

3.9 Conflict of Interest:

- (1) Railway Administration considers "**Conflict of Interest**"; to be a situation in which party has interests that could improperly influence the Tendering process or that party's Performance of official duties or Responsibilities, Contractual Obligations or Compliance of applicable laws and regulations. Any Tenderer(s), which in the opinion of Railway Administration has or may have the likelihood of a conflict of interest, **shall be disqualified**. Without limiting the generality of the above, a Tenderer shall be considered to have a conflict of interest that affects the Tendering process, if;
 - (a) Such Tenderer, its Member (In case of Partnership firm) or any of its Constituents and any other Tenderer for the same work, its Member or any of its constituents have cross ownership interest; provided that this disqualification shall not apply in case the direct or indirect ownership/Shareholding (of paid up and subscribed shares) of a Tenderer, its Member or any of its constituent in the other Tenderer, its Member or any of its constituent is less than 10% (Ten percent); or
 - (b) Such Tenderer or a Member of such Tenderer is also a member of another Tenderer for the same work; or

- (c) Such Tenderer has the same authorized Signatory/ representative for a tender as any other Tenderer for the same work; or
 - (d) Such Tenderer, its member or any of its Constituent has participated as consultant to Railway in the preparation of any document, design or technical specifications for the same work; or
 - (e) If legal, financial or technical advisor of Railway for the same work is or has been engaged by Tenderer, its member or any of its Constituent in any manner for matters related to or incidental to the same work during or prior to the Tendering process up to the signing of Agreement; or
 - (f) Such Tenderer, its Member or any of its Constituent and the consultant of Railway for the same work, its Member or any of its Constituent have cross ownership interest; provided that this disqualification shall not apply in cases the direct or indirect ownership/ shareholding (of its paid up and subscribed shares) of a tenderer, its Member or any of its Constituents in the consultant of Railway for this work, its Member or any of its Constituent, or vice versa, is less than 10% (ten percent); or
 - (g) Such Tenderer, its member or any Constituent thereof received or has received any direct or indirect subsidy, grant, concessional loan or subordinated debt from any other Tenderer for the same work, its member or Constituent, or has provided any such subsidy, grant concessional loan or subordinated debt to any other Tenderer for the same work, its member or any Constituent thereof; or
 - (h) Such Tenderer, or any Constituent thereof, has a relationship with any other Tenderer for the same work, or any Constituent thereof, directly or through common third party/parties, that puts either or both of them in a position to have access to each other's' information about, or to influence the Tender of either or each other for the same work.
- (2) Disqualification specified under sub-clause **3.9.1 (a) to (h)** shall not apply to the Tenderer or its Member of both Public and Private unless and until such Tenderer or its Member is a Constituent of another Tenderer or its Member or Railway Consultant for the same work.
- (i) Tenderer/ Each Member of the firm shall submit the following documents on the basis of which it has arrived at the conclusion that it does not have any Conflict of interest:
 - (ii) List of Constituents along with their shareholding and registered office address;
 - (iii) The details of each of shareholders holding more than 10% in the firm, each of its members and their Constituents;
 - (iv) A chart showing the relationship of the Tenderer/Members of the firm with their respective constituents.
 - (v) Notwithstanding anything contained herein above, Railway may, after opening of Tender, seek a reconfirmation that there is no conflict of interest among the Tenderer, Members and / or Constituents of the Tenderer/ Members of the firm, within a period to be stipulated by Railway. Railway will also seek reconfirmation from its legal, financial or technical advisors that there is no conflict of interest with Tenderers.

3.10 Fraud & Corrupt Practice:

- 3.10.1** The Tenderer and their representative officers, employee, agents and advisors shall observe the highest standard of ethics during the Tendering process and subsequent to the issue of the LOA during the substance of the Agreement. Notwithstanding anything to contrary contained herein or in the LOA or the Agreement, Railway shall reject the Tender, Withdraw the LOA, or Terminate the Agreement, as the case may be, without being liable in any manner whatsoever to the selected Tenderer, if it determines that the selected Tenderer, as the case may be has directly or indirectly or through agent, engaged in corrupt practice, fraudulent practice, Coercive practice, undesirable practice or restrictive practice in the Tendering process. In such an event, in addition to exercise of its right of Termination, Railway shall forfeit and appropriate the contract security or Performance Guarantee as the case may be, as mutually agreed genuine pre-estimation

compensation and damage payable to Railway towards, inter alia, time, cost and effort of Railway, without prejudice to any other right or remedy that may be available to Railway hereunder or otherwise.

3.10.2 Without prejudice to the right of Railway hereinabove and the rights and remedies which Railway may have under the LOA or the Agreement, if the Tenderer/Contractor, as the case may be, is found by Railway to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice during the Tendering process, or after the issue of LOA or the execution of Agreement, **such Tenderer, Members and Contractor shall not be eligible to participate in any Tender issued by Northern Railway during a period of 02 (Two) years from the date** such Tenderer, Member or Contractor, as the case may be, is found by Railway to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice, as the case may be.

3.10.3 For the purposes of this clause, the following terms shall have the meanings hereinafter respectively assigned to them;

- (i) **“Corrupt Practice”** means the offering, giving, receiving or soliciting, directly or indirectly of anything of value to influence the action of any person connecting with the Tendering process (for avoidance of doubt, offering employment to or employing or engaging in any manner whatsoever, directly or indirectly, any official of Railway who is or has been associated in any manner, directly or indirectly with the Tendering process or the LOA or has dealt with matters concerning the Agreement or arising there from, before or after the execution thereof, at any time prior to the expiry of one year from date such official resigns or retires from or otherwise ceases to be in the service of Railway, shall be deemed to constitute influencing the actions of a person connected with the Tendering process), or

Engaging in any manner whatsoever, whether during Tendering process or after the issue of the LOA or after execution of Agreement, as the case may be, any person in respect of in respect of any matters relating to the work or the LOA or the Agreement, who at any time has been or is a legal, financial or technical advisor of Railway in relation to any matter concerning to work.

- (ii) **“Fraudulent practice”** means a misrepresentation or Omission of facts or suppression of facts or disclosure of incomplete facts, in order to influence the Tendering process;
- (iii) **“Coercive Practice”** means impairing or harming, or threatening to impair or harm, directly or indirectly, any person or property to influence any person’s participation or action in the Tendering process;
- (iv) **“Undesirable Practice”** means establishing contract with any person connected with or employed or engaged by Railway and/ or the Ministry of Railways and / or any Ministry or Department, Authority or body whether statutory or non-statutory that may be concerned or connected, in any manner whatsoever, with this work, with the objective of canvassing, lobbying, seeking intervention in or in any manner influencing or attempting to influence the Tendering process; or having a conflicted of interest; and
- (v) **“Restrictive Practice”** means forming a cartel or arriving at any understanding or arrangement among Tenderers with the objective of restricting or manipulating a full and fair completion in the Tendering process.

3.11 Confidentiality: Information relating to the examination, clarification, evolution and recommendation for the Tenderer shall not be disclosed to any person, who is not officially concerned with the process or is not retained professional advisor Advising Railway, in relation to, or matter arising out of, or concerning the Tendering process. Railway will treat all information submitted as part of the Tender, in confidence and will require all those who have access to such material to treat the same in confidence. Railway may not divulge any such information unless it is directed to do so by a Court of Law and/ or any statutory entity that has the power under Law to require its disclosure.

3.12 Employment/Partnership etc. of Retired Railway Employee:

(a) Should a tenderer

- i) be a retired Engineer of the gazetted rank or any other gazetted officer working before his retirement, whether in the executive or administrative capacity or whether holding a pensionable post or not, in the Engineering or any other department of any of the railways owned and administered by the President of India for the time being, OR
- ii) being partnership firm / joint venture (JV) / registered society / registered trust etc. have as one of its partners/members a retired Engineer of the gazetted rank or any other gazetted officer working before his retirement, OR
- iii) being an incorporated company have any such retired Engineer of the gazetted rank or any other gazetted officer working before his retirement as one of its directors

AND

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

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

(b) In case, upon successful award of contract, should a tenderer depute for execution of the works under or to deal matters related with this contract, any retired Engineer of gazetted rank or retired gazetted officer working before his retirement in the Engineering or any other department of any of the railways owned and administered by the President of India for the time being, and now in his employment, then the tenderer will ensure that retired Engineer or retired gazetted officer had retired from government service at least 1 year prior to the date of his employment with tenderer and in case he had retired from service within a year then he possesses the requisite permission from the President of India or any officer, duly authorized by him in this behalf, to get associated with the tenderer.

(c) Should a tenderer or Contractor being an individual, have member(s) of his family or in the case of partnership firm/ company / joint venture (JV) / registered society / registered trust etc. one or more of his partner(s)/shareholder(s) or member(s) of the family of partner(s)/shareholder(s) having share of more than 1% in the tendering entity employed in gazetted capacity in the Engineering or any other department of the railway, then the tenderer at the time of submission of tender, will inform the authority inviting tenders the details of such persons.

Note: If information as required as per 16. (a), (b), (c) above has not been furnished, contract is liable to be dealt in accordance with provision of clause 62 of Standard General Condition of contract.

3.13 Miscellaneous: The Tendering process shall be governed by and construed in accordance with the Laws of India and the Courts at Moradabad shall have exclusive jurisdiction over all disputes arising under pursuant to and/ or in connection with the Tendering process.

Railway in its sole discretion and without incurring any obligation or liability reserves the right at any time to;

- (i) Suspend or cancel the Tendering process and /or amend and/ or Supplement the Tendering process or modify the dates or other terms & condition relating thereto;
- (ii) Consult with any Tenderer in order to receive clarifications or further information;

- (iii) Retain any information and /or evidence submitted to Railway by, on behalf of, and/ or in relation to any Tenderer, and / or.
- (iv) Independently verify, disqualify, reject and/ or accept any and all submission or other information and/ or evidence submitted by or on behalf of any Tenderer.
- 3.13.1** No Tenderer should tender for the work for speculative purposes. Once the Tender Documents is submitted, no change shall be permitted in the equity participation in the work of the Tenderer or Member of the firm except as expressly otherwise provided in the Tender Documents. Any breach of this condition shall lead to rejection of the Tender and /or termination of Agreement.
- 3.13.2** No assignment, Sale, Transfer, Conveyance of the work shall be permitted except as otherwise expressly provided in the Tender Documents. Any breach of this condition shall lead to rejection of the Tender and /or termination of Agreement.
- 3.13.3** For the sake of clarity, the Tenderer (s) may note that in case there are any obligation (s) or condition (s) imposed on them under a particular clause of any part of the Tender Documents, which includes the forms, and on a similar issue some additional conditions are mentioned under another clause of any other part of the Tender Documents, which includes the forms, then all the conditions and/ or obligations should be read in conjunction with each other and all of them have to be fulfilled.
- 3.13.4** It shall be deemed that by submitting the Tender, the Tenderer agrees and releases Railway, its employees, agents, consultants and advisers, irrevocably, unconditionally, fully and finally from any and all liability for claims, losses, damages, costs, expenses or liabilities in any way related to or arising from the exercise of any rights and/ or performance of any obligations hereunder, pursuant hereto and/ or in connection herewith and waives any and all right and/ or claims it may have in their respect, whether actual or contingent, whether present or future. No claim of any nature and to any extent whatsoever shall be made by any Tenderer against Railway, its employees, agents, consultants and advisers.
- 3.13.5** The Tender Documents including all attached documents are and shall remain the property of Railway and are transmitted to the Tenderer solely for the purpose of preparation and submission of the Tender in accordance herewith. Tenderer are to treat all information as strictly confidential and shall not use it for any purpose other than for the preparation and submission of their Tenders. Railway will not return any Tender or any information provided to it by the Tenderers.
- 3.14 Preparation & Submission of Document:** The Tenderer will be deemed to visit the site and inspected the same to acquaint itself about all the existing site conditions, Laws and regulations before submitting his/their Tender. Once the Tender is submitted no Tenderer will be permitted to withdraw his/their Tender on the ground of any alleged defect in the site or its conditions. All the contents of the Tender should be typed or hand written in indelible blue ink and signed by Tenderer/authorized signatory of the Tenderer who shall also initial each page in blue ink. The Tenderer requirement in the Tender, for authorizing the signatory to commit the Tenderer. The power of attorney must include the specimen signature of the authorized signatory duly attested by authorized person under applicable laws.
- 3.15 Credential/ Approved list of contractors:**
- 3.15.1** Works of construction and of supply of material shall be entrusted for execution to contractors whose capabilities and financial status have been investigated and approved to the satisfaction of the Railway. A list of approved contractors may also be maintained by the Railway. The said list be revised periodically once in a year or so by giving wide publicity through advertisements etc.
- For registration, the contractor including a contractor who is already on the approved list shall apply to the concerned General Manager (Construction) / Chief Administrative Officer (Construction) / Principal Chief Engineer / Principal Chief Signal & Telecommunication Engineer / Principal Chief Mechanical Engineer / Principal Chief Electrical Engineer/ Divisional Railway Manager, furnishing particulars regarding:

- (a) his position as an independent contractor specifying engineering organization available with details of partners / staff / engineers employed with qualifications and experience;
 - (b) his capacity to undertake and carry out works satisfactorily as vouched for by a responsible official or firm; details about the transport equipments, construction tools and plants etc. required for the work, maintained by him;
 - (c) his previous experience of works similar to that to be contracted for, in proof of which original certificates or testimonials may be called for and their genuineness verified, if needs be, by reference to the signatories thereof;
 - (d) his knowledge from actual personal investigation of the resources of the area/zone or zones in which he offers to work;
 - (e) his ability to supervise the work personally or by competent and duly authorized agent;
 - (f) his financial position;
- 3.15.2** An applicant shall clearly state the categories of works and the Area / Zone / Division(s) / District(s) in which he desires registration in the list of approved contractors.
- 3.15.3** The selection of contractors for enlistment in the approved list would be done by a committee for different value slabs as notified by Railway.
- 3.15.4** An annual fee as prescribed by the Railway from time to time would be charged from such approved contractors to cover the cost of sending notices to them and clerkage for tenders etc. Notices shall be sent to them on registered e-mail address and registered postal address.
- 3.15.5** The list of approved contractors would be treated as confidential office record.

3.16 Tenderer's Credentials:

Documents testifying tenderer's previous experience and financial status should be produced along with the tender. Tenderer (s) who is/are not borne on the approved list of the Contractors of Northern Railway shall submit along with his/their tender.

- (i) Certificates and testimonials regarding contracting experience for the type of job for which tender is invited with list of works carried out in the past.
- (ii) Certificates which may be an attested Certificate from the client, Audited Balance Sheet duly certified by the Chartered Accountant regarding contractual payments received in the past.
- (iii) The list of personnel / organization on hand and proposed to be engaged for the tendered work (**Annexure-X**). Similarly list of Plant & Machinery available on hand and proposed to be inducted and hired for the tendered work (**Annexure-IX**).
- (iv) A copy of **Certificate** stating that they are not liable to be disqualified and all their statements/documents submitted along with bid are true and factual. Standard format of certificate to be submitted by the bidder is enclosed as **Annexure-V**. In addition to Annexure-V, in case of other than Company / Proprietorship Firm, **Annexure-V(A)** shall also be submitted by each member of a Partnership Firm / Joint Venture (JV) / Hindu Undivided Family (HUF) / Limited Liability Partnership (LLP) etc., as the case may be. **Non submission** of copy of certificate(s) by the bidder shall result in **Summarily Rejection** of his/their bid. It shall be mandatorily incumbent upon the tenderer to identify, state and submit the supporting documents duly self-attested/digitally signed by which they / he is qualifying the Qualifying Criteria mentioned in the Tender Document.

NOTE:

- 1. Submission of copy of certificate as per **Annexure-V is not mandatory** if the bidder has **confirmed and certified the same online** at the time of submission of bids.
- 2. Submission of copy of certificate as per **Annexure-V(A) is mandatory** for each member of a Partnership Firm/ Joint Venture (JV)/ Hindu Undivided Family (HUF)/ Limited Liability Partnership (LLP) etc., as the case may be.

- (v) The Railway reserves the right to verify all statements, information and documents submitted by bidder in each tender offer and the bidder shall when so required by the railway make available all such information, evidence and documents as may be necessary for such verification. Any such verification or lack of such verification, by the railway shall not relieve the bidder of its obligation and liabilities hereunder nor will it affect any rights of the railway there under.
- a. In case of any information submitted by tenderer is found to be false forged or incorrect at any time during process of evaluation of tenders, it shall lead to forfeiture of the tender Bid Security besides banning of business for a period of up to two years.
- b. In case of any information submitted by tenderer is found to be false forged or incorrect after the award of contract, the contract shall be terminated. Bid Security, Performance Guarantee and Security Deposit available with railway shall be forfeited. In addition, other dues of contractor, if any under this contract shall be forfeited and agency shall be banned for doing business for a period of up to two years.

Note: Non-compliance any of the conditions set forth therein above is liable to result in the tender being reject.

4.0 Consideration of Tenders: For 'Similar Nature of Work' In case a work is started prior to 07 (seven) years, ending last day of month previous to the one in which tender is invited, but completed in last 07 (seven) years, ending last day of month previous to the one in which tender is invited, the completed work shall be considered for fulfillment of credentials.

4.1 Right of Railway to Deal with Tender: Notwithstanding anything contained in Tender Document. Railway Administration reserves the right to accept or reject any tender and to annul the Tendering process, and reject all Tenders at any time during Tendering process, without thereby any liability to the affected Tenderer (s) or any obligation to inform the affected Tenderer (s) for Railway action. In the event Railway reject or annuls all the Tender (s), it may at its discretion to invite fresh Tender.

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

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

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

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

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

- 4.1 B Pre-Bid Conference:** Intenders having advertised value more than Rs 50 Crore or as mentioned in the tender document, Railway shall conduct Pre-Bid Conference(s) with the prospective bidders.
- 4.1 C Make in India Policy:** Provisions of Make in India Policy 2017 issued by Govt. of India, as amended from time to time, shall be followed for consideration of tenders.
- 4.1 D Permission to Bid for a bidder from a country which shares Land boundary with India:** Any bidder from the countries sharing a land border with India will be eligible to bid in any procurement of works (including turnkey projects) only if the bidder is registered with the Competent Authority. The Competent Authority for registration will be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT), Government of India. For interpretation of this para, Department of Expenditure, Ministry of Finance, Government of India letter F.No.6/18/2019-PPD dated 23/07/2020 shall be referred.
- 4.1 E Clarification of Bids:** To assist in the examination, evaluation & comparison and pre-qualification of the Tender, the Railway may, at its discretion, ask any Bidder for a clarification of its Bid. Any clarification submitted by a Bidder that is not in response to a request by the Railway shall not be entertained or considered. The Railway request for clarification and the response of the bidder in this regard shall be in writing.
However, if a Bidder does not provide clarification of its bid by the date and time communicated in the Railway request for clarification, the bid shall be evaluated as per the documents submitted along with the bid.
- 4.1 F** However, in case of tender more than Rs.10 crore two packet system of tender is to be adopted.
- 4.1 G** (i) Tenderer(s) shall upload two files/packets. File-I/Packet-I and File-II/Packet-II.
(ii) File-I/packet-I shall contain Technical Cum Commercial bid and all necessary documents regarding constitution of the firm and other requisite documents/credentials.
- 4.2 Opening of Tender:** E- tenders are opened after closing date and time of submission online bids on website www.ireps.gov.in through Digital Signature Certificate/Encryption Certificate of concern Authorized Officer of Railways on specified date and time. However, if date of tender opening is declared as Holiday, the tender will be opened at the same time on next working day.
- 4.3 Conditional offer and Alternative proposal by Tenderer:** Tenderers shall submit offers that fully comply with the requirements of the Tender documents including the conditions of contract, design and specification requirements if any. **Conditional offer or alternative offers will not be considered in tender evaluation and will be summarily rejected.** The Tenderer shall have no claims in this regard whatsoever.
“Any unconditional rebate offered by the tenderer should be mentioned on of “Bill(s) of Quantities” specifically. To attract the rebate mentioned each page of schedule may refer the note for the conditional rebate mentioned in the end. Any rebate mentioned at any other place in tender document shall not be considered. The unconditional rebate mentioned in “Bill(s) of Quantities” shall be considered while evaluation of bid.”
- 4.4. Withdrawal of Offer:** No Tender offer can be withdrawn in the interval between the after due date & time of submission and expiration of the Tender validity period. Withdrawal of offer during this period shall result in forfeiture of Tenderer **Bid Security** in terms of Para 1242 of Engineering code Reprint 2012.
- 4.5 Omission, Discrepancies & Clarification:**
Should a tenderer find discrepancies in or omissions from the drawings or any of the Tender Forms or should he be in doubt as to their meaning, he should at once notify the authority inviting tenders. The tender inviting authority may, if deemed necessary, clarify the same to all tenderers. It shall be understood that every endeavor has been made to avoid any error which can materially affect the basis of tender and successful tenderer shall take upon himself and provide for the risk

of any error which may subsequently be discovered and shall make no subsequent claim on account thereof.

- 4.6 Evaluation of Tender/ Bids:** Eligibility proposals that are found to be responsive will be evaluated by Railway to check whether he/they meet the Eligibility Criteria as laid down in section 4.5 (Tender form 4) of tender document. Thereafter declaration about not having conflict of interest, that Tender does not contain any condition and other relevant documents attached with Tender Document may be verified by Railway. To facilitate evaluation Railway may at its sole discretion, seek clarifications in writing from any Tenderer on the attached documents in the format as considered appropriate by Railway. Notwithstanding anything to the contrary contained in the Tender Documents. Railway may, at its sole discretion, waive any minor infirmity, non-conformity or irregularity in a Tender Document that does not constitute a material deviation and that does not prejudice or affect the relative position of any Tenderer, provided it confirms to all the terms, condition of Tender Documents without any material deviation, objection, conditionality or reservations.

"No post tender correspondence for submission of additional documents shall be entertained after opening of the Technical & Commercial offers. Even suo-moto post tender letters of the tenders shall be treated as NULL & Void."

5.0 Contract Document:

- 5.1 Execution of Contract Document:** The Tenderer whose tender is accepted shall be required to appear in person at the office of General Manager/General Manager (Construction), Chief Administrative Officer (Construction), Divisional Railway Manager or concerned Engineer, as the case may be, or if tenderer is a firm or corporation, a duly authorized representative shall appear (there would be no need for appear in person if agreement is signed digitally) and execute the contract agreement within seven days of notice from Railways that the Contract Agreement is ready. The Contract Agreement shall be entered into by Railway only after submission of valid Performance Guarantee by the Contractor. Failure to do so shall constitute a breach of the agreement affected by the acceptance of the tender. In such cases the Railway may determine that such tenderer has abandoned the contract and there upon his tender and acceptance thereof shall be treated as cancelled and the Railway shall be entitled to forfeit the full amount of Bid Security and other dues payable to the Contractor under this contract. The failed Contractor shall be debarred from participating in the re-tender for that work.

5.1 (A) Security Deposit:

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

Balance of Security Deposit may be deposited by the Contractor in cash or Term Deposit Receipt issued from Scheduled commercial bank of India or irrevocable Bank Guarantee bond issued from Scheduled commercial bank of India, or may be recovered at the rate of 6% of the bill amount till the full Security Deposit is recovered. Provided also that in case of defaulting Contractor, the Railway may retain any amount due for payment to the Contractor on the pending "on account bills" so that the amounts so retained (including amount guaranteed through Performance Guarantee) may not exceed 10% of the total value of the contract.

The Irrevocable Bank Guarantee submitted towards Security deposit shall be initially valid up to the stipulated date of Maintenance period plus 60 days and shall be extended from time to time,

depending upon extension of contract granted in terms of Clause 17A and 17B of the Standard General Conditions of Contract.

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

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

- (a) Final Payment of the Contract as per clause 51(1) of Part-II of GCC-2022 and
- (b) Execution of Final Supplementary Agreement or Certification by Engineer that Railway has No Claim on Contractor and
- (c) Maintenance Certificate issued, on expiry of the maintenance period as per clause 50(1) of Part-II of GCC-2022, in case applicable. **Maintenance period** for this work is **12 months**.

(ii) Forfeiture of Security Deposit: Whenever the contract is rescinded as a whole under clause 62(1) of Part-II GCC-2022, the Security Deposit already with railways under the contract shall be forfeited. However, in case the contract is rescinded in part or parts under clause 62(1) of GCC, the Security Deposit shall not be forfeited.

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

5.1 (B) Performance Guarantee

The procedure for obtaining Performance Guarantee is outlined below:

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

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

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

- (b)** The successful bidder shall submit the Performance Guarantee (PG) amounting to 5% of the original contract value and Additional Performance guarantee as per clause 5.1 (B)(h) in any of the following forms:-

- (i) A deposit of Cash;
- (ii) Irrevocable Bank Guarantee;
- (iii) Insurance Surety Bond as per Annexure-XXVII;

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

Bond.

- (iv) Government Securities including State Loan Bonds at 5% below the market value;
- (v) Pay Orders and Demand Drafts tendered by any Scheduled Commercial Bank of India;
- (vi) Guarantee Bonds executed or Deposits Receipts tendered by all Scheduled Commercial Bank of India;
- (vii) Deposit in the Post Office Saving Bank;
- (viii) Deposit in the National Savings Certificates;
- (ix) Twelve years National Defence Certificates;
- (x) Ten years Defence Deposits;
- (xi) National Defence Bonds and
- (xii) Unit Trust Certificates at 5% below market value or at the face value whichever is less.

Also, FDR in favour of **Sr. DFM N.R. Moradabad** (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 up to the stipulated date of completion plus 60 days beyond that. In case, the time for completion of work gets extended, the Contractor shall get the validity of P.G. extended to cover such extended time for completion of work plus 60 days.
- (d) The value of PG to be submitted by the Contractor is based on original contract value and shall not change due to subsequent variation(s) in the original contract value.
- (e) The Performance Guarantee (PG) shall be **released after physical completion of the work** based on 'Completion Certificate' issued by the competent authority stating that the Contractor has completed the work in all respects satisfactorily.
- (f) Whenever the contract is rescinded, the Performance Guarantee already submitted for the contract shall be encashed in addition to forfeiture of Security Deposit available with railway.
- (g) The Engineer shall not make a claim under the Performance Guarantee except for amounts to which the President of India is entitled under the contract (not withstanding and/or without prejudice to any other provisions in the contract agreement) in the event of:
 - i. Failure by the Contractor to extend the validity of the Performance Guarantee as described herein above, in which event the Engineer may claim the full amount of the Performance Guarantee.
 - ii. Failure by the Contractor to pay President of India any amount due, either as agreed by the Contractor or determined under any of the Clauses/Conditions of the Agreement, within 30 days of the service of notice to this effect by Engineer.
 - iii. The Contract being determined or rescinded under clause 62 of Part-II of the GCC-2022.
 - iv. The format of Performance Guarantee is at Annexure-XXV.
- (h) If a tender is accepted on the quoted rates of bidder which is below the advertised tender value, an additional performance security shall be submitted by the bidder as below:

Bid quoted in % of Advertised Cost	Additional Performance Guarantee (%)
Below 0 to 5% (inclusive)	NIL
Below 5%	5%

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

- (a) For Zone contracts, awarded on the basis of the percentage above or below the applicable chapter(s) of Standard Schedule of Rates (SSOR) for the whole or part of financial year, the

contract agreement required to be executed by the tenderer whose tender is accepted shall be as per specimen form, **Annexure-II**. During the currency of the Zone Contract, work orders as per specimen form **Annexure-III**, for works not exceeding ₹ 5,00,000 each, shall be issued by the Divisional Railway Manager / Executive Engineer under the agreement for Zone Contract.

- (b) For contracts for specific works, the contract document required to be executed by the tenderer whose tender is accepted shall be an agreement as per specimen form **Annexure-IV**.

5.3 Applicable charges/recoveries/Advance etc.: Please refer to **Annexure-XIII** of Tender Document.

5.4 Special Conditions of Contract for mandatory updating of Labour data on Railway's Shramik Kalyan portal by Contractor.

The special conditions are as under:

- A.** Contractor is to abide by the provisions of Payment of Wages act & Minimum Wages Act in terms of clause 54 and 55 of Indian Railways General Conditions of Contract. In order to ensure the same, an application has been developed and hosted on website <https://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/updating of Portal shall be done as under:
- Contractor shall apply onetime registration of his company/firm etc. in the Shramik Kalyan portal with requisite details subsequent to issue of Letter of Acceptance. Engineer shall approve the contractor's registration on the portal within 7 days of receipt of such request.
 - 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.
 - The contractor once registered on the portal, shall provide details of his Letter of Acceptances (LoA)/Contract Agreements on Shramik Kalyan 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.
 - 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 them on Shramik Kalyan portal on monthly basis.
 - 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.
- B.** 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 Shramik Kalyan portal at '<https://shramikkalyan.indianrailways.gov.in/>' till _____ Month _____ Year."
- (Railway Board's letter No. 2018/CE-I/CT/4 dated 17.10.2018).**

5.5 Force Majeure Clause: If at any time, during the continuance of this contract, the performance in whole or in part by either party of any obligation under this contract shall be prevented or delayed by reason of any war, hostility, acts of public enemy, civil commotion, sabotage, serious loss or damage by fire, explosions, epidemics/pandemics, strikes, lockouts or acts of God (hereinafter, referred to events) provided, notice of the happening of any such event is given by either party to the other within 30 days from the date of occurrence thereof, neither party shall by reason of such event, be entitled to terminate this contract nor shall either party have any claim for damages against the other in respect of such non-performance or delay in performance, and works under the contract shall be resumed as soon as practicable after such event has come to

an end or ceased to exist, and the decision of the Engineer as to whether the works have been so resumed or not shall be final and conclusive, PROVIDED FURTHER that if the performance in whole or in part of any obligation under this contract is prevented or delayed by reason of any such event for a period exceeding 120 days, either party may at its option terminate the contract by giving notice to the other party

5.5A Extension of Time in Contracts: Subject to any requirement in the contract as to completion of any portion or portions of the works before completion of the whole, the Contractor shall fully and finally complete the whole of the works comprised in the contract (with such modifications as may be directed under conditions of this contract) by the date entered in the contract or extended date in terms of the following clauses:

- (i) **Extension due to Modification:** If any modifications have been ordered which in the opinion of the Engineer have materially increased the magnitude of the work, then such extension of the contracted date of completion may be granted as shall appear to the Engineer to be reasonable in the circumstances, provided moreover that the Contractor shall be responsible for requesting such extension of the date as may be considered necessary as soon as the cause thereof shall arise.
- (ii) **Extension for Delay not due to Railway or Contractor:** If in the opinion of the Engineer, the progress of work has any time been delayed by any act or neglect of Railway's employees or by other Contractor employed by the Railway under Sub-Clause (4) of Clause 20 of GCC or in executing the work not forming part of the contract but on which Contractor's performance necessarily depends or by reason of proceeding taken or threatened by or dispute with adjoining or to neighboring owners or public authority arising otherwise through the Contractor's own default etc. or by the delay authorized by the Engineer pending arbitration or in consequences of the Contractor not having received in due time necessary instructions from the Railway for which he shall have specially applied in writing to the Engineer or his authorized representative then upon happening of any such event causing delay, the Contractor shall immediately give notice thereof in writing to the Engineer within 15 days of such happening, but shall nevertheless make constantly his best endeavours to bring down or make good the delay and shall do all that may be reasonably required of him to the satisfaction of the Engineer to proceed with the works. The Contractor may also indicate the period for which the work is likely to be delayed and shall be bound to ask for necessary extension of time.
- (iii) **Extension for Delay due to Railways:** In the event of any failure or delay by the Railway to hand over the Contractor possession of the lands necessary for the execution of the works or to give the necessary notice to commence the works or to provide the necessary drawings or instructions or any other delay caused by the Railway due to any other cause whatsoever, then such failure or delay shall in no way affect or vitiate the contract or alter the character thereof or entitle the Contractor to damages or compensation therefor, but in any such case, the Railway may grant such extension or extensions of the completion date as may be considered reasonable.

The Contractor shall indicate the period for which the work is likely to be delayed and shall seek extension of time as may be considered necessary under clause 5.5A(i) or/and 5.5A(ii) or/ and 5.5A(iii) above, as soon as the cause thereof shall arise and, in any case, not less than **15 days** before the expiry of the date fixed for completion of the works. The Engineer shall consider the same and shall grant and communicate such extension of time as in his opinion is reasonable having regard to the nature and period of delay and the type and quantum of work affected thereby. No other compensation shall be payable for works so carried forward to the extended period of time; the same rates, terms and conditions of contract being applicable, as if such extended period of time was originally provided in the original contract itself.

The non-submission of request for extension or submission of request within less than **15 days** before the expiry of the date fixed for completion of the works, shall make him ineligible for extension under these sub clauses, subject to final decision of Engineer.

5.5B Extension of Time with Liquidated Damages (LD) for delay due to Contractor:

The time for the execution of the work or part of the works specified in the contract documents shall be deemed to be the essence of the contract and the works must be completed not later than the date(s) as specified in the contract. If the Contractor fails to complete the works within the time as specified in the contract for the reasons other than the reasons specified in Clause 1.1.49 and 1.1.49(A), the Railway may, if satisfied that the works can be completed by the Contractor within reasonable short time thereafter, allow the Contractor for further extension of time (Proforma at **Annexure-XIV**) as the Engineer may decide. On such extension the Railway will be entitled without prejudice to any other right and remedy available on that behalf, to recover from the Contractor as agreed damages and not by way of penalty for each week or part of the week, a sum calculated at the rate of Liquidity Damages as decided by Engineer, **between 0.05% to 0.30% of contract value** of the works for each week or part of the week.

For the purpose of this Clause, the contract value of the works shall be taken as value of work as per contract agreement including any supplementary work order/contract agreement issued. Provided also, that the total amount of liquidated damages under this condition shall not exceed 5% of the contract value or of the total value of the item or groups of items of work for which a separate distinct completion period is specified in the contract.

Provided further, that if the Railway is not satisfied that the works can be completed by the Contractor and in the event of failure on the part of the contractor to complete the work within further extension of time allowed as aforesaid, the Railway shall be entitled without prejudice to any other right or remedy available in that behalf, to appropriate the contractor's Security Deposit and rescind the contract under Clause 62 of PART-II of GCC , whether or not actual damage is caused by such default.

NOTE: In a contract, where extension(s) of time have been allowed once under clause 5.5B, further request(s) for extension of time under clause 5.5A can also be considered under exceptional circumstances. Such extension(s) of time under clause 5.5A shall be without any Liquidated damages, but the Liquidated damages already recovered during extension(s) of time granted previously under clause 5.5B shall not be waived. However, Price variation during such extension(s) shall be dealt as applicable for extension(s) of time under clause 5.5B.

5.5C Bonus for Early Completion of Work: In open tenders having advertised value more than Rs 50 crore and original period of completion 12 months or more, when there is no reduction in original scope of work by more than 10%, and no extension granted on either railway or Contractor's account, Contractor shall be entitled for a bonus of 1% for each 30 days early completion of work. The period of less than 30 days shall be ignored while working out bonus. The maximum bonus shall be limited to 5% of original contract value. The completion date shall be reckoned as the date of issuance of completion certificate by engineer.

6.0 Applicability of PART-II of GCC-2022:

"All Standard General Condition of Contract for use in connection with works contract will strictly be applied as per Part-II of Indian Railway Standard Conditions of contract (GCC-2022) i.e., Para 1 to 64.(8) along with Annexures"

STANDARD GENERAL CONDITIONS OF CONTRACT
Standard Bid Conditions of Contract Part-II will be applicable on the SBD. # Content of the same may be downloaded from Railway Board's website - www.indianrailways.gov.in/railwayboard

Annexure-I

SECTION 3: SCOPE OF WORK AND TENDER DRAWINGS

1.	Scope of Work	TRD work i.c.w. interlocking of LC gates with TUV>20000 over Moradabad Division
2.	Location of Work	Over various level crossing gates over Moradabad Division. See Clause 3.2 Section C (Particular Specifications) of PART-II of Tender Document.
3.	Approximate Cost	₹ 1,69,25,435.10/- (incl GST @18 %)
4.	TRD Estimate Nos.	88, 164 of 2025-26 of Sr. DEE/TRD/MB
5.	Allocation	SF (26297103)
6.	Period of completion	9 months
7.	Definition of Similar Nature of Work to be considered for the above work	Supply, erection, testing & commissioning of 25kV/240V, 5 kVA, 10 kVA & above LT supply transformer, or Design, supply, erection, testing & commissioning of 50 Hz, single phase 25 kV AC OHE, or Design, supply, erection, testing & commissioning of 66 kV or higher voltage 3-phase grid substation, or Design, supply, erection, testing & commissioning of 50 Hz, single phase, 25 kV switching station (SP, SSP).
8.	Cost of work similar in nature to be considered for this Tender Rs.....Lacs	The tenderer must have successfully completed any of the following during last 07 (seven) years, ending last day of month previous to the one in which tender is invited: Three similar works each costing not less than the amount equal to 30% of advertised value of the tender, or Two similar works each costing not less than the amount equal to 40% of advertised value of the tender, or One similar work each costing not less than the amount equal to 60% of advertised value of the tender.
9.	Drawings and sketches duly approved by CA for the Tender	As per plan available with Divisional Office and with site Engineer.

SECTION 4.1: Check List as given in Annexure-XXI.

SECTION 4.2: COVER LETTER

TENDER FORM-1

(To be submitted by Tenderer on its letter head)

Tender No.: T-02-TRD-MB-26-27

Name of Work: TRD work i.c.w. interlocking of LC gates with TUV>20000 over Moradabad Division

The President of India

Acting through the Sr. Divisional Electrical Engineer/TRD, Northern Railway, Moradabad

1. I/We _____ have read the various conditions to tender attached hereto and agree to abide by the said conditions. I/We also agree to keep this offer open for acceptance for a period of **60 days** from the date fixed for closing of the tender and in default thereof, I/We will be liable for forfeiture of my/our "Bid Security". I/We offer to do the work for **Northern Railway**, at the rates quoted in the attached bill(s) of quantities and hereby bind myself/ourselves to complete the work in all respects within **9 months** from the date of issue of letter of acceptance of the tender.

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

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

(a) I/We do not submit the Performance Guarantee within the time specified in the Tender document;

(b) I/We do not execute the contract documents within seven days after receipt of notice issued by the Railway that such documents are ready; and

(c) I/We do not commence the work within fifteen days after receipt of orders to that effect.

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

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

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

Signature of Tenderer(s)

Date _____

Address of the Tenderer(s)

ANNEXURE - I (Contd. ...)

TENDER FORM-2

SECTION 4.3: General information of the Tenderer

S.N.	Item Description	Item Details	Page No.
1.	Name of the Tenderer		
2.	Constitution of Tenderer ¹ (Tick as applicable)	Sole Proprietor /Partnership Firm/ Pvt. Ltd Co./Public Ltd. Co./ JV/ Society /..... (any other)	
3.	Act under which Tenderer is Registered	Company Act, Firm & Societies Act, Co- operative Societies Act, Income-tax Act, /..... (any other) etc.	
4.	Registration details ²		
5.	PAN No. ²		
6.	GSTIN No. ²		
7.	Registered Address		
8.	Communication Address along with Telephone, Fax and Email address		
9.	In case of Joint Venture (JV), MoU and other details ³		
10.	Details of Bank account on which payment shall be released		
a	Name of Bank, branch with IFS code		
b	Account type, Account No.		
c	MICR No.		
d	Partners of accounts in the bank ⁴		

Superscript Notes:

1. Please submit the supporting documents demonstrating the status of Applicant / Tenderer as legal person corresponding to its constitution like certificate of incorporation along with Memorandum and Article of Association in case of Pvt./Public Ltd. Co., copy of partnership deed, Affidavit in case of sole proprietor etc. as the case may be.
2. Please submit the copy of the registration certificate as applicable, PAN card, GSTIN certificate should be enclosed.
3. In case of Joint Venture, details as per **Annexure-VIII** need to be submitted. JV firms are not allowed to participate in the works costing less than or equal to **Rs. 10 Crores. (Railway Board letter no: 2002/CE-I/CT/37 JV Pt. VIII Dated: 14.12.2012.)**

Details of all the partners of the subject bank account need to be disclosed by the Tenderer on its letter head under the signature of person who is authorized to operate the subject bank account.

TENDER FORM-3

SECTION 4.4: POWER OF ATTORNEY

POWER OF ATTORNEY FORMAT FOR AUTHORISED SIGNATORY.

(To be executed on non-judicial stamp paper of the appropriate value in accordance with Stamp Duty Act. The stamp paper should be in the name of the Firm / Company who is issuing the Power of Attorney in favour of Authorized Signatory).

POWER OF ATTORNEY

Know all men by these present, we do hereby constitute, appoint and authorize Mr./Ms..... who is presently employed with us and holding the position of as our attorney, to do in our name and on our behalf, all such acts, deeds and things necessary in connection with or incidental to our bid for the work of **"TRD work i.c.w. interlocking of LC gates with TUV>20000 over Moradabad Division"** including signing and submission of all documents and providing information/ responses to Northern Railway representing us in all matters, dealing with Northern Railway in all matters in connection with our Tender for the said work.

We hereby agree to ratify all acts, deeds and things lawfully done by our said attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid attorney shall and shall always be deemed to have been done by us.

Dated this. day of 20

Place:

(Signature.....)

Name & Designation in Block letters of
Person authorized to sign Power of Attorney
for and on behalf of the Applicant Tenderer)

Common Seal of Company

I accept.

(Signature of Authorized Signatory)

Name and Designation of AS

Notes:

1. The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure.
2. Please refer to Para 14, 15 & 18 of GCC Part-I for requirement of the Documents to be submitted in different cases of Tenderer being Sole Proprietor, Partnership, Private / Public Limited Company etc.
3. The obligations to Railway will not be affected by changes in the composition of the firm made subsequent to the opening of the tender / execution of the contract and / or grant of Revised Power of Attorney, if any, by the tenderer. However, changes in composition of the Firm and / or Revised POA should be promptly advised in writing to the Tender Issuing Authority / Contract Signing Authority as the case may be.

Witness 1:

Signature.....

Name.....

(In Capital)

Address.....

Witness 2:

Signature

Name

(In Capital)

Address.....

TENDER FORM -4A

SECTION 4.5: DETAILS OF WORKS COMPLETED or SUBSTANTIALLY IN LAST 7 FINANCIAL YEARS i.e.,ONWARDS TO ADJUDGE TECHNICAL ELIGIBILITY

(All figures in Rs Lacs)

SN	Name of the Work ¹	Final cost of Completed work	Actual Date of Completion	Name & Nature of the Firm ²	Completion Certificate ³ at Page	Percentage of the ⁴ Tenderer	Amount for Technical eligibility
	1	2	3	4	5	6	7= 6x2
1.							
2.							
Total							

Superscript Notes:

- (i) The tenderer must have successfully completed or substantially completed any of the following during last 07 (seven) years, ending last day of month previous to the one in which tender is invited.
 - Three similar works** costing not less than the amount equal to **30%** of advertised value of tender, or
 - Two similar works** costing not less than the amount equal to **40%** of advertised value of tender, or
 - One Similar work** costing not less than the amount equal to **60%** of advertised value of tender.
- (ii) Letter of Acceptance issued by Competent Authority in favour of Name of the firm who had executed the work duly stating Name & cost of the Work, Original Date of Completion etc., against which the completion/Experience certificates have been attached with the tender document, must be enclosed.
- (iii) Completion Certificate issued by Competent Authority in favour of Name of the firm who had executed the work duly stating Name & Final cost of the Work, Date of Completion etc. must be attached. No printed Document like annual report etc. should be attached with Tender Document.
- (iv) Please go through the **Annexure-VIII**. If Work was executed jointly with other Firms, amount for credentials will be considered as per applicable percentage (%age).
- (v) All Documents must be submitted along with the Tender failing which the claimed credentials as above will not be considered at the time of evaluation of Tender.

TENDER FORM -4B

Please refer Annexure-VIIB and Clause 3.5.2

-DELETED-

TENDER FORM -5
SECTION 4.6: TOP SHEET For Bill(s) of Quantities

S. No.	Description of Schedule/Item	Supply	Erection	Total of Supply & Erection	Escalation (%)	Total after Escl.
A	Section 1 (GENERAL)					
1	Supply and Erection for Section 1 (GENERAL)	1984380.00	339480.00	2323860.00	154.54%	5915153.24
2	Extra on Erection for Section 1 (GENERAL)	-	159328.00	159328.00	154.54%	405553.49
	<i>Sub-total for Section 1 (GENERAL)</i>					6320706.73
B	Section 2 (CONCRETE)					
1	Supply and Erection for Section 2 (CONCRETE)	372360.00	98484.00	470844.00	249.78%	1646918.14
	<i>Sub-total for Section 2 (CONCRETE)</i>					1646918.14
C	Section 3 (FERROUS)					
1	Supply and Erection for Section 3 (FERROUS)	1983749.27	281505.94	2265255.21	186.49%	6489729.65
2	Extra on Erection for Section 3 (FERROUS)	-	140368.41	140368.41	186.49%	402141.46
	<i>Sub-total for Section 3 (FERROUS)</i>					6891871.11
D	Section 4 (NON-FERROUS)					
1	Supply and Erection for Section 4 (NON-FERROUS)	15447.00	1824.00	17271.00	223.98%	55954.59
	<i>Sub-total for Section 4 (NON-FERROUS)</i>					55954.59
E	Section 5 (INSULATORS)					
1	Supply and Erection for Section 5 (INSULATORS)	561810.81	0.00	561810.81	127.42%	1277670.14
	<i>Sub-total for Section 5 (INSULATORS)</i>					1277670.14
F	NS Items					
1	Supply and Erection for NS Items	-	-	681215.03	At Par	681215.03
2	Extra on Erection for NS Items	-	-	51099.36	At Par	51099.36
	<i>Sub-total for NS Items</i>					732314.39
	Grand Total Rs. (Incl. GST @ 18%)					16925435.10

SCHEDULE 1 SECTION 1 (GENERAL)										
IREPS Item Code	Item No.	Description	Unit	All prices are in Rs.						
				SOR Rate		Qty.		Total Prices		
				(S)	(E)	(S)	(E)	(Sup)	(Erec)	(S+E)
01011201 01011202	11(a)(ii)	Supply without Insulator and erection of a suspension (9 Tonne) Insulator	Each	713	168	60	60	42780.00	10080.00	52860.00
01011602	17(b)	Extra for special embedment of earth electrode	Each	0	679	0	60	0.00	40740.00	40740.00

01013201 01013202	27(a)	Supply, Erection, oil-filtration, testing and commissioning of L.T. supply transformers (10 kVA)	Each	27426	4572	60	60	1645560.00	274320.00	1919880.00
01013601 01013602	28	Supply without Insulator & erection of 25 kV D.O. fuse switch	Each	4934	239	60	60	296040.00	14340.00	310380.00
		Total for Section 1						1984380	339480	2323860

SCHEDULE 1 SECTION 2 (CONCRETE)										
IREPS Item Code	Item No.	Description	Unit	All prices are in Rs.						
				SOR Rate		Qty.		Total Prices		
				(S)	(E)	(S)	(E)	(Sup)	(Erec)	(S+E)
02010501 02010502	2(b)	In other than hard soil and rock (for concrete mix of M 10 and M 15 Grade in Foundation)	cum	2140	566	174	174	372360.00	98484.00	470844.00
		Total for Section 2						372360.00	98484.00	470844.00

SCHEDULE 1 SECTION 3 (FERROUS)										
IREPS Item Code	Item No.	Description	Unit	All prices are in Rs.						
				SOR Rate		Qty.		Total Prices		
				(S)	(E)	(S)	(E)	(Sup)	(Erec)	(S+E)
03010501 03010502	3(b)(iii)	Supply & Erection of special fabricated and galvanised steel structures other than Portals & traction-Masts not covered under items 3(b)(i) & 3(b)(ii).	MT	47703	3546	21.24	26.39	1013211.72	93578.94	1106790.66
03010601	3(c)	Supply only of fabricated steel other than masts	MT	66257	0	5.15	0	341223.55	0.00	341223.55

03010901 03010902	3(i)	Supply and erection of 25KV Caution Boards/Plates .	Each	131	42	57	57	7467.00	2394.00	9861.00
03013201 03013202	16(a)(i)	Supply and erection of a structure bond.	Each	528	131	182	182	96096.00	23842.00	119938.00
03013401 03013402	16(b)	Supply and erection of a longitudinal bond	Each	298	117	595	595	177310.00	69615.00	246925.00
03013501 03013502	16(c)	Supply & erection of a transverse and special bond.	Each	679	140	270	270	183330.00	37800.00	221130.00
03013601 03013602	17(a)	Supply & erection of a single earth electrode.	Each	1191	498	60	60	71460.00	29880.00	101340.00
03013701 03013702	17(c)	Supply and erection of earth bus	Metre	126	35	456	456	57456.00	15960.00	73416.00
03014301 03014302	30(b)(iii)	Supply and erection of anticlimbing device for L.T. Supply Transformer Stations.	Each	635	148	57	57	36195.00	8436.00	44631.00
		Total for Section 3						1983749.27	281505.94	2265255.21

SCHEDULE 1 SECTION 4 (NON-FERROUS)										
IREPS Item Code	Item No.	Description	Unit	All prices are in Rs.						
				SOR Rate		Qty.		Total Prices		
				(S)	(E)	(S)	(E)	(Sup)	(Erec)	(S+E)
04012901 04012902	17(d)	Supply and erection of copper strips for equipment earthing.	Metre	271	32	57	57	15447.00	1824.00	17271.00
		Total for Section 4						15447.00	1824.00	17271.00

SCHEDULE 1 SECTION 5 (INSULATORS)										
IREPS Item Code	Item No.	Description	Unit	All prices are in Rs.						
				SOR Rate		Qty.		Total Prices		
				(S)	(E)	(S)	(E)	(Sup)	(Erec)	(S+E)

06011901	11(ax)(i)	Supply of 9-Tonne Insulator for item 11(a)(i) & 11(a)(ii)- Porcelain (CD-1050 mm)	Each	1962.33	0	57	0	111852.81	0.00	111852.81
06013501	28(x)	Supply of Post insulators for item 28	Set	7894	0	57	0	449958.00	0.00	449958.00
		Total for Section 5						561810.81	0.00	561810.81

SCHEDULE 1 SECTION 1 (GENERAL)						
IREPS Item Code	Item No.	Description	Unit	All prices are in Rs.		
				SOR Rate	Qty.	Total Prices
				(E)	(E)	(Erec)
01011202	11(a) (ii)	Supply without Insulator and erection of a suspension (9 Tonne) Insulator	Each	168	32.00	5376.00
01013202	27(a)	Supply, Erection, oil- filtration, testing and commissioning of L.T. supply transformers (10 kVA)	Each	4572	32.00	146304.00
01013602	28	Supply without Insulator & erection of 25 kV D.O. fuse switch	Each	239	32.00	7648.00
		Total for Extra on erection for Section 1				159328

SCHEDULE 1 SECTION 3 (FERROUS)						
IREPS Item Code	Item No.	Description	Unit	All prices are in Rs.		
				SOR Rate	Qty.	Total Prices
				(E)	(E)	(Erec)
03010502	3(b)(iii)	Supply & Erection of special fabricated and galvanised steel structures other than Portals & traction- Masts not covered under items 3(b)(i) & 3 (b)(ii). (100% extra for work done under power block)	MT	3546	26.39	93578.94
03010502	3(b)(iii)	Supply & Erection of special fabricated and galvanised steel structures other than Portals & traction- Masts not covered under items 3(b)(i) & 3 (b)(ii). (50% extra for work done manually)	MT	1773	26.39	46789.47
		Total for Extra on erection for Section 3				140368.41

Supply and Erection of NS Items

S. No.	Item Description	Unit	Total Qty.	Unit Rate	Amount
1	Supply of copper jumper wire from AT to OHE with components.	Nos	57	8532.41	486347.37
2	Erection of copper jumper wire from AT to OHE with components.	Nos	57	896.48	51099.36
3	Supply & erection of retro-reflective Sigma caution board with mounting arrangement (as per RDSO drg. no. TI/DRG/OHE/PLTBRD/RDSO/00036/12/D & spec. no. ETI/OHE/33A (12/97) Rev 8 or latest)	Nos	57	1361.1	77582.70
4	Supply of retro reflective no. plates as per RDSO Drg. No. ETI/OHE/7503 or latest specification no. ETI/OHE/33A(12/97) or latest including acceptance test as per RDSO specification/ guidelines.	Nos	32	777.91	24893.12

5	Fixing of retro-reflective type structure no. plates as per RDSO Drg. No. ETI/OHE/P/7503 or latest and specification no. ETI/OHE/33A(12/97) or latest.	Nos	32	112.49	3599.68
6	Supply of XLPE insulated PVC sheathed Aluminium conductor cable 70 sqmm, 2 core suitable for outdoor applications 1100 volt grade armoured aluminium cable from AT to distribution box.	Metre	64	423.37	27095.68
7	Installation of XLPE insulated PVC sheathed Aluminium conductor cable 70 sqmm, 2 core suitable for outdoor applications 1100 volt grade armoured aluminium cable from AT to distribution box.	Metre	64	165.58	10597.12
Supply and Erection of NS Items					681215.03

Extra on Erection of NS Items

S. No.	Item Description	Unit	Total Qty.	Unit Rate	Amount
1	Erection of copper jumper wire from AT to OHE with components.	Nos	57	896.48	51099.36
Total for Extra on Erection of NS Items					51099.36

Note-

- 1) The quantities shown above are approximate & subject to variation according to actual requirement to Railways. No claim on this account will be entertained by Railway Administration.
- 2) The item wise break up of above schedule is attached for guidance to tenderer for estimated rates and quantity of each item involved in the work.
- 3) The contractor shall **Complete** the work **within 9 months** from issue of LOA.
- 4) If any minor item which are not specified in the scope of work/schedule of rates and required for completeness of job, shall be provided by the firm.
- 5) The tenderer will be required to visit the site at his own expenses by prior appointment with Sr. DEE/TRD/MB or his authorized representative and ascertain himself for local conditions, storage facilities, extent of work and other limitations. Railway transport or any sort of transport facility will not be provided from Railway side in connection with execution of this work.
- 6) The contractor may go through all specifications and conditions mentioned in PART-II and PART-III of Tender Documents before submitting their offer.
- 7) Competent authority reserves the right to accept/cancel/delete any item from schedule and or accept partial/full quantity of any item without giving any reason.
- 8) As per needs item may be changed anywhere in Moradabad Division with the approval of competent authority. No extra payment will be made.
- 9) The contractor will give documentary proof to show that all the spares required are genuine and having purchased from OEM.
- 10) **The advertised rates are including GST @ 18%. Bidder should quote the rates considering the rate of GST applicable.** Carefully read the Clause 3.0 'Care in submission of Tenders' of PART-I of Tender Document regarding GST.

PART-II

TECHNICAL SCOPE OF WORK

SECTION-A

2.1 CHAPTER-I

EXPLANATORY NOTES OF SCHEDULE (FOR OHE, SWS, BT STATION & LT SUPPLY TRANSFORMER STATIONS)

SCHEDULE OF PRICES

Part "A" - OHE GENERAL

2.1.1 Explanatory notes for various items of work in NIT/Tender Form-5 of PART-I of Tender Document are given below:

2.1.2 The basic quantities of components and materials required to make up a unit of work for selected items, are indicated for guidance only. There may be minor variations to suit erection but no adjustment in prices of NIT/Tender Form-5 of PART-I of Tender Document 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 of work, indicated herein, except where otherwise specified for materials supplied by the Purchaser.

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

2.1.4 In the explanatory notes given in Part-"B"- Particular of this chapter, the term "bimetallic connection" is meant to cover any connection between a copper conductor and an aluminum conductor. The clamps used for such connections shall be made of a suitable 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.

2.1.5 Special notes for measurements are included in Part-"B"- Particular of this chapter under various items, where necessary.

2.1.6 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 para.

d) **Wires and conductors** - The purchaser will supply to the contractor all wires and conductors required for the work based on unit quantities, inclusive of erection allowances in accordance with the lengths of finished wires and conductors for new items of work. Out of the quantity as calculated above, the contractors shall return to the purchaser wires and conductors in longest possible bits or in the form of scrap as calculated on the basis of final quantities of item of work of schedule and the quantities specified. The total length of finished wires and conductors deemed to have been erected will be the difference viz as calculated on the basis of the final quantities of IREPS schedule and the bare unit length specified with the lengths of finished wire and conductors for new items of work.

Notwithstanding the above, it is general condition that the contractor shall return to the purchaser all wires and conductors which have been supplied to him but not utilized on works. Should the

contractor be unable to do so, the purchaser shall be entitled to recover the cost of such wires and conductors. For the purpose of reconciliation, the length of wire or conductors deemed to have been supplied by purchaser to contractor will be the length stenciled on the drum and the length deemed to have been returned by the contractor will be the actual length of cut pieces and/or the length calculated on the basis of the actual weight of cut pieces scrap and liner density specified.

e) Other equipments, fittings and components- The purchaser will supply the requirement of the various other equipment's, components or fittings if required. If there are any shortage 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 paras if the items stated under clause 2.1.6 are made contractor supply by including the respective optional items in the contract.

Part "B" - OHE PARTICULAR
Schedule-1, Section-1 to 5

ITEM No.1(a): Preparation of designs and drawings for overhead equipment and verification of Purchaser's pegging plans.

The price shall cover verification of Purchaser's overhead equipment pegging plans indicating location of structures which will be furnished by the purchaser, in stages, and preparation of all drawings and designs required to be finalised by the Contractor. The price shall include the following:-

1. Making minor modifications with the approval of the Purchaser to the layout of the structures and overhead equipment, if necessary, and submission of overhead equipment layout plans, including stagger, location of cut in insulators etc.
2. Preparation of cross section drawings and structure erection drawings for each structure locations.
3. Choice of type and size of foundations to suit soil and loading conditions, except for the ones which are considered as "Works under other Agencies".
4. Preparation of long section drawings of overhead equipment where such drawings are required including detailed study of overline structures such as foot over bridges, road over bridges etc. for maintaining the specified height of contact wire and requisite clearances.
5. Preparation of other designs and drawings including drawings of small parts steel work (other than those for which RDSO standard drawings are available) and detailed designs for booster transformer stations and LT. Supply Transformer stations.
6. Supply of requisite no. of copies of all drawings, including completion drawings specified in part - II, Chapter V to the Purchaser.
7. Preparation, design, development of Bonding Plans based of Track Circuit plans supplied by the purchaser, clearly specifying the location of various bonds, +ve, -ve rails and other relevant details as required for bonding plan and supply of requisite number of copies of Bonding Plans drawings.
8. In case preparation of the overhead equipment pegging plans by the Purchaser for any part of the section is delayed, the Contractor may be asked to prepare pegging plans for the section. No extra payment will be made for the preparation of such pegging plans. The total length of track for which the Contractor may be asked to prepare such pegging plans will not exceed 2% of the final total quantity against this item. This price shall also cover soil investigation and testing in an approved manner.

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

- i. General: By the difference in the chainages of the length under consideration, as incorporated in the layout plans.
- ii. Turnouts: The track taking off shall be deemed as starting from the toe of the switch of the Turnout.
- iii. Cross-overs : The length of track shall be taken as the difference in the chainages of the toes of switches of the two turnouts constituting the crossover.
- iv. Diamond crossing with or without slips: The two tracks crossing each other shall be measured independently as per note 1 above as though there were no crossing. No extra shall be provided for slip points.
- v. Dead ends and tops of loops: The lengths for payment under this item shall be up to the chainage of anchor mast of the terminating OHE.
- vi. Feeders and return feeders from grid sub-station to feeding station

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

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

ITEM No.1(b): Preparation of designs and drawings for switching stations (FP/SP/SSP)

The price shall cover on a flat rate basis per switching station, survey, investigation of soil bearing pressure, preparation of cross section drawings, preparation of general arrangement drawings, detailed layout of equipment, bus-bar connections and insulators, layout of earthing system and earth connections, cable run layout, detailed designs and drawings for steel work and structural support, excluding the ones for which supply is made by the Purchaser, suitable concrete plinths for equipment and drawings for equipments, components, fitting and materials supplied by the Contractor. The price shall include supply of requisite number of copies of all drawings, including completion drawings as specified in Part -II, Chapter-V to the Purchaser.

ITEM No. 2(a): (i) Concrete for foundation and plinth in hard soil.

(ii) Concrete for foundation and plinth in rocky soil.

(For concrete mix of M 10 and M 15 Grade in Foundation)

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

The Purchaser's Engineer shall certify where use of chisel and hammer or blasting has been necessary. The contractor shall arrange for supply of explosives and all tools and plants for blasting operations at his own cost. If half or more of the depth or width of excavation is in hard soil/concrete/masonry drains/walls or in rock, the entire foundations shall be paid for under item 2(a)(i) or 2(a)(ii) as the case may be. If half of the depth or width of the excavation is in hard soil/concrete/masonry drains/walls and the other half is in rock, the entire foundation shall be paid under item 2(a)(ii). The price shall include the cost of cement.

Notes for measurement for items 2(a)(i) and (ii):-

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

ITEM No. 2(az): (i) Concrete for foundation and plinth in hard soil.

(ii) Concrete for foundation and plinth in rocky soil.

(for concrete mix of M 15 and M 20 Grade in Foundation)

Same as 2(a)(i) and 2(a)(ii) above.

ITEM No. 2 (b): Concrete for foundation and plinth in other than hard soil and rock. (for concrete mix of M 10 and M 15 Grade in Foundation)

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

ITEM No. 2 (bz): Concrete for foundation and plinth in other than hard soil and rock. (for concrete mix of M 15 and M 20 Grade in Foundation)

Same as 2(b) above.

ITEM No. 2 (c): Reinforced concrete for foundation and plinth in other than hard soil and rock (Grade M-15)

The price shall cover excavation and all reinforced concrete work for foundations excluding supply of steel for reinforcement {which will be paid separately under Item 3(g)} and including other materials shoring where necessary, casting concrete including frame work where necessary, grouting and finishing the tops of foundation blocks. The price shall also include dismantling of all connected temporary arrangements, back filling as required and removal of spoil. The price shall also cover all concrete work for foundation (including that of Height Gauge) or anchor blocks on bridge piers, irrespective of whether they are actually reinforced or not, and counter weight foundations. Rails and fasteners required for counter weight foundations shall be supplied by the Purchaser free at the Contractor's depot or work spot according to convenience of the Purchaser. Dowel bars as may be required for bond with bridge structures shall be supplied and erected free of cost by the Purchaser. Dowel bars will not be considered as reinforcement for the purpose of this item. The price shall, include the cost of cement.

Note: Erection charges for CC/RCC in Hard Soil & rock shall be payable @ erection charges of Item 2(a)(i)/2(az)(i) & item 2(a)(ii)/2(az)(ii) respectively.

ITEM No. 2 (cz): Reinforced concrete for foundation and plinth in other than hard soil and rock (Grade M-20)

Same as for Item 2(c) above except Concrete mix shall be M-20.

Note :

- i. Erection charges for CC/RCC in Hard Soil & rock shall be payable @ erection charges of Item 2(a)(i)/2(az)(i) & item 2(a)(ii)/2(az)(ii) respectively.
- ii. Cost of steel for reinforcement if any, shall be payable under item 3(g).

Item No. 2(czz) : Re-inforced cement concrete grade M-25 for foundation and plinth.

This item is exclusively applicable for casting foundation with Reinforced cement concrete of Grade M- 25 suitable for special portal structures at stations and yards. Foundation shall be cast as per drawing no. CERC-6575-RC-CE-DC-001 applicable for special portal structures. The prices include the following activities-

- a. Excavation of pit of appropriate size.
- b. Provision of PCC in grade M-10.
- c. Casting of RCC in M-25 grade concrete.
- d. Provision of 36 mm dia foundation bolts.
- e. Provision of Reinforcement.
- f. Re-filling, compaction, ramming of pit after casting of foundation.

The price shall cover excavation, supply and handling of all materials and accessories, temporary arrangements for excavation in concrete/ masonry drains/ walls requiring use of chisel and hammer, shoring wherever necessary, casting concrete, finishing the top of foundation after erection of portal structures. The price also includes dismantling of all connected temporary arrangements and removal of spoil after completion of casting work.

Note:

- i. 75 mm thick PCC ratio 1:3:6 (M-10) required for foundation bed shall be paid under item 34 (b).
- ii. Cost of supply of steel Reinforcement shall be payable against item 3(g) including cutting, straightening, hooking, bending, binding, erecting and placing and
- iii. keeping in position including all lead and lift and including cost of binding wire.
- iv. Cost of supply of 36 mm dia Bolts, nuts, washers etc. shall be payable against item 3(m), however, erection price is inclusive in this item.
- v. Price is inclusive of re-fillings, compaction, ramming of pit after casting of foundation.

ITEM No. 2 (d): -DELETED-

Notes for items 2 (a) to (c)-

- i. The prices under item 2 shall be same for any shape or size of concrete blocks. In calculating the individual volume of concrete, fraction of a cubic metre beyond the third decimal shall be rounded off to the next nearest third decimal.
- ii. The prices under items 2(a), (b) and (c) shall apply for concreting of all foundations for mast, gantries, portals, anchor blocks for guy rods, and fencing uprights.
- iii. For purposes of computation of volume of concrete under item 2, the volume of steel work embedded in the foundation block shall be ignored.
- iv. Cost of all concrete will be paid for only under item 2 and the prices of other items shall not include cost of concrete except for Item-17.
- v. For purpose of computation of volume of concrete under item-2. The volume of concrete shall include the volume of sand and bitumen in sand cored foundation. However, for the purpose of computation of quantity of cement utilised in sand core foundations, the volume of the sand and bitumen used in core hole should be deducted from the total volume of the foundation.
- vi. For purposes of computation of volume of concrete, the volume of each muff for all masts shall be taken as 0.02 cum except for masts with balance weights and for each column of portal, each headspan mast, 2 or 3 track cantilever masts, and special fabricated masts for which the volume of muff shall be taken as 0.08 cu.m. irrespective of the size and shape of muff, on a flat basis.
- vii. The prices under items 2 (a), (b) and (c) shall also include the cost of concrete cable trenches and trench covers at the switching stations as well as embodiment of drain pipes, where required.
- viii. The prices under items 2 (a),(b) and (c) shall also cover the cost of diversion of masonry/earth drain wherever necessary for casting of foundations.
- ix. Concrete mix for foundation and grouting/muffing under item 2(a),(b) and (c) will be as per para 2.2.4 of Section-B Chapter-II.
- x. In case Ready Mix concrete is used, no extra payment shall be payable to the contractor. Payment shall be done at the rates given in the contract irrespective of concrete is nominal or Ready Mix.

ITEM No. 2(e): Extra for supply & sinking of concrete shells

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

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

Item No. 2(f): Casting of Foundations using mechanised Augur

The price shall cover excavation, supply and handling of all materials including supply and erection of steel for reinforcement, accessories/temporary arrangements and all associated operations for casting of foundations by mechanised Augur in all type of soils except rocks. All machines, tools and equipment needed for the above shall be supplied by the Contractor at his own cost. The price shall include the cost of cement.

NOTE :

- i. The payable volume of the foundation shall be the designed one as shown in the drawings for which the pit has been excavated irrespective of the actual configuration assumed by the latter after auguring.
- ii. The depth of the excavation shall be measured from the formation level to the maximum excavated point.

ITEM No. 2(h)(i): -DELETED-

ITEM No. 2(j): Concrete for Cylindrical type side bearing foundations (M-15 and M-20) (SBC-11000 kgf/sqm)

Cylindrical type foundation for side bearing locations for 11000 kgf/sqm safe bearing capacity (SBC) as an alternative to Conventional Side Bearing type foundation for conventional and High Rise OHE as per RDSO's drawing Nos.

TI/DRG/CIV/FND/RDSO/00002/17/0 Rev-0 for Conventional OHE.

TI/DRG/CIV/FND/RDSO/00003/17/0 Rev-0 for High Rise OHE.

The price shall cover excavation of pits with the help of mechanized augur, supply and handling of all materials and accessories including re- reinforcement steel (epoxy coated) conforming to IS: 432 Part -1. The price shall include cutting, bending and binding of re-enforcement bars.

Price shall include shoring if required, concrete grouting of mast and finishing the top of foundation of mast. The price shall also include dismantling of all temporary arrangement and removal of spoil. Machinery/Plant and Augur required for digging of pit shall be arranged by contractor at their own cost.

ITEM No. 3(a)(i): Supply and Erection of traction masts fabricated from Rolled mild steel beam (BFB) of size 152mm x 152mm x 37.1 Kg/m and galvanised in length 9.5 m or 8.5 m long.

The price shall cover the cost of supply of finished traction mast fabricated from Rolled mild steel beam (BFB) 152mm x 152mm x 37.1 Kg/m designated SC-150, table 3.1 of IS-808/1989 duly drilled as per RDSO's Drawing No. ETI/OHE/G/00144, Sh.No.3 Mod-C, with latest mod. and galvanised as per Specification No. ETI/OHE/13 (4/84) with A&C Slip No.1 to 3 with latest spec. The length of mast will be 9.5 or 8.5 meter as required. The steel shall be conforming to IS-2062/2006 (latest) Gr 'A' SK Zinc conforming to IS-209/1992 (or latest).

The price shall cover cost of erection, alignment and setting before grouting of individual traction masts. The price shall also include the cost of repairing of platform shelters in case the shelter is dismantled/removed/damaged during the course of erection of a mast at platforms.

ITEM No. 3(a)(ii): Supply and Erection of traction masts, main mast of Switching stations and Booster transformer stations fabricated from Rolled mild steel Joist (RSJ) of size 203 mm x 152 mm x 52.0 kg/m and galvanised in various lengths.

The price shall cover the cost of supply of traction mast, main mast of Switching stations and Booster transformer stations fabricated from Rolled mild steel joist (RSJ) 203mm x 152mm x 52.0 Kg/m designation WB- 200, table 2.2 of IS-808/1989 duly drilled as per RDSO's Drawings given below for various types of masts and galvanised as per Specification No. ETI/OHE/13 (4/84) with A&C Slip No.1 to 3, with latest spec. The steel shall be conforming to IS-2062/1992 (latest) Gr 'A' SK Zinc conforming to IS-209/1992 (or latest).

Drg No. (i) ETI/OHE/G/00144, Sh.No.3 latest Mod	9.5 M long
(ii) ETI/C/0030 latest Mod	11.4 m (S1)
(iii) ETI/C/0031 latest Mod	11.4 m (S2)
(iv) ETI/C/0036 latest Mod	8.0 m (S4)
(v) ETI/C/0181 latest Mod	12.4 m (S6)
(vi) ETI/C/0184 latest Mod	9.4 m (S9)

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

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

ITEM No. 3(b)(i): Supply and erection of fabricated and galvanized structures (O,N & R type portals) with necessary components other than masts.

The price shall cover the cost of supply of O, N and R type portals 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

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

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 galvanized 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, not covered under item 3(b)(iii). 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(b)(ii) : Supply and erection of structural steel (traction mast) fabricated and galvanized, of all type B-Series Mast.

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

The price shall also cover the supply of all size of B-Series mast required which has not been mentioned. The price shall cover cost of erection, alignment and setting before grouting of individual traction masts and main masts of Switching and Booster Transformers stations including those for head spans. The price shall also include the cost of repairing of platform shelters in case the shelter is dismantled/removed/damaged during the course of erection of a mast at platforms.

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

ITEM No. 3(b)(iii) Supply and erection of special fabricated & galvanised steel structure other than portals and traction masts not covered under item 3(b)(i) & 3(b)(ii).

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

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

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

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

Note for Item 3(a)(i), 3(a)(ii), 3(b)(i), 3(b)(ii) & 3(b)(iii) :

- The price for the items 3(a)(i), 3(a)(ii) and 3(b)(i), 3(b)(ii) , 3(b)(iii) shall also include the cost of stenciling of location number on masts/portal uprights in the manner as directed by the Purchaser. The price shall also include straightening of masts/portals uprights wherever approved by the purchaser and cutting of mast/portals/upright to suit the site condition.
- For the purpose of payment for supply and/or erection, the black weights as per respective RDSO drawing for individual traction masts (RSJ, BFB & B series, S-1, S4, S-6 & S-9), head span, Portal structures (O, N & R type), special steel structures (TTC, BFB, G & P type portal, Dwarf masts, S3, S5, S8, S100, S101, T-150 etc) shall be payable to the contractor.
- For the purpose of payment for supply and/or erection, of bridge mast or any other structures which are not covered in RDSO's drawings, if any, the black weights of such structures including all components as shown in respective approved drawing, shall be payable to the contractor by purchaser.
- No payment is permissible for increased weight of any structure or their components on account of galvanization.
- The payment shall be made on the basis of the final lengths/weight of the structures, in case the same are cut or modified as indicated above before erection.
- In case of any dispute in unit weights mentioned in drawings, the matter will be decided by the CPM of the project and decision taken in the matter will be final and binding on to the contractor.

Standard weights of Galvanised structures

S. No.	Structure Type	Standard Length in Meters	Black Wt. (kg) as per Drawing	Weight of finished Galvanised Structure (kg)
A	B	C	D	E
1	RSJ	9.50	494.00	499.77
2	BFB	9.50	352.45	357.64
3	B-150	9.50	369.69	378.67
4	B-175	9.50	422.89	432.40
5	B-200	9.50	474.19	483.95
6	B-250	9.50	659.27	672.34
7	NU	10.445	365.26	385.30
8	NE1	5.38	183.88	193.63
9	NE2	5.88	199.18	209.80
10	NB 1.5	1.5	68.83	70.33
11	NB 3.0	3.0	110.99	113.69
12	NB 4.5	4.5	160.58	164.47
13	NB 6.0	6.0	210.20	215.14
14	NB 7.5	7.5	252.36	258.50
15	NB 9.0	9.0	301.95	309.28
19	RU	10.58	627.48	651.87
20	RE-1	11.6	634.33	662.13
21	RE-2	12.1	660.56	689.75
22	RB 7.5	7.5	432.58	440.78
23	RB 9.0	9.0	507.71	517.15
24	RB 10.5	10.5	586.49	597.65
25	RB 12.0	12.0	665.26	677.78
26	RB 13.0	13.0	717.88	731.60
Note: The tolerance of (+/-) 2.5% of the weight of finished galvanized structures as per column-E above will be the limit.				

Note: This list is only indicative in nature and weight of finished galvanized structures or weight of galvanisation in structures shall be governed by latest guidelines issued by RDSO in this regard.

Item 3(b) (iv): Design, Supply, Fabrication, Erection & Painting of Height Gauge at level crossings (for clear span up to 7.3m and / or above 7.3m up to 12.2m)

The price shall cover supply of Height Gauges duly fabricated painted complete in all respect. However, provision of particular type of Height Gauge at various level crossings shall be decided and advised by the purchaser during execution of work. Contractor shall procure the structures/Steel required for the work accordingly. Following RDSO/ CORE drawings are applicable for different types of Height Gauges.

SN	Description	RDSO/CORE Drg. No.
1	Standard Plan, Details of Height Gauge for span 7.3 m to 10.0 m, Details of structure and foundation.	CORE Drawing No. RE/CIVIL/S/148-2011 Mod-1 & 2 OR TI/DRG/CIV/HGAUGE/RDSO/00001/14/0 Mod-A
2	Standard Plan, Height Gauge for level crossing (For clear span up to 7.3 m) Details of structures and foundation.	TI/DRG/CIV/HGAUGE/RDSO/00001/05/0
3	Standard plan, Height Gauge for level crossing (For clear span above 7.3 m up to 12.2 m) Details of structures and foundations.	TI/DRG/CIV/HGAUGE/RDSO/00002/05/0

Price shall cover supply of various steel sections conforming to IS 2062/2011, IS 808/1989, Fabrication at site or supply duly fabricated from CORE/IS approved sources for structures & SPS. Price shall cover supply of bolts, nuts & washers etc. necessary for fastening the components of Height Gauge. Price shall cover cost of painting of Booms & upright with Red Oxide / Zinc Chromate to IS: 2074 as first coat and 2nd coat with enamel paint to IS: 2933-1975 Black and white colour alternatively 300 mm wide band.

Crash Barrier and Rail Barricading shall be provided as required and as per provision in drawings.

The price shall cover cost of erection, alignment and setting while grouting of upright and side supports.

The price shall cover labour charges required for welding / fabrication of side supports / uprights and other components at site.

Note:-

1. For the purpose of payment against item 3(b)(iv) for all the components (upright, boom, side supports, crash barrier / Barricading etc.), weight of structures/ fabricated steel works will be calculated according to standard unit weight of respective sections for required quantity. Contractor will be required to submit Bill of materials for each type of Height Gauge along with Black weight thereof for approval by the purchaser before claiming the payment.
2. In case of any dispute in unit weights, the matter will be decided by the CPD of the project and decision taken in the matter will be final and binding on to the contractor.
3. No crane / tools & Plants will be provided by purchaser for fabrication, erection or transportations of Height Gauge or black steel required for the work.
4. Prices for foundation works (CC & RCC) shall be admissible under item 34(b) and 2(cz) respectively.

Item 3(b)(v): Supply and Erection of special type portal structures including uprights, Booms and components.

The price shall cover the cost of supply of special type portal structure with components as per Drawing to be supplied by the purchaser.

The structure shall be fabricated from steel confirming to IS-2062/2006 No. E - 250 (Fe 410W) quality- A, IS-808/1989 and galvanised as per RDSO specification No. ETI/OHE/13 (4/84) with A&C slips Nos 1 to 3.

The price shall cover, cost of erection, alignment and setting before grouting, wherever required of portal assembly of boom components and erection of the same. The prices shall also include supply and erection of galvanised bolt, nuts, washers etc wherever required as per approved designs and drawings. The price shall cover assembling, adjustment and erection of booms. 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 platform.

The Price shall also cover the cost of stenciling of location number on the portal upright in the manner as directed by the purchaser. The price shall include cost of straightening of uprights/Booms if required.

ITEM 3 (c): Supply only of fabricated steel work other than mast

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

For standard fabricated steel work for which RDSO'S approved drawings are available, the weight of steel work as specified in RDSO'S drawing shall be considered for payment. However, in case the unit sectional weight of any member indicated in RDSO's drawing is not in conformity with the unit sectional weight as per the latest IS specification, the weight of the fabricated steel work shall be calculated on the basis of latest IS specification and the same will be considered for payment. For the non-standard fabricated steel work, the calculated weight to be considered for payment under this item shall be included in the relevant drawing based on, latest IS sectional weight at the time of submitting the designs for approval of the Purchaser.

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

ITEM No. 3(d): - DELETED-

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

- For the purpose of payment against items 3(a)(i), 3(a)(ii), 3(b)(i), 3(b)(ii), 3(b)(iii) & 3(c), weight of structures or fabricated steel work will be calculated according to the weight of black steel given in section books for the lengths of various members shown in the approved drawings. There will be no addition for increased weight due to galvanizing or painting or weld material or reduction for holes or skew cuts.
- The rates against item 3(b)(iii) shall be applicable to the erection of small part steel work, which are not covered under the various other items of work. Unless specifically indicated none of the other items of work shall include the cost of supply and/or erection of small part steel work, which will invariably be paid for under item 3(b)(iii) or and 3(c) as applicable.

ITEM No. 3(e)(i) : Supply and erection of a Guy Rod Assembly

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

COMPONENTS REQUIREMENT

Rly. Id. No.	Description of components	Qty. per unit
3232	Mast guy rod fitting (welded) complete with 4 short bolts, nuts, lock nuts and washers for attachment to mast/S.P.S including appropriate fittings.	1 off
5001/ 5001-1/ 5001-3	Anchor bolts (complete with nuts lock nuts and split pins)	1 Set
5002	Guy rod stirrup	1 off
5004 or 5005 or 5005-2 or 5006-1 or 9070 or 9071 or 5006-2	Guy rod with nut, lock nut, washer and split pin	1 off
5007-1	Anchor 'v' bolt	2 off
5008	Anchor	2 off
5220	Guy rod double strap assembly	1 off or 2 off (as required)

NOTE:

- In case the Contractor desires to adopt a different design for guy rod assembly, the same shall be indicated by him in the Tender and the components required should be clearly listed under this item as deviation.
- Supply and erection of guy rod assembly at anticreep portals will also be paid for under this item.

ITEM No. 3(e)(ii) : Supply and erection of Anchoring Arrangement of traction mast with Galvanised steel stranded wire

The price shall cover supply and erection of Anchoring Arrangement with Galvanised steel stranded wire of required length for traction masts, feeder line towers or supports complete with mast guy rod fittings, Galvanised steel stranded wire of 9.3 or 9.7 m and part/s be grouted in the anchor block as per RDSO's drawing No. TI/DRG/OHE/GSSW/0002/09/0. The price shall not include the cost of supply and erection of a dwarf or stub mast with anchor plates drilled and welded in position, where required, for anchorage, and small parts steel work, complete with bolts and nuts etc., if any for attaching the mast guy rod fittings

to the mast/structure which shall be paid for separately under the relevant item. Prices indicated against all other items should be exclusive of the price of supply and erection of guy rod, if any which will be paid for under this item.

COMPONENTS REQUIREMENT

Rly. Id.No.	Description of components	Qty. per unit
3232	Mast guy rod fitting (welded) complete with 4 short bolts, nuts, lock nuts and washers for attachment to mast/S.P.S including appropriate fittings	1 of
5023-1	Eye Bolt (complete with M24 nut, Lock nut Plain washer, thimble and split pins 5x40	1 Set
5002	Guy rod stirrup	1 off
5004-1or 5005-1	Galvanised Steel Stranded Wire 12.5 mm dia	1 off
5007-1	Anchor 'v' bolt	2 off
5008	Anchor loop	2 off
5220	Guy rod double strap assembly	1 off or 2 off (as required)

Item No.3(f) : Erection of PSC Mast.

The erection price shall cover cost of erection, alignment and getting before grouting of individual PSC masts wherever these are to be located. The price shall also include the cost of stenciling of location number on masts in the manner directed by the purchaser.

Item No.3(g) : Supply of steel reinforcement for RCC work including cost of cutting , straightening, bending , biding, erecting and placing & keeping in position including all lead & lift & including cost of binding wire

The item covers the price of supply of tested quality of steel for reinforcement of appropriate size and for reinforcement steel above 8 mm or suitable dia shall be High strength deformed steel bars conforming to IS:1786/1985 and below 8 mm dia shall be mild steel and medium tensile steel bars conforming to IS:432(Pt.I)/ 1982.

Price shall cover the cost towards cutting, straightening hooking, bending, binding, erecting and placing and keeping in position including all lead and lift and including cost of binding wire.

Test certificates for steel will be furnished by the Contractor at his own cost from a laboratory approved by the Engineer-in-Charge. Nothing extra will be paid for unauthorised overlaps and wastage of steel involved in cutting the bars to their required sizes.

Item No.3(h)(i): -DELETED-

Item No. 3(h)(ii): -DELETED-

Item No.3(i) : Supply and Erection of 25 kV Caution Boards/Plates

The price shall cover price of material including Caution Boards, SPS items, nuts, bolts etc. as required and erection charges Caution Boards shall be of two types.

- General Caution Notice at entrance to Railway station (Hindi & English). No. ETI/OHE/G/7551 latest Mod.
- Caution Plate 25000 V. No. ETI/OHE/G/7531 latest Mod.

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

ITEM No.3(j) : Supply and erection of protective screen on ROB/FOBs

The price shall cover on per track basis on both sides of ROB/FOB, the cost of all material required for fabrication of protective screen including angle, Tee, expanded metal (Jali), GI sheet, paints etc. The price

shall also include the labour cost for fabrication, erection and painting at various locations. The fabrication and erection work shall be done as per RDSO Drg. No. ETI/C/0068 latest Mod.

ITEM No. 3(k) Supply and erection of Danger Plate on a Height Gauge

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

ITEM No. 4(a) (i) : Supply without Insulator and erection of a single bracket assembly

The price shall cover on a flat rate basis any bracket assembly on a traction mast or support on drop arm and shall include those on high/low level platform, in the vicinity of turnouts, over bridges or and at locations with reduced encumbrance or terminating wires. The price shall include the cost of supply of all components including galvanised steel tube, dropper wires, bolts and nuts etc. but excluding small parts steel work and solid core insulators. Cost of insulators will be paid in Schedule-1, Section-5 and cost of SPS will be paid under item 3(c) of Schedule-1, Section-3. The price shall cover erection of all components including insulators, small parts steel work and dropper wires. However, this does not include the anticreep arrangement at masts/structures. The price shall include:

Rly. Id No.	Description of components	Qty. per unit
3020-1	Mast fitting for hook insulator (Forged)with 2 off bolts, nuts, lock nuts and washers of 16 dia.	1 set
2400	Tubular stay arm assembly (including galvanised steel tube).	1 set
2110/ 2130/ 2380	Catenary suspension bracket assembly or hook bracket	1 off
1160	Suspension clamp	1 off
2120, 2140, 2040, 2080	Bracket tube assembly complete with tube cap and sleeve where required (including galvanised steel tube).	1 set
3070-1/2	Mast bracket fitting assembly including 2 off bolts, nuts, lock nuts and washers of 16 m for attachment to structure or to small part steel work.	1 set
2151-2, 2152-2, 2161-2, 2162-2	Register arm hook Top & Bottom complete (Forged) with bolts, nuts and lock nuts.	1 off
2420 or 2430, 2270-4 or 5	Register arm assembly or raised register arm assembly (including galvanised steel tube).	1 set
2460 Style 02 or 2470-Style 02	Register arm dropper assembly including dropper wire complete with bolts, nuts etc.	1 set
2391-1, 2540/2520	Steady arm hook (BFB) (Forged) or bent steady arm (where required)	As required
2361-1, 2491-2, 2492-2	25 mm drop bracket (Forged) with bolts & locknuts. 25 mm Steady arm clamp (Forged) with bolts & locknuts.	-do-
1220/1370/-1	Contact wire swivel clip or raised register arm clamp	1 off
2550-1/2	Antiwind clamp	As required

ITEM No. 4(a)(ii) : Extra on 4(a) (i) for supply and erection of additional fittings on a single bracket assembly for supporting two OHEs

The price is applicable as an extra to item 4(a) (i) or 4(a) (v) for the provision of additional fittings required to support an additional OHE on a single bracket assembly payable under item 4(a)(i) or 4(a)(v). The price

shall include supply of all extra fittings excluding the double contact wire swivel clip. The price shall include erection of all extra fittings, including the double contact wire swivel clip.

ITEM No. 4(a)(iii) : Supply without insulator and erection of a single bracket assembly suitable for tramway type overhead equipment (regulated).

The price shall cover on a flat rate basis any bracket assembly, on a traction mast or support on drop arm, and shall include those on high level platform, in the vicinity of turnouts, over bridges or over-laps and at locations with reduced encumbrance or terminating wires. The price shall include the cost of supply of all components including galvanised steel tubes, dropper wires, bolts and nuts etc. but excluding small parts steel work and solid core insulators (Cost of insulators will be paid in Schedule-1, Section-5). Cost of SPS will be paid under item 3(c) of Schedule-1, Section-3. The price shall cover erection of all components including insulators, small part steel work and dropper wires. However, this does not include the anticreep arrangement at masts/structures. The price shall include:

Rly. Id. No	Description of Component.	Qty. per Unit.
3021-1	Mast fitting for hook insulator (Forged) with 2 off bolts, nuts, lock-nuts & washers of 16 mm dia.	set 1
2400	Tubular stay arm (including galvanised steel tube).	set 1
2403-1, 2402	Tubular stay sleeve with Adjuster.	set 1
2380	Hook bracket	set 1
2140	Large catenary direct clamp	set 1
2160-1	Large register arm hook	set 1
2080	Large bracket tube assembly (49 mm) (including galvanised steel tube).	set 1
3070-1/2	Mast bracket fitting assembly including 2 off, bolts, nuts, lock-nuts and washers 16 mm.	set 1
2540-1	BFB steady arm assembly	set 1
2550-3	Standard anti-wind clamp	set 1
1220	Contact wire swivel clip	set 1

ITEM No.4(a)(iv) : Extra on item 4(a)(iii) for supporting two tramway type OHE (Regulated).

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

ITEM No.4(a)(v) : -DELETED-

Item No.4 (ax): Supply of Insulators for item Nos.4 (a)(i) & 4 (a) (iii).

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

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

ITEM No. 4(b)(i) : Supply without insulator and erection of pull-off arrangement for one OHE

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

fittings excluding solid core insulators (Cost of insulator will be paid in Schedule-1, Section-5). The price shall cover erection of all components including solid core insulators, small jumper wire and conductors.

NOTE:

- i. For composite OHE' a catenary dropper clip with necessary bimetallic strip/ washer to be used in place of catenary dropper clip (Id. No.1192).
- ii. mm diameter Hard drawn Copper wire shall be used for Register Arm Dropper for all locations except for those on long Girder Bridges, where wear rate is high for which 7 mm diameter Hard drawn Copper wire shall be used for Register Arm Dropper.

ITEM No. 4(b)(ii): Extra for each additional equipment pulled.

The price shall cover as an extra to item 4(b)(i) supply and erection of all additional fittings required including the supply of required conductors/ jumper wires, in case the pull off pulls more than one equipment the prices applicable for each extra equipment pulled.

ITEM No. 4(b)(iii) Supply without insulator and erection of a pull-off arrangement for regulated Tramway type OHE.

The price shall cover supply of all components including conductors required for a pull off arrangement to pull one equipment only, complete with steady arm, contact wire swivel clip and fittings, including solid core insulator (Cost of insulator will be paid in Schedule-1, Section-5). The price shall cover erection of all components including solid core insulators, small jumpers.

ITEM No. 4(b)(iv) : DELETED

ITEM No.4 (bx) : Supply of Insulators for item Nos. 4 (b)(i) & 4 (b)(iii)

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

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

ITEM No. 5(a)(i) : Supply and erection of mounting arrangement for span wire.

The price shall cover supply of all components including adjusters, terminal fittings and mast attachments required to attach a span wire or a head-span wire or a cross span wire or a steady span wire or a support span wire for supporting contact wire only, at both ends, to traction masts/structures or special brackets. The price shall include the cost of solid core insulators (Cost of insulator will be paid in Schedule-1, Section-5), and small parts steel work, if any. The price shall cover erection of all components including mounting arrangements for span wire and solid core insulators but excluding small parts steel work, if any.

ITEM No. 5(a)(ii): Supply and erection of a span wire

The price shall cover supply and erection of a span wire per meter. The payable length in case of head span wires shall be the horizontal distance between the inner faces of all traction masts/structure on which the mast attachments are mounted, and in case of Large Span Wire, the actual length shall be measured at the time of erection. No extra payment shall be made on account of the sag. The price is applicable for all types of span wires including Large Span Wires. Erections of a meter beyond the first decimal shall be rounded off to the nearest first decimal.

ITEM No. 5(az)(ii): Supply and erection of a span wire

Same as item 5(a)(ii) but excluding supply of Catenary wires

NOTE : The quantity for which the payment is made for the supply and erection of large span wire under this item shall be deducted from the corresponding length in the span for which payment is made under item 6(a).

ITEM No. 5(b): Supply without insulator and erection of suspension of one conventional OHE/ composite OHE from headspan

The price shall cover supply of a suspension assembly to carry complete all copper OHE/ Composite OHE on head spans inclusive of all dropper assemblies (exclusive of dropper wire) and from head-span, cross-span steady wire attachment, steady arm/rod, catenary suspension clamps and other fittings required to make complete suspension arrangements for copper OHE/Composite OHE on head span. The price shall cover

ITEM No. 5(c) : Supply of without insulator and erection of Suspension /registration of contact wire only

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

Vee clamp or double vee clamp with adjuster, or steady arm with steady wire clamp.

Contact wire swivel clip.

ITEM No.5 (ax): Supply of Insulators for item 5(a)(i), 5(b) and 5(c)

The price shall cover only supply of any of the following Insulators mentioned against each item required for execution of item covered under items 5(a)(i), 5(b) and 5(c). Erection cost of insulators is inclusive in items 5(a)(i), 5(b) and 5(c) respectively.

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

ITEM No. 6 (a): Supply and erection of overhead equipment only.

The price shall cover the supply of contact wire (107 sqmm HDGCC), catenary (65 sqmm 19/2.1 mm), dropper wire(5mm), jumper wires (50 sqmm, 19/1.80 mm or) as per the specifications indicated under para 2.4.9 of the tender paper.

The price shall cover supply of all components including dropper clips, parallel clamps for jumpering and splices (where their use is approved) and small parts steel works complete with bolts and nuts etc. for attachment of number plates to mast/structure, if any. The price shall cover erection of all components and wires and conductors including contact wire, catenary, droppers, jumpers and terminating wires, if any, but excluding small parts steel work, if any. The price shall be excluding the cost of erection of large span wire, which will be paid under item 5(a)(ii).

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

Rly. Ident No.	Description of components	Qty. for unit
1040-2 or SK-534/1 & SK-575/2 or SK- 576/1 & SK-535/2 or 1041-3.	Contact wire parallel clamp small	As required
1180/SK-572/1 & SK-572/2	Contact wire dropper clip (107)	-do-

1192	Catenary dropper clip complete with bolts, nuts etc	-do-
7501/7503	Enameled/ Retro reflective number plates complete with 2 Galv. MS. bolts m 10x35/30, nuts and lead washer for M-10 bolts but excluding SPS for attachment of number plate to masts/structures.	-do-
1110-2	Contact wire ending clamp	-do-
1120	Catenary ending clamp	-do-
1140	Large span wire clamp (130)	-do-
5020-1/5020-2	9-T, Adjuster (Forged)	-do-
5030	Anchor double strap assembly	-do-
5191/5192	Compensating plate/equalizing plate	-do-

ITEM No. 6 (az) : Supply and erection of overhead equipment only

Same as item 6(a) but excluding supply of Contact and Catenary wires.

ITEM No. 6 (ax)(i) : Supply of Hard Drawn Grooved Copper Contact Wire 107 Sq. mm required for item nos. 6(az), 6(bz), 6(cz), 10(az), 10(bz), 10(cz), 12(az), 12(cz) and 31(gz).

The price shall cover only supply of 107 Sq. mm Hard Drawn Grooved Copper Contact Wire required for item nos. 6(az), 6(bz), 6(cz), 10(az), 10(bz), 10(cz), 12(az), 12(cz) and 31(gz) in MT.

ITEM No. 6 (ax)(ii) : Supply of Cadmium Copper Catenary Wire 65 Sq. mm, 19/2.10mm required for item nos. 5(az)(ii), 6(az), 9(dz), 9(ez), 10(az), 10(bz), 10(cz), 12(cz), 15(az)(iii) and 31(gz).

The price shall cover only supply of 65 Sq. mm, 19/2.10mm, Cadmium Copper Catenary Wire required for item nos. 5(az)(ii), 6(az), 9(dz), 9(ez), 10(az), 10(bz), 10(cz), 12(cz), 15(az)(iii) and 31(gz) in MT.

ITEM No. 6(b) : Supply and Erection of contact wire only

The price shall cover the supply of contact wire (107 Sqmm HDGCC as per the specifications indicated under para 2.4.9 of the tender paper, and erection of contact wire only. The price shall exclude termination which will be paid for under item 8. The price shall include provision of Retro-reflective and enameled number plates on traction masts/structures and painting of setting distance structures and rail levels on masts/structures. The price shall exclude the supply of small part steel works complete with bolts and nuts for attachment of enameled number plates to masts/ structures.

Description	Qty. for unit	Supplied by
Contact wire (107 Sq mm)	As required	Contractor
Retro-reflective and Enameled number plates	As required	Contractor

ITEM No. 6(bz) : Supply and Erection of contact wire only

Same as item 6(b) but excluding supply of Contact wires.

ITEM No. 6(c) : Supply and Erection of contact wire only (regulated with bridle wire)

The price shall cover the supply of contact wire (107 Sqmm HDGCC), dropper wire (5mm), 7/2.10, 20 Sq.mm Bridle wire as per the specifications indicated under para 2.4.9 of the tender paper, erection and provision of bridle wires with clamps and two droppers including clips, Retro-reflective and enameled number plates on traction masts/structures, painting of setting distance and rail levels on masts/ structures, stenciling of symbol for direction of emergency telephone socket if required. The price shall exclude supply of required small part steel works complete with bolts and nuts for attachment of enameled number plates to masts/ structures. The price shall exclude termination which will be paid for under item 8.

ITEM No. 6(cz) : Supply and Erection of contact wire only (regulated with bridle wire)

Same as item 6(c) but excluding supply of Contact wires.

ITEM No. 6(d): -DELETED-

Note : All bolts and nuts below 14mm dia on current carrying parts of OHE shall be stainless steel.

Note for Measurement:

- i. For the purpose of payment against item 6(a), (b), (c), & (d) the length of overhead equipment, which shall include terminating wires, shall be measured from the center lines of the traction masts/structures at which the two ends of each tension length of overhead equipment are anchored.
- ii. The length shall be the difference between the actual chainages of the two traction masts/structures at which the ends of each tension length are anchored or by the sum of the actual spans between the same two points whichever is higher as included in the "As Erected" layout plans. No extra payment will be made on account of either due to sag in these wires/conductors or scraps generated. The price under items 6(a), 6(b), 6(c) & 6(d) does not cover the cost of supply and erection of cut-in-insulators, the supply and erection of which shall be paid for under item 11.
- iii. For the purpose of progress payment reference to layout plans "As Approved" shall be made. However, the price under this item shall be adjusted according to the final length of OHE indicated in the "As Erected" layout plan.

Note for Number Plates:

- i. Retro-reflective OHE number plates should be provided generally at all locations. (Reference- Railway Board's letter No. 2001/Elect(G)/170/1 Dated 22/23.12.2016)
- ii. Sigma Board in foggy prone area only, for identification of all signals shall be provided two masts prior to all signal locations for easy identification during foggy weather. (Reference-Railway Board's letter No. 2001/Elect(G)/170/1 Pt. Dated 07.05.2012)

ITEM No. 7(a): Supply and Erection of all Aluminum 25 KV feeder/return conductor (Single Spider)

The price shall cover supply and erection of Hard-drawn stranded All Aluminium conductor conforming to IS-398(Pt.I) with ammendment-1 and of size 19/3.99mm (240 Sq.mm) feeder/return conductor (along or across the tracks). The price shall not include the cost of suspension assembly (which will be paid for under item-11) and termination (which will be paid for under item-8.) and small part steel work, complete with bolts and nuts etc, if any. The price shall also cover on a flat rate basis, the cost of supply of splices to the extent required.

ITEM No. 7(b): -DELETED-

ITEM No. 7(c) : Supply and erection of earth wire

The price shall cover supply and erection of earth wire made of 7/4.09 mm steel reinforced aluminium conductor (RACCOON) excluding termination which will be paid for under item 8 and shall include cost of fittings on structures for supporting the earthwire including bonding of the earth wire to the structure and the structure to earth electrodes or a non-track circuited running rail or impedance bond which will be provided by the Purchaser. The price shall include disc insulators, cut-in-insulator to isolate sections of earth wire which will be paid for under item 11(c) and the cost of small part steel works complete with bolts and nuts to attach the earth wire mast clamp to masts/structures, if any.

Note for Measurement:

- i. The prices under items 7(a) and (b) shall not include. Termination which will be paid for under item 8. The connection (a) between feeders, or return conductors and (b) of feeders, or return

- conductors to a bus bar, overhead equipment or isolator switch which will be paid for under item 15, & cut-in-insulators and suspension insulators which shall be paid for under item 11.
- ii. For the purpose of payment against item 7 (a) and (b) the length of feeders, return conductors or earth wire shall be measured from the center lines of the mast/structure at which the two ends of each length of feeder or conductor run are anchored, by adding actual spans. In case of feeders/return conductors crossing a track, the length shall be measured between the faces of traction masts/structures at which the two ends of the cross feeder or return conductors are anchored, as indicated in the as erected structure erection drawings for traction masts/structures. No payment will be made for the extra length of the conductor/s on account of sag or scrap.
- iii. For purposes of progress payment reference to "As Approved" drawings shall be made. However, the price under this item shall be adjusted according to the final length of OHE indicated in the "As Erected" layout plan/drawings

Item No.7(d): Supply and Manual Erection of All Aluminium 25 kV Feeder/Return (Single Spider).

Same as item 7 (a) but the work is to be executed manually instead of with wiring train.

Item No. 7(e) : Supply and Erection of Copper cross feeder wires (37/2.25 mm HDBC) across the track at SP/SSP/FP/BT locations.

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

ITEM No. 8(a)(i) : -DELETED-

ITEM No. 8(a)(ii) : -DELETED-

ITEM No. 8(a)(iii) : -DELETED-

ITEM No. 8(a)(iv) : -DELETED-

ITEM No. 8(a)(v): Supply and erection of regulating equipment (3 pulley type) with Counter weight assembly for conventional/composite OHE.

The price shall cover supply and erection of counter weight assembly (for both conventional and High Rise OHE) including 5-ton adjuster with double strap assembly and normal/anti-theft guide tube assembly, the supply of regulating equipment and stainless-steel wire rope (of various length as required) required for the regulating equipment and small part steel work, if any. The price shall also cover adjustment of the entire regulating equipment. The price shall not include supply and erection of termination, which will be paid for under item No. 8(b).

ITEM No. 8(a)(vi) : Supply and erection of a regulating equipment (3 Pulley type) with counter weight assembly for Tram Way Type OHE (Regulated)

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

ITEM No.8(a)(vii) : -DELETED-

ITEM No. 8(a)(viii) : -DELETED-

ITEM No.8(a)(ix) : -DELETED-

ITEM No. 8(a)(x): Supply and erection of a regulating equipment (3 Pulley type) with counter weight assembly for conventional/ composite OHE

Same as item 8(a)(v) but excluding stainless steel wire rope required for the regulating equipment. For shorter tension lengths OHE (like Emergency x-overs) GI Sleeve of 20 mm dia to be inserted in the hexagonal tie rod of ATD of cross-over OHE in accordance with RDSO's SMI No. TI/MI/0035 (Rev-O).

ITEM No. 8(a)(xi) : Supply and erection of a regulating equipment (3 pulley type) with counter weight assembly for tramway type OHE (Regulated) Same as item 8(a)(vi) but excluding stainless steel wire rope required for the regulating equipment.

Same as item 8(a)(vi) but excluding stainless steel wire rope required for the regulating equipment. For shorter tension lengths OHE (like Emergency x-overs) GI Sleeve of 20 mm dia to be inserted in the hexagonal tie rod of ATD of cross-over OHE in accordance with RDSO's SMI No. TI/MI/0035 (Rev-O).

ITEM No. 8(a)(xii) : Marking of 'Y' measurement at BWA locations

The price shall cover marking/ painting of temperature and 'Y' measurement on OHE masts at BWA locations including cost of paint.

ITEM No. 8(b)(i): Supply without Insulator and erection of materials for termination of single conductor of overhead equipment or a terminating wire.

The price shall cover supply of all material necessary for the termination of single conductor of overhead equipment or terminating wire on a traction mast or structure, including appropriate mast anchor fittings, clevis assembly, adjuster, anchor double straps, ending clamp for the catenary or contact wire or terminating wire and fittings including 9-ton insulator (Cost of insulator will be paid in Schedule-1, Section-5), assembly and terminating wire, if any. The price shall cover erection of all materials including the 9-ton insulator assembly and terminating wire, if any.

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

ITEM No. 8(b)(ii): Supply without Insulator and erection of materials for termination of double conductors.

The price shall cover supply of all materials necessary for the yoked termination of two overhead equipment conductors on a traction mast or structure, including appropriate mast anchoring, clevis assembly, two adjusters, ending clamps for catenary and contact wires, anchor double strap assembly, equalising/ compensating plate and fittings including 9-ton insulator (Cost of insulator will be paid in Schedule-1, Section- 5), assembly and terminating wire, if any. However, the price shall cover erection of all materials including the 9-ton insulator assembly.

ITEM No. 8(b)(iii): Supply without Insulator and erection of materials for termination of all Aluminum 25 KV feeder/return conductor (single SPIDER).

The price shall cover supply of all materials required for the termination of an All Aluminium 25 KV feeder/return conductor (SPIDER), including appropriate mast anchor fittings adjuster, strain clamp end fitting including 3 KV cut-in-insulator and 9-ton insulator assembly. However, the price shall cover erection of all materials including the 9-ton insulator (Cost of insulator will be paid in Schedule-1, Section-5) assembly and 3 KV cut-in-insulator (Cost of insulator will be paid in Schedule-1, Section-5). The price shall include the cost of 9-ton insulator assembly and erection cost thereof.

ITEM No. 8(b)(iv): -DELETED-

ITEM No. 8(b)(v) : Supply without Insulator and erection of materials for termination of an earth wire.

The price shall cover supply and erection of all materials required for the termination of an earth wire including appropriate mast anchor fittings, adjuster, terminal clamp and fittings.

ITEM No. 8(b)(vi) : Supply without Insulator and erection of materials for termination of tramway type OHE (Regulated).

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

ITEM No. 8(b)(vii) : Supply without insulator and erection of materials for termination of double conductors for composite OHE.

The price shall cover supply of all materials necessary for the yoked termination of two overhead equipment conductors on a traction mast or structure including appropriate mast anchor fittings clevis assembly three adjuster, ending clamps for aluminum Alloy catenary and copper contact wires, anchor double strap assembly, unequal tension compensatory plate and fittings excluding the 9 ton insulator (Cost of insulator will be paid in Schedule-1, Section-5), assembly and terminating wire, if any. The price shall cover erection of all materials including the 9-ton insulator assembly.

ITEM No. 8(b)(viii) : Supply without insulator and erection of materials for termination of an aluminum conductor of the composite overhead equipment.

The price shall cover supply of all materials necessary for the termination of single Aluminum conductor of composite OHE or terminating wire on a traction mast or structure, including appropriate mast anchor fittings, clevis assembly, adjuster, anchor double straps, ending clamps for the aluminum catenary or terminating wire and fittings including 9-ton insulator (Cost of insulator will be paid in Schedule-1, Section-5), assembly and termination wire, if any. The price shall cover erection of all materials including the 9-ton insulator assembly and termination wire, if any.

Item No. 8(b)(ix) : Supply without insulators and erection of materials for termination of copper cross feeder with gantries.

The price shall cover the supply of all materials required for termination of copper cross feeder wire (37/2.25 mm HDBC) including appropriate mast anchor fitting (3231), 18 mm Single clevis (5040), 9-Tone adjuster (5020-2), Feeder ending clamp (1130), double clevis (3010) and other components as necessary excluding 9- Ton insulator (Cost of insulator will be paid in Schedule-1, Section-5), assembly. The price shall also cover the erection of all materials including 9-Ton insulator assembly and termination of cross feeder at either end. Fittings/components required for termination of one cross feeder at both ends constitute one set.

Notes to item 8 :

- Small parts steel work complete with bolts and nuts wherever required, will be paid under item 3(a) or 3(b) and 3(c) as applicable and shall not be including in this item.
- The prices under item 8(b)(iii) shall not include the cost of jumper connection (i) between feeders or return conductors and (ii) or feeders or return conductors to a busbar, overhead equipment or isolator switch which will be paid for under item 15.
- The prices under items 8(b)(i) to 8(b)(viii) shall also include the cost of double eye distance rod (ID no. 5183), if provided for any type of terminations.
- Supply and erection of materials for termination of catenary wire on either side of the portals at anticreep locations, will also be paid for under this item.

ITEM No. 8 (bx) : Supply of 9-T Insulators for item 8(b)(i), (ii), (iii), (vi), (vii), (viii) & (ix)

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

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

ITEM No. 9(a) : Supply without Insulator and erection of anti-creep with Galvanised steel wire.

The price shall cover supply of all materials for anti-creep including adjusters, galvanised steel wire, mast anchor fittings at its terminations on either side on structures, ending clamps and fittings excluding 9-ton insulator assembly (Cost of insulator will be paid in Schedule-1, Section-5) and small parts steel work, if

any. Cost of SPS will be paid under item 3(c) of Schedule-1,Section-3. The price shall cover erection of all materials including 9-ton insulator assembly and small parts steel work, if any.

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

ITEM No. 9(b) : Supply without insulator and erection of anti-creep with galvanized Steel wire suitable for tramway type overhead equipment (Regulated)

The price shall cover supply and erection of all materials (Cost of insulator will be paid in Schedule-1, Section- 5) for anti-creep for the tramway type equipment (Regulated) similar to the fittings catered for an item 9(a).

ITEM No. 9(c) : DELETED

NOTE for 9(a) & 9(b) :

- The price shall include the cost of any additional cut-in or suspension insulator which will be paid for under item 11(a) (i) or 11(a) (ii) as applicable.
- In case the anti-creep extends beyond one span on either side of anti-creep center, payment for the supply and erection of extra length shall be paid additionally at the rate of 20% of the rate for 9(a) for each extra span.

ITEM No. 9(d): Supply without Insulator and erection of anti-creep with cadmium wire in polluted area.

The price shall cover the supply of all materials for anti-creep including adjusters, mast anchor fittings at its terminations on either side, structure ending clamps, fittings and cadmium copper catenary wire but excluding 9- ton insulator assembly and small parts steel work, if any. The price shall cover erection of all materials including cadmium copper catenary wire, 9- ton insulator assembly and small parts steel work, if any.

RLY. Ident No.	Description of components	Qty. per unit
-	Cadmium copper catenary wire (65 sq.mm)	As required
6020-1	9 ton insulator assembly	As required
1120 or 1122or1123	Catenary ending clamp (65)	2 off
5020-1/5020-2	9 ton adjusters (Forged)	2 off
5030	Anchor double strap assembly	As required
3010/5040	Clevis assembly	2 off
3231	Mast anchor fitting with bolts, nuts etc.	2 sets
1170	Double suspension clamp	1 off
Less 1160	Suspension clamp	(-) 1 off
5183	Double eye distance rod.	As required

ITEM No. 9(dz): Supply without Insulator and erection of anti-creep with cadmium copper catenary wire in polluted area.

Same as item 9(d) but excluding supply of Catenary wire.

ITEM No. 9(e): Supply without Insulator AND Erection of anti-creep with cadmium copper catenary wire suitable for tramway type OHE (Regulated) in polluted area.

Same as ITEM 9(d) (Cost of insulator will be paid in Schedule-1, Section-5) with the following changes - Id No. 2140, large catenary contact clamp to be used in place of Id. No. 1170

ITEM No. 9(ez): Supply without Insulator AND Erection of anti-creep with cadmium copper catenary wire suitable for tramway type OHE (Regulated) in polluted area.

Same as item 9(e) but excluding supply of Catenary wire.

NOTE :- Note 1 & 2 given under item 9(a) shall also be applicable for item 9(b) to 9 (ez).

ITEM No. 9(ax): Supply of 9-T Insulators for Items 9(a), 9(b), 9(c), 9(d) and 9(e)

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

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

ITEM No. 10 (a), (b) & (c): Extra on item 6(a), 6(b) & 6(c).

- For supply and erection of additional fittings.
- Required at a turnout, diamond crossing or over-lap.

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

The price shall also cover erection of potential equaliser jumpers at insulated overlaps and neutral sections. The price shall not include extra bracket assemblies, overhead equipments, termination of overhead equipment and cut-in-insulators in the case of insulated overlaps and neutral section which will be paid for under items 4, 6, 8, and 11 respectively.

ITEM No. 10 (az), (bz) & (cz): Extra on item 6(az), 6(bz) & 6(cz).

Same as item 10(a), (b) & (c) but excluding supply of Contact and Catenary wire.

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

ITEM No. 11(a)(i): Supply without insulator and Erection of a cut-in (9 Tonne) insulator

The price is applicable to the provision of an additional 9 Tonne cut-in-insulator on a flat rate basis such as in a head-span, cross span or in span wire or an overhead equipment conductor at an insulated overlap, anti- creep not provided for in other items. The price shall cover supply of all components required for the cut-in-insulators assembly, including appropriate terminal fittings for the conductor but excluding the cost of 9-ton insulator assembly. This price shall cover erection of all components, including the 9-ton insulator. This price shall also be applicable as an adjustment price for non-provision of insulators under items 8(b)(i) to 8(b)(viii).

ITEM No. 11(a)(ii): Supply without insulator and Erection of a suspension insulator.

The price is applicable to the provision of 9-ton suspension insulator assembly for suspension of an All Aluminium 25 kV feeder (single or double SPIDER), 130 sq.mm or 65 sq.mm overhead equipment conductor or 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 'SPIDER' conductor.

ITEM No. 11(ax): Supply of 9-Tonne Insulators for Item 11(a)(i) & 11(a)(ii)

The price shall cover only supply of any of the following 9 tonne insulator assembly to be supplied at site for execution of work under items 11(a)(i) & 11(a)(ii) respectively. Erection cost of insulators are inclusive in items 11(a)(i) & 11(a)(ii) respectively.

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

ITEM No. 11(b): Supply without Insulator and Erection of a 25 kV Post Insulator.

The price is applicable to the provision of a 25 kV Post Insulator to support copper or aluminium 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. 11(bx): Supply of a 25 kV Post Insulator for Item 11(b)

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

ITEM No. 11(c): Supply without insulator and Erection of a 3 kV Disc Insulator.

The price is applicable to the provision of a 3 kV Disc Insulator for suspension of an All-Aluminum return conductor or any other similar type of suspension. The price is also applicable to a 3 kV cut-in-insulator for earth wire.

The price shall cover supply and erection of all components required for the assembly, including appropriate suspension clamp, ending clamp for cut-in-insulator on earth wire, but excluding 3 kv Disc Insulator and small parts steel work, with bolts and nuts etc., if any. The price shall include the cost of provision of a flat armor tape to be used in connection with the suspension of SPIDER/RACCOON conductor.

ITEM No. 11(cx): Supply of 3 kV Disc Insulator for Item 11(c).

The price shall cover only supply of 3 KV Disc Insulator to be supplied at site for execution of work under items 11(c). Erection costs of insulators are inclusive in items 11(c).

ITEM No. 11(d): Supply without insulator and Erection of a 11 kV Post Insulator.

The price shall cover, on a flat rate basis for supply of all necessary fittings for erection of 11 KV post insulator to support return conductor, Aluminum or copper busbars or return conductor jumper connections but excluding 11 KV post insulator and small parts steel work with bolts and nuts etc. if any. The price includes the erection of all the fittings including 11 kV Post Insulator.

ITEM No. 11(dx): Supply of 11 kV Post Insulator for Item 11(d).

The price shall cover only supply of 11 kV Post Insulator to be supplied at site for execution of work under items 11(d). Erection cost of insulator is inclusive in item 11(d).

ITEM No. 12(a): Supply without Insulator and erection of a Section Insulator Assembly.

The price shall cover supply of all components required for a standard section insulator assembly (serving both the overhead equipment conductors) including supply of copper conductors, dropper wires for special droppers for supporting the equipment and all terminal fittings for conductors and the section insulator assembly including 9-ton Insulator (RI No.6020) (Cost of insulator will be paid in Schedule-1, Section-5) on the catenary and Sectioning insulator (RI No.6110). The price shall cover erection and adjustment of all components including section insulator assembly, 9-ton insulator on the catenary, Sectioning Insulator and droppers.

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

ITEM No. 12(az): Supply without Insulator and erection of a Section Insulator Assembly.

Same as item 12(a) but excluding supply of Contact and and dropper wires.

ITEM No. 12(ax): Supply of 9 Tonne and Sectioning Insulators for Item 12(a) & 12(az)

The price shall cover only supply of Sectioning Insulator with any of the following 9 Tonne Insulator for execution of work under item 12(a). Erection cost of insulators is inclusive in items 12(a).

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

ITEM No. 12(b): Supply without Insulator and erection of a double wire section insulator assembly.

The price shall cover supply of all components required for a double wire section insulator assembly (to serve both wires of two overhead equipments and special droppers, including supply of dropper wires, for supporting this equipment) at any location, including terminal fittings for the conductors and the double wire section insulator assembly including 9-ton insulator (Cost of insulator will be paid in Schedule-1, Section-5). The price shall include erection and adjustment of the entire assembly including double wire section insulator assembly, droppers and the 9-ton insulators.

ITEM No. 12(bx): Supply of 9 Tonne and Sectioning Insulators for Item 12(b)

The price shall cover supply of 2 Nos Sectioning Insulators and any of the following 9Tonne Insulator only for execution of work under item 12(b). Erection cost of insulators is inclusive in items 12(b).

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

ITEM No. 12(c): Supply without Insulator and erection of a Section Insulator Assembly suitable for tramway type OHE (Regulated)

The price shall cover supply of all components required for a standard Section Insulator Assembly including special arrangements for supporting the equipment and terminal fittings for conductors and the section insulators assembly as required with Sectioning Insulator (RI No.6110) (Cost of insulator will be paid in Schedule-1, Section-5). The price shall cover the supply of required copper conductors, erection and adjustment of all components including sectioning insulator.

ITEM No. 12(cz): Supply without Insulator and erection of a Section Insulator Assembly suitable for tramway type OHE (Regulated)

Same as item 12(c) but excluding supply of Contact and Catenary wires.

NOTE:

- i. The same price will apply if the section insulator is provided in the tramway type equipment (contact wire only).
- ii. The supply and erection of a bracket assembly shall be paid under item 4(a) (iii). No adjustment of price due to non-provision of steady arm, in this case, shall be made.

ITEM No. 12(cx): Supply of Sectioning Insulators for Item 12(c) and 12 (cz)

The price shall cover only supply of Sectioning insulator for execution of work covered under item 12(c) and 12 (cz). Erection cost of insulators are inclusive in items 12(c).

ITEM No. 12(d): Supply and erection of Ceramic/ beaded Glass fibre type (PTFE) short neutral section assembly.

The price shall cover Supply of Ceramic/Glass fibre or PTFE type short neutral section assembly and erection and adjustment of Glass Fibre or PTFE type short neutral sections, which will be supplied by the Contractor. The price would cover fittings for contact and catenary wire as necessary including supply of required dropper wire.

ITEM No. 13(a) & (b): Supply without Insulator and erection of 25 KV SP Isolators without earth contact assembly.

The prices under sub-items (a) and (b) shall cover supply and erection of Isolator switches of approved make, complete with arcing horns, operating rods, operating rod guides, 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. 13(c): Supply without Insulator and erection of 25 KV Double Pole Isolator.

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

ITEM No. 13(d): Extra for supply and erection of an earth contact assembly in an isolator.

The price shall be payable as extra for erection of an earth contact assembly in any isolator

The price shall cover the cost of supply and erection of 3x25 mm copper connections between the earth contact assembly and the structures.

ITEM No. 13(e): Extra on item 13(a), (b) or (c) for an interlocking device.

The price shall cover supply and erection of an inter locking mechanism on an isolator to permit working of two or more isolators or an isolator and an interrupter in a desired sequence. This item shall be applicable individually for each isolator or interrupter.

NOTE: Prices under item 13 do not include the cost of supply and erection of (i) any post insulator to support jumpers/busbars which shall be paid for under item 11(b), (ii) flexible jumper connection which will be paid for under item 15 and (iii) busbar/bus-rod terminals which will be paid for under item 26(b) or (c). The price does not include also the cost of supply and erection of an aluminium/copper busbar or a copper bus rod the cost of which will be paid for under item 26(a)(i) or 26(a) (ii), as applicable.

ITEM No. 13(ax), 13(bx) and 13(cx): Supply of Post and Operating Rod Insulators for Single and Double Pole Isolator for Item 13(a), 13(b) & 13(c)

The price shall cover only supply of 25 kV Solid Core Post and Operating Rod Insulators for execution of work covered under item 13(a), 13(b) & 13(c) respectively. Erection cost of insulators are inclusive in items 13(a), 13(b) & 13(c).

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

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

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

ITEM No. 15(a)(i): Supply and erection of 105 Sq. mm (19/7/1.02 mm) Large copper jumpers.

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

ITEM No. 15(a)(ii): Supply and erection of 50 Sq.mm (19/1.8 mm) small copper jumpers.

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.

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

ITEM No. 15(a)(iii): Supply and erection of a copper jumpers (65 Sq mm catenary)

The price shall cover the supply of 65 sq mm catenary wire & 50 sq mm Small Jumper and on a flat rate basis, the supply of all components and fittings required for providing a flexible 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.

The price shall also cover the erection of the complete jumper assembly including jumper wire. The price shall be applicable for jumper connections using 65-Sqmm catenary wire in any combination required for lightening arresters and isolators etc., not included under item 6(a), 10, 15(a)(i), and 15(a)(ii). The supply of all components and fittings including catenary wire and the erection of all the components and fittings including the catenary wire for providing double catenary contact wire in place of catenary under overline structures as per DRG. No. ETI/OHE/SK/446 and ETI/OHE/SK-529, with latest mod. respectively will also be payable under this item, treating the double catenary as one jumper irrespective of its length including the catenary/contact wire ending clamp.

ITEM No. 15(az)(iii): Supply and erection of a copper jumpers (65 Sq mm catenary).

Same as item 15(a)(iii) but excluding supply of Catenary wire.

ITEM No. 15(a)(iv) : Supply and erection of copper jumpers (5 mm dia dropper wire).

The price shall cover supply of conductors/ jumper wires, and on a flat rate basis, the supply of all components and fittings required for providing a single strand / flexible copper jumper connection not included under items 6(a), 10, 15(a)(i), 15(a)(ii) & 15(a)(iii), including supply of parallel clamps, bi-metallic and Aluminum Copper Al-Cu strips, wherever required, including supply of bolted type terminal connector where ever required.

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

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

ITEM No.15 (b) : Supply and erection of an aluminum jumper.

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

ITEM No.15 (c) : Supply and Erection of Insulated Catenary cable in the span under Over-Line Structure.

The price shall cover supply of insulated catenary wire, catenary splice (1090) for each location and required dropper clip and erection of the same for each location. The prices shall also cover erection and adjustment of special droppers wherever required. The insulated catenary wire to be supplied shall be as per RDSO's specification No. ETI/OHE/75(04/95) with A&C slip Nos.1&2(with latest spec.). The work shall be executed in accordance with drawing No. ETI/OHE/ SK/570, with latest mod. The price shall also cover the cutting of existing Catenary wire, supply and erection of all materials and components including adjustment of dropper wires.

Item No. 15 (d): Supply of materials and erection of a large copper jumper 160 Sq. mm between Aluminum bus and cross feeder.

This jumper shall be provided between 36 mm Aluminum bus and the copper cross feeder at SP/SSP/FP/BT locations. The price shall cover the supply of 160sqmm flexible copper jumper wire, made of annealed stranded 100% pure copper conductor as per RDSO's specification ETI/OHE/3(2/94) with A&C Slip No 1

(latest spec.), all components and fittings required for providing a flexible copper jumper (160 Sq. mm) and connection between 36 mm Aluminum bus and cross feeder including Terminal connector 19mm multiple hole bolted type (1009), parallel clamps (1050-3), Al-Cu bimetallic strips, fasteners. The price shall also cover the erection of the complete jumper assembly including jumper wire.

Item No. 15 (e): Supply of materials and erection of a large copper jumper 160 Sq. mm between cross feeder and OHE.

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

ITEM No. 16 (a)(i): Supply and erection of a structure bond.

The price shall cover supply of all materials including mild steel flat required to provide a structure bond connecting a traction mast or structures to the nearest non-track circuited rail, or earth electrode, including all fasteners at both ends. The price shall include shaping and drilling of the bond and erection of all materials including the bond. The price shall also include provision of heat shrinkable PVC tube for structure bond under track circuited rail. This would also cover connection or earthing terminals of 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. 16 (a)(ii) : Supply and erection of a Galvanized steel stranded Wire structure bond.

The price shall cover supply of all materials including Galvanised steel stranded wire required to provide a structure bond connecting a traction mast or structures to the nearest non-track circuited rail including all fasteners at both ends as per RDSO's drawing No. TI/DRG/OHE/GTBLUG/ RDSO/0001/04/0. The price shall include fixing of lugs and drilling of the rails and erection of all materials including the bond. The price shall also include provision of heat shrinkable PVC tube for structure 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.

ITEM No. 16(b): Supply and erection of longitudinal bond.

The price shall cover the supply of all materials including mild steel flats, fasteners etc. required to provide longitudinal bond connecting two rails at the rail joint at the locations to be specified by the Purchaser. The price shall include shaping and drilling of the bond and erection of all materials including the bonds.

ITEM No. 16(c) : Supply and erection of transverse and special bond.

The price shall cover supply of all materials including mild steel Flats, fasteners etc. required to provide transverse bond connecting rails of the same/ adjacent tracks at the locations to be specified by the Purchaser. The price shall also cover the supply of all materials including mild steel flat to provide special bonds at a level crossing, foot over/road over bridge/protective screen etc. for which the location will be specified by the Purchaser. The price shall include shaping and drilling of the bond and erection of all materials including the bond.

ITEM No. 17(a) : Supply and erection of single earth electrode.

The price shall cover supply and erection of an earthing station with a single pipe embedded into the ground 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. 17(b) : Extra for special embedment of earth electrode.

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

ITEM No. 17(c) : Supply and erection of earth bus.

The price shall cover the supply of all materials including 50 mm x 6 mm mild steel flats for providing earth bus. The price shall also cover erection of earth bus either buried at a depth of 300 mm below ground level painted with 2 coats of red oxide zinc chromate primer and 2 finishing coats of bitumen as per the particulars specified in para 2.1.49 or fixed on wooden gutties on walls. It shall include connecting the earth bus to earth electrodes and to various floor-or-wall-mounted equipments or structures to be earthed and also connections to non-track-circuited rails, wherever required it shall also cover the cost of making recesses in concrete foundation blocks or floor or cubicles and covering them up. The connection of earth strips to each other shall be made either by riveting or by welding. The connection of earth strips to various equipment, structures or fencing post shall be made with G.I. bolts and nuts and spring washer/ lock-nuts.

ITEM No. 17(d) : Supply and erection of copper strips for equipment earthing.

The price shall cover supply and erection of 25mmx3mm copper strips to connect the earth terminals of equipments like potential transformers, lightening arrestors, L.T. supply transformers and booster transformer to the main masts of the gantries on which they are mounted. The price shall cover all fastenings required for fixing the copper strips along any structure member of the gantry.

ITEM No. 17(e) : Supply and erection of 8 SWG G.I WIRE for earthing.

The price shall cover supply and erection of 8 SWG G.I wire per Meter, used for earthing at remote control cubicles and fencing panels.

ITEM No. 17(h): Supply and Erection of Earthing station at Switching Posts (SSP & SP) with Conventional earthing system.

The rate covers cost of supply & erection of one set of earthing station for single line/single track. The earthing station using 13 meter long Buried Rail, shall be as per RDSO SMI No. TI/SMI/0032 with the latest amendments thereof.

The released Rail shall be made available by the purchaser to the contractor at any location on "as is where is" basis. Contractor shall transport the rail upto site of installation. The price covers transportation of rail, excavation of trench 0.6X15mX1m from the ground level, lowering of Rail duly prepared into the trench and refilling the soil including compaction and making the surface good after connection to earth electrodes and Running Rails.

The price shall cover the cost of supply of 75X8 mm Galvanized flats for connection between Buried Rail and Earth electrode /Running Rail and erection of 75X8 mm Galvanized flats for connection between Buried Rail and Running Rail. Price shall also cover cost of required Nut Bolts, Copper rivets, Plain/Spring Washers etc. including shaping and drilling of 75X8 mm galvanized flats.

Price does not cover:-

- i. Cost of supply and erection of 2 nos earth electrodes which is payable under item 17(a) in schedule-1 section 3.
- ii. Connection between Buried Rail and these earth electrodes, which is payable under Erection portion of item 16(a)(i) in schedule-1 section 3.

ITEM No. 18(a) : Supply and Erection of 25 kV, SF-6 gas filled Interrupters.

The price shall cover supply of 25 KV, AC, 50 Hz, Single Pole, outdoor type, SF-6 Gas Interrupters complete with all accessories and components as per RDSO's specification No. ETI/PSI/167(09/97), with latest spec. at site and erection of the same complete with supporting frame-work and terminal connectors. The price for erection shall include alignment and grouting of the Interrupter on its foundation block and mounting of accessories, if any, in their respective positions. The required SF-6 gas will be supplied by the Contractor and make his own arrangements for filling of the same. The price shall also cover supply and erection of enameled number plates. All necessary tools, equipments instruments, including power supply required for carrying out necessary checks, tests and commissioning shall be arranged by the Contractor.

NOTE: The replenishment of SF6 gas required due to leakages during the warranty period shall be done by the Contractor at his own cost.

ITEM No. 18(b) : Supply and Erection of 25 kV, vacuum type Interrupters.

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

ITEM No. 19: Supply and erection of 25 KV Potential Transformers (Type-I).

The price shall cover supply and erection of a 25 kV potential transformer type-I complete with all fittings and accessories as per relevant specifications, including terminal connectors and fixing bolts. The price for supply and erection shall include proper alignment of the transformer in position. The price shall also cover the supply and erection of an enameled number plate and fixing bolts. The price shall not include the cost of any small parts steel work.

ITEM No. 20(a): Supply and erection of 42 kV lightening arrestors.

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

ITEM No. 20(b): Supply and erection of lightening arrestors 7.5 kV.

The price shall cover supply and erection of 7.5 kV lightening arrestor complete with all fittings and accessories. The cost of supply and erection shall include proper alignment of the lightening arrestor in position. The price shall not include the cost of any small parts steel work.

ITEM No. 21: Supply and erection of terminal boards in control cubicles.

The price shall cover supply and erection of a wall mounted terminal board with six numbers of two-way terminal blocks for connecting the cables from the outdoor equipment of a switching station as per Railway Drawing given in Annexure-1(Part-V).

ITEM No. 22(a): Supply and erection of an iron clad 110 V D.C. fuse box.

The price shall cover supply and erection of a 15A, 110V iron clad two-way fuse box on the wall inside the remote-control cubicles. The fuse box shall be complete with two fuse carriers and bases.

ITEM No. 22(b): Supply and erection of iron clad 230 V A.C. fuse box.

The price shall cover supply and erection of a 15A, 230V, A.C. iron clad 4-way fuse box on the wall inside the remote-control cubicle, for heater supply of interrupters. The fuse box shall contain four fuse carriers and bases.

ITEM No. 23: Supply and erection of lead acid batteries.

The price shall cover supply and erection of 110V, 40AH lead acid battery complete with stand, accessories and a tool board. The price for erection shall include installation and connecting up of the battery, but exclude the cost of connecting cables (cable will be supplied by the purchaser), erection of which will be paid for under item 25. Price shall include supply of 110V, 40AH lead acid battery complete with accessories and connectors as per relevant RDSO's specification given in Annexure-1. Price shall also cover supply of Mild Steel stand, electrolyte and Tool Board with thermometer, hydrometer & wrench.

ITEM No. 24: Supply and erection of battery chargers.

The price shall cover supply and erection of battery charger for a 110 V, 40 AH lead acid battery complete with connecting lead and plug for connection to 230 V A.C. supply. The price for erection shall include mounting of the charger in position and connecting it up to the 230 V A.C. distribution boards, which will be provided by the Purchaser in the control cubicles. The price shall not include supply and erection of any cable for connecting the charger to the 110 V battery which shall be paid for under item 25.

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

ITEM No. 25(a): Control and Indication.

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

ITEM No. 25(b): Heater Supply.

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

ITEM No. 25(c): Catenary Indication

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

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

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

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

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

NOTE:

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

- ii. for purposes of payment fraction of a metre in the total length of cable of each type used at a switching station shall be rounded off to the next higher metre.
- iii. Price under item 25 do not include cost of concrete cable trenches which will be paid for under item 2(c).

ITEM No. 26(a)(i): Supply and erection of bus bars- Aluminum bus bar 36 mm x 28 mm

The price shall cover supply and erection of aluminum bus bars 36mm x 28mm including bending, shaping and clamping on to insulators, connectors or equipment terminals.

ITEM No. 26(a)(ii): Supply and erection of bus bars- Solid copper bus bar 18 mm

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

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

ITEM No. 26(b)(i) to (vii): Supply and erection of aluminum bus-bar connectors

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

ITEM No. 26(c)(i) to (iv) : Supply and erection of solid copper bus-bar connectors

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. 27(a): Supply, Erection, oil filtration, testing and commissioning of 25 kV/240 V 10 kVA L.T. supply transformers.

The price shall cover Supply of 25 kV/240V 10 kVA LT supply transformers, at site, as per the RDSO's specification indicated in Annexure-1 of Part-V of this tender paper, and erection of the same complete with terminal connectors on a mast or gantry. The price shall be applicable for transformers mounted on steel pedestals at switching stations also. The price shall also cover supply and erection of an enameled number plate of approved design. The price shall also cover oil filtration and pre- commissioning tests as approved by the railways. The contractor shall make his own arrangement for oil filtration equipments, as well as power supply required for the same. All necessary tools, equipments, instruments required for carrying out oil filtration/ checks/tests and commissioning shall be arranged by the contractor.

ITEM No. 27(b) : Supply, Erection, oil filtration, testing and commissioning of 25 kV/240 V, 5 kVA L.T. supply transformers.

The price shall cover supply of 25 kV/240 V, 5 kVA LT supply transformers, at site, as per the RDSO's specification indicated in Annexure-1 of Part-V of this tender paper, and erection of the same complete with terminal connectors on a mast or gantry. The price shall be applicable for transformers mounted on steel pedestals at switching stations also. The price shall also cover supply and erection of an enameled number plate of approved design. The price shall also cover oil filtration and pre- commissioning tests as approved by the railways. The contractor shall make his own arrangement for oil filtration equipments, as well as power supply required for the same. All necessary tools, equipments, instruments required for carrying out oil filtration/ checks/tests and commissioning shall be arranged by the contractor.

ITEM No. 27(c): Supply, Erection, oil filtration, testing and commissioning of 25 kV/240 V, 25 kVA L.T. supply transformers.

The price shall cover Supply of 25kV/240V 25 kVA LT supply transformers, at site, as per the RDSO's specification indicated in Annexure-1 of Part-V of this tender paper, and erection of the same complete with terminal connectors on a mast or gantry. The price shall be applicable for transformers mounted on steel pedestals at switching stations also. The price shall also cover supply and erection of an enameled

number plate of approved design. The price shall also cover oil filtration and pre- commissioning tests as approved by the railways. The contractor shall make his own arrangement for oil filtration equipments, as well as power supply required for the same. All necessary tools, equipments, instruments required for carrying out oil filtration/checks/tests and commissioning shall be arranged by the contractor.

ITEM No. 27(d) : Supply, Erection, oil filtration, testing and commissioning of 25 kV/240 V, 50 kVA L.T. supply transformers.

The price shall cover supply of 25kV/240V, 50 kVA LT supply transformers, at site, as per the RDSO's specification indicated in Annexure-1 of Part-V of this tender paper, and erection of the same complete with terminal connectors on a mast or gantry. The price shall be applicable for transformers mounted on steel pedestals at switching stations also. The price shall also cover supply and erection of an enameled number plate of approved design. The price shall also cover oil filtration and pre- commissioning tests as approved by the railways. The contractor shall make his own arrangement for oil filtration equipments, as well as power supply required for the same. All necessary tools, equipments, instruments required for carrying out oil filtration/checks/tests and commissioning shall be arranged by the contractor.

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

ITEM No. 28 : Supply without Insulator and Erection of 25 kV D.O. Fuse Switch

The price shall cover supply and erection of 25 kV drop out fuse switch complete with all mounting accessories and terminal connectors as required but without the cost of the supply of 25 kV solid core insulator. The price shall not include erection of small parts steel work.

ITEM No.28(x) : Supply of Post Insulators for Item 28

The price shall cover only supply of 25 kV Solid Core Insulators (Post Insulators) for execution of work covered under item 28. Erection cost of insulators is inclusive in item 28.

ITEM No. 29(a) : Erection, oil filtration, testing and commissioning of Booster Transformers

The price shall cover erection of a 150 or 100 KVA booster transformer supplied by the purchaser complete with terminal connectors on a gantry. The price shall include proper alignment of the transformer on the gantry, but shall exclude any steel work required for mounting the transformer. The price shall also cover supply and erection of an enameled number plate. The price shall also cover oil filtration and pre-commissioning tests as approved by the Railways. The contractor shall make his own arrangement for oil filtration equipments as well as power supply required for the same. All necessary tools, equipments, instruments required for carrying out oil filtration /checks/tests and commissioning shall be arranged by the contractor.

ITEM No. 29(b): -DELETED-

ITEM No. 30(a)(i): Supply and erection of fencing panels at Switching Stations

The price shall include supply and erection of fencing panels painted with two coats of red oxide zinc chromate primer to IS:2074:1979 and finished with two coats of aluminum paint. The prices shall not include supply and erection of fencing up-rights, anti-climbing devices but shall include the cost of fasteners and the price shall be for a metre length of the panels, 2.4-meter height measured in the plan view of the appropriate approved drawings.

ITEM No. 30(a)(ii): Supply and erection of fencing uprights

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

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

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

ITEM No. 30(b)(ii): Supply and erection of anti-climbing device for B.T. Stations

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

ITEM No. 30(b)(iii): Supply and erection of anti-climbing devices for L.T. Supply Transformer Stations.

The price shall cover on a lump sum basis the supply and erection of anti-climbing device consisting of galvanised steel fixtures mounted on the masts below the transformer. The price shall be for each mast provided with the devices.

ITEM No. 30(b)(iv): Supply and erection of Anti Monkey Menace.

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

ITEM No. 31: Modifications to erected equipment

The price under this item shall cover various modifications required to be carried out, in a section of completely erected overhead equipment energised or fit to be energised, certified as such by the Purchaser's Engineer provided such modifications are not on account of non-compliance of specifications, approved drawings and instructions given by the Purchaser for the execution of the work from time to time, during the progress of the work. All the prices are on a flat basis and cover only the important and most frequent type of modifications required to compensate the contractor for additional work involved. No payments shall be admissible for other minor modifications which may be necessary in the course of work. All work originally done shall be paid for at normal rates for items 1 to 30 of schedule 1 as applicable. Dismantling of foundations and masts/structures shall be done by the Purchaser at his own cost.

In all the following cases, the dismantled equipment shall be handed over by the contractor to the Purchaser's Engineer at the spot of dismantlement or at the contractor's Depot, as required by Purchaser's Engineer. Where prices under this item are applicable, the Contractor shall finalise the quantities of work jointly with the Purchaser's Engineer before taking the work in hand.

ITEM No. 31(a): Transfer of equipment from one mast or support to another

The price shall cover transfer of overhead equipment to a bracket assembly on a new mast or support and dismantling of the erected bracket assembly from the old mast of support and consequent adjustment to overhead equipment required such as re-spacing of droppers (including cost of dropper wire), leveling etc. the foundation and steel work and bracket assembly for the new mast or structure will be paid for under appropriate items 2, 3 and 4 respectively.

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

The price shall cover dismantling of an existing bracket assembly/assemblies and provision of a multiple cantilever cross arm wherever required, supplied free of cost by the Purchaser and erection of bracket assemblies on the multiple cantilever cross arm. The price shall include any consequential adjustment to traction overhead equipment such as re-spacing of droppers, leveling, etc. This price shall not include the price for supply and erection of any additional bracket assemblies, which will be paid for under item 4.

ITEM No. 31(c): Re-adjustment of a head-span

The price shall cover the re-adjustment of the head span polygon to enable the additional equipment/s to be suspended from the head span. Payment for the suspension of additional overhead equipment shall be made for under item 5 as extra to item 31(c).

ITEM No. 31(d): Dismantling of overhead equipment

The price shall cover cost of dismantling of equipment including Terminations, tensioning devices, guy rod assemblies, bracket assemblies and associated small parts steel work (excluding components embedded in concrete).

ITEM No. 31(e): Dismantling of feeder/return conductor

The price shall cover dismantling of feeder, or return conductor including guy rods, terminations, suspension assemblies, super masts and associated small parts steel work.

ITEM No. 31(f): Splicing and extension of anchored overhead equipment

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

ITEM No. 31(g): Dismantling of a section insulator

The price shall cover cost of 107 sq mm contact wire, 65 sq mm catenary wire, dropper wire and dismantling of a section insulator, splicing of catenary and contact wires and the necessary adjustments to droppers. The price shall include the supply of required copper conductors for the adjustment. The dismantled equipment shall be handed over to the Purchaser's Engineer at the spot of dismantling or at the contactor's Depot/s.

ITEM No. 31(gz): Dismantling of a section insulator

Same as item 31 (g) but excluding supply of Contact and Catenary wires.

ITEM No. 31(h): Slewing and putting back of OHE in original shape

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

Additional components or materials used during such restoration or re-adjustment will be paid for at rates included in schedule 3 plus handling charges of 10% provided such use has, in the opinion of the Purchaser, become necessary due to reasons beyond the control of the Contractor.

ITEM No. 31(i) Dismantling of an isolator

The price shall cover cost of dismantling of an isolator, single or gang-operated, including dismantling of connections to the overhead equipment and associated small parts steel work.

ITEM No. 31(j) Dismantling of a post/pin insulator

The price shall cover cost of dismantling of a pedestal pin insulator including dismantling of jumper connections, if any and associated small parts steel work.

NOTES FOR ITEM No. 31: All claims under this item have to be supported by the following certificate to be furnished by the Contractor on the connected bill.

- (a) The modifications are not on account of non-compliance of specifications approved and instructions given by the Railways for execution of works.
- (b) The quantities of work involved for modification have been finalised jointly with the Railway's Engineers before taking the work in hand.
- (c) The dismantled material has to be handed over to the Purchaser's representative.

ITEM No. 31 (m)(i) & 31(m)(ii): Manning of Switching Stations/Traction Sub-stations

The prices shall cover the payment/wages to the staff to be deployed at each switching station and traction sub-station as directed by purchaser's Engineer. Manning shall be done round the clock. The staff to be deployed must be skilled and fully conversant with operation of various equipments installed in switching station and traction sub-stations. The staff shall be deployed after test and trial by purchaser and on issue of competency certificate. The staff deployed shall act in accordance with instructions/directions given by Traction Power Controller/representative of purchaser. The staff shall not leave the working place (Switching station and Traction Sub-station) in any case without prior permission of purchaser's representative. The price shall cover conveyance charges to the staff for going and coming to the working place. The period of manning shall be decided by the purchaser during execution of contract and manning shall commence on receipt of intimation in writing from the purchaser one month in advance.

Note: In case Feeding Post is situated in adjacent to TSS same will also be included for manning along with TSS.

ITEM No. 32(a), 32(b), 32(c), 32(d): Extra on erection rate for work under a power block

The price under this item cover extra charges over and above erection rates of TENDER FORM-5 of PART-I of Tender Document for erection of equipment in the vicinity of energized overhead equipment and feeders or erection of equipment with joints equipment already 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 rates of the item 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 a **4 hour or more in a day**. Where the prices under this item are applicable, the Contractor shall finalise 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.

ITEM No. 33(a): Extra on erection rates for stringing work manually under Item No. 6(a) to 7(c)

The price under this item covers extra charges over and above the erection rates of item 6(a) to 7(c) of Schedule-1(Pt. I, Ch. IVA) without use of Wiring Train/Tower Wagon. The price payable under this item shall be 50% extra over the erection rates 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.

ITEM No. 33(b) : Extra on erection rates for steel work manually under Item 3(a)(i), 3(a)(ii), 3(b)(i), 3(b)(ii) & 3(b)(iii)

The price under this item covers extra charges over and above erection rates of item No. 3 (a) (i), 3 (a)(ii), 3 (b)(i), 3 (b)(ii) & 3 (b)(iii) of Schedule-1(Pt. I, Ch. IVA) without use of rail crane. The price payable under this item shall be 50% extra over the erection rates of 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.

Note : Where the works under these items 33(a) i.e., "Manual Stringing" and 33(b) i.e., "Manual Erection of Masts" are feasible, the Contractor shall finalise the quantities of various items of work jointly with the purchaser's engineer prior to taking up the work in hand, subject to a maximum of two percent each for item 6(a) to 7(c) and 3 (a) (i), 3 (a)(ii), 3 (b)(i), 3 (b)(ii) & 3 (b)(iii) of Schedule-1.

Item No.34(a): Supply of materials and construction of Super-structure of SP/SSP building

The price shall cover the construction of Control room of SP/SSP building above plinth and will include labour and material cost for the following works:-

- i. RCC work in plinth, lintels, chajja, Roof slab.
- ii. Pre-cast RCC slab, RCC jali.
- iii. Cement concrete in flooring and cable trench.
- iv. Brick masonry in walls.
- v. Plastering works.
- vi. Provision of Doors, windows grills, rolling shutters, water pipe line ventilators and painting thereof.
- vii. White washing and colour washing.
- viii. Acid proof or painting of floor and wall in battery room.
- ix. Spreading of stone metal.
- x. Provision of RCC pipe etc.
- xi. Any other item of work required to complete the work which has not been mentioned/included above shall also be done by the contractor and nothing extra shall be paid the same.

Construction of switching station shall be done strictly as per RDSO's drawing No. ETI/C/0067 (Latest version as given in Annexure-XXVII of PART-V of Tender Document) and technical specification included in Part-II Chapter-VIII of the Tender Papers.

The price shall cover the provision of all shuttering, frame works, arrangement of water, all tools and plants required for the work, consumable materials etc.

The materials used for the work such as brick, sand, stone aggregates, steel for door frame, grill/Rolling shutters, RCC pipe shall be of best quality in accordance with Railways specification. The price shall also cover the provision of suitably sized of opening on the wall, for installation of Exhaust fan in the battery room.

Item No. 34 (b) : Cement concrete for foundation with stone ballast 40 mm nominal size rammed in layers not exceeding 15 cm thick in cement and sand, ratio 1:3:6 :-

The price covers the supply of all necessary materials for casting cement concrete including cement, sand, ballast, arrangement of water and labour. The price shall cover the arrangement of all tools and plants such as mixer, vibrator (mechanical/electrical).

The price shall cover provision of shuttering and dismantling thereof. The price shall cover cost of screening and washing of aggregate mixing as well grinding of mortar, preparation, deposition and curing of concrete and rendering or finishing the exposed surface were required. The price shall cover the cost of transportation of all materials, tools and plants to the site or from the site.

Item No. 34 (c) : RCC work of foundation

The price shall cover the price of reinforcement concrete work for construction of column including supply of cement, concrete, structuring arrangements and dismantling thereto but excluding cost of steel required for reinforcement which has been covered under item 3(g). The concrete mixture shall also be before casting in accordance with IS:456/2000.

Item No. 34(d) : Brick work in foundation, plinth ,Retaining walls and drainage

The price shall cover all labour and materials including cement and brick. The price covers supply, fixing, erecting, and removal of scaffolding, timber or steel frame work, shuttering, centering etc. The price

covers arrangement of water at site, mixing of mortar, soaking bricks and all watering during the work and prescribed period of curing afterwards. The price shall cover the arrangement of all tools and plants required for work. The price shall cover all consumable materials e.g., fuel, oil, string, rope, wedges etc.

Item No. 34(e)(i): Construction of retaining wall with Random rubble masonry in cement & sand 1:6

The price shall cover all labour and materials including cement. The price shall cover supplying, fixing, erecting, and removal of scaffolding, timber or steel frame work, Shuttering, centering etc. The price shall cover watering during the work. The price covers the arrangement of water at site.

NOTE:- In case the stone rubbles are not available nearby the work site then the Retaining wall shall be constructed by Brick Masonry work and the payment should be made to the contractor under item 34 (d).

ITEM No. 34(e)(ii) : Construction of retaining/baffle wall with RCC M-20

The price covers the supply of all necessary materials for casting cement concrete (RCC) including cement, sand, ballast, arrangement of water and labour. The price shall cover the arrangement of all tools and plants such as mixer, vibrator (mechanical/electrical).

The price shall cover provision of shuttering and dismantling thereof. The price shall cover cost of screening and washing of aggregate mixing as well grinding of mortar, preparation, deposition and curing of concrete and rendering or finishing the exposed surface where required. The price shall cover the cost of transportation of all materials, tools and plants to the site or from the site. The price shall be exclusive of the cost of Steel required for Reinforcement which shall be paid under Item 3(g). The price shall also include dismantling of all connected temporary arrangements, back filling as required and removal of spoil.

Note: Normally construction of retaining/Baffle wall requires digging for base preparation. Erection charges up to ground level will be paid as per erection rate of item 2(b)/2(bz) for soil other than hard soil & rock. For hard soil & rock, erection rate for base preparation up to ground level shall be paid as per erection rate of Item 2(a)(i)/2(az)(i) & item 2(a)(ii)/2(az)(ii) respectively.

Item No. 34(f) : Earth work in excavation and filling

The price shall cover the earth filling at the site of SP/SSP control room at specified area upto required level. The price covers all labour and materials required including arrangement of necessary tools and plants required for the work. This price also includes the transportation cost of earth in case, earth is not available for filling up the nearby area. The price covers the watering and ramming of levelled/ filled earth either manually or by mechanical means. The price shall cover arrangement of necessary water required for the work.

Item No. 34(g) : Earth work in excavation for foundation

Same as for above, item No.34(f) except that no watering and ramming of earth is required in this case, but includes the disposal of excavated earth /leveling etc. for foundations, drainage etc.

Item No. 34(h): Excavation of pile 100 to 200 mm dia with Single under ream up to 3.5 m deep

The price shall cover the cost of all labour tools and plants required at site during making of a 100 to 200 mm dia bare hold along-with single under ream upto a depth of 3.50 metre. The excavated earth from the bare hole shall be disposed of and leveled all around. The price shall also cover the cost of all consumable materials and water required at site during execution of work.

Item No. 34(i) : Plastering of Retaining wall

The price shall cover the supply of all materials and labour cost including cement for plastering of Retaining wall either constructed by Ruble masonry work or by Brick work. Plastering work shall be done by cement mortar in 1:4 (1cement and 4 sand). The price shall also cover the cost of arrangement of necessary water required for the work. The price shall cover the cost of necessary tools and plants required for the work and necessary consumable items. Nothing extra shall be paid to the contractor for

any rehandling of materials from the place of delivery to place of work. The price shall cover the cost of cleaning and wetting the surface of the work. The price shall also cover the cost of curing of the plastered surface as per extent practice.

Item No. 35 : Supply & Erection of materials for Internal and External Lighting of Switching Station Building (SP/SSP).

The price shall cover all cost of labour and materials required for the work. Wiring work shall be done in accordance with IE rules, IS-732 and specifications given in Part-II Chapter-VIII of the tender paper. The price shall also cover the cost of testing and commissioning of the installations. The various activities involved in the work are as follows:-

- i. Fixing of MS conduits on wall and drawing of wires for circuit and point wiring.
- ii. Provision of C.I. Switch boxes of appropriate size concealed in wall at appropriate height with phenolic laminated (Hylum) sheet for fixing of switches, plugs etc. Provision of Main Board and Distribution Boards and connection thereof.
- iii. Provision of light fittings, Exhaust fan, Outdoor luminaries complete with tubes and bulbs.
- iv. Provision of Earthing station and connection between earthing station to Main Board with the help of 8 SWG GI wire. Earthing work shall be done in accordance with IS:3043/1987.
- v. Materials such as light fittings, Exhaust fan, switches sockets, Ceiling Rose, Socket outlets all shall be with ISI mark and shall be one of the makes mentioned in technical specification.
- vi. Provision of Switches, sockets outlet, Ceiling Roses on respective switch boards and points in appropriate numbers and connection thereof.
- vii. Provision of 150-Watt HPSV Street light fitting complete in all respect including lamp on the wall of the building.
- viii. After completion of wiring work necessary testing of wiring and Earthing station shall be done and results submitted to the site-in-charge duly signed by representatives of both the contractor and purchaser.

Item No. 36 (a) : Unloading of all type of Steel Structures :

The price shall cover unloading charges for all type of steel structures (BFB/ RSJ, B-Series, Spl structures, N, O, R type structures etc.) from BFR/ trailer/ truck over and above the requirement given by the contractor for the completion of the present work or actual qty utilised in the completion of work; whichever is higher.

Item No. 36(b): Loading of all type of Steel Structures:

The price shall cover loading charges for all type of steel structures (BFB/ RSJ, B-series, Spl structures, N,O & R type structures etc.) into BFR/ trailer/ truck over and above the requirement given by the contractor for the completion of the present work or actual qty utilised in the completion of work; whichever is higher.

Item No. 37 (a): Unloading of all type of Copper & Aluminum conductors :

The price shall cover unloading charges for all type of copper conductors (contact wire, catenary wire, Dropper, Bridle wire, Jumpers etc) and Aluminum conductors (spider conductor etc) into BFR/ Tower wagon/ trailer/ truck over and above the requirement given by the contractor for the completion of the present work or actual qty utilised in the completion of work; whichever is higher.

Item No. 37 (b) : Loading of all type of Copper & Aluminum conductors :

The price shall cover loading charges for all type of copper conductors (contact wire, catenary wire, Dropper, Bridle wire, Jumpers etc) and Aluminum conductors (spider conductor etc) into BRF/ Tower wagon/ trailer/ truck over and above the requirement given by the contractor for the completion of the present work or actual qty utilised in the completion of work; whichever is higher.

2.2 CHAPTER-II

EXPLANATORY NOTES OF SCHEDULE (FOR TRACTION SUB-STATION WORKS) Schedule-1, Section-8

*****DELETED*****

2.3 CHAPTER-III

EXPLANATORY NOTES OF SCHEDULE (For 220 KV TSS) Schedule-1, Section-9

*****DELETED*****

2.4 CHAPTER-IV

EXPLANATORY NOTES OF SCHEDULE (For 220 KV TSS ITEMS) Schedule-1, Section-10

*****DELETED*****

2.5 CHAPTER-V

EXPLANATORY NOTES OF SCHEDULE Schedule E – NS Items

NS Item No. 1 & 2: Supply & Erection of copper jumper wire from AT to OHE with components.

The price shall cover on a flat rate basis, the Supply & erection of all components and fittings required for providing a flexible copper jumper connection, including parallel clamps, bimetallic and aluminium copper Al/Cu strips, wherever required, and terminal or tee clamps at either end including jumper wire.

The price shall also cover the erection of the complete jumper assembly including jumper wire. The price shall not, however, be applicable for jumper connection already included under any item but shall be applicable for any jumper connections in any combination between feeders, L.T. transformers, drop-out switch, lightening arrestors for overhead equipments, isolators for overhead equipment and outgoing bus-bar for switching stations and booster stations, continuity jumper at boom anchor anti-creep will be payable under this item.

The price shall include the supply & erection of the complete jumper assembly wire and applicable for any jumper connection in any continuation between LT transformer, suspension, drop-out switch and OHE.

NS Item No. 3: Supply & erection of retro-reflective Sigma caution board with mounting arrangement (as per RDSO drg. no. TI/DRG/OHE/PLTBRD/RDSO/00036/12/D & spec. no. ETI/OHE/33A (12/97) Rev 8 or latest).

The price shall cover the cost of supply and erection of Retro-reflective Sigma Caution Board (as per RDSO Drg. No. TI/DRG/OHE/PLTBRD/RDSO/ 00036/12/D & Spec. No. ETI/OHE/33A (12/97) Rev.8) or latest with supply of fixing material (Clamp, back flat strip & fasteners etc) as per approval and RDSO's latest drawings and specifications using proper size of clamps, fasteners etc.

NS Item No. 4: Supply of retro reflective no. plates as per RDSO Drg. No. ETI/OHE/7503 or latest specification no. ETI/OHE/33A(12/97) or latest including acceptance test as per RDSO specification/ guidelines.

The price shall cover the manufacturing, supply of retro-reflective number plates as per RDSO Drg. No. ETI/OHE/P/7503 or latest and specification no. ETI/OHE/33A (12/97) Rev.8 or latest including type acceptance test as per RDSO latest specification / guidelines. The number plate shall be provided on

existing OHE structures (at various OHE masts / locations in electrified section over Moradabad Division) including Supply & Fixing of GI nut bolt size 10 x 35 x 30 mm. with four number new fiber washers with thickness 2mm, outer dia. 20 mm. and hole dia 12mm. The nut, bolts and washers shall be purchased from RDSO/CORE approved suppliers only. Inspection shall be done by Railway representative at manufacturer premises. The tenderer may see the drawing /specification as referred above in the office of Sr. DEE/TRD/MB on any working day, before quoting their rates.

NS Item No. 5: Fixing of retro-reflective type structure no. plates as per RDSO Drg. No. ETI/OHE/P/7503 or latest and specification no. ETI/OHE/33A(12/97) or latest.

The price shall cover the removing of each existing number plates from the existing OHE structures where ever required and fixing of retro- reflective number plates as per RDSO Drg. No. ETI/OHE/P/7503 or latest and specification no. ETI/OHE/33A (12/97)Rev.8 or latest including type acceptance test as per RDSO latest specification / guidelines. The number plate shall be provided on existing OHE structures (at various OHE masts / locations in electrified section over Moradabad Division) including Supply & Fixing of GI nut bolt size 10 x 35 x 30 mm. with four number new fiber washers with thickness 2mm, outer dia. 20 mm. and hole dia 12mm. Released number plates with GI nut bolt shall be deposited with the concerned depot incharge i.e. SSE/TRD who shall take it in their ledger for proper accountal.

NS Item No. 6: Supply of XLPE insulated PVC sheathed Aluminum conductor cable 70 sqmm, 2 core suitable for outdoor applications 1100-volt grade armoured aluminum cable from AT to distribution box.

The Cable shall be XLPE, insulated PVC sheathed aluminum conductor armored (Heavy duty) power cable suitable for outdoor application and of size 2 core, 70 Sqmm for working voltage 1.1KV volt grade conforming to I.S.7098(Part-I)1988 or latest. Cable shall be of latest RDSO approved supplier only. The price shall cover supply of L.T. power supply cable, between the L.T. supply transformer at mast/switching stations and L.T. board on the mast. The price shall cover supply of suitable cable boxes, if required, and connectors at both ends.

NS Item No. 7: Installation of XLPE insulated PVC sheathed aluminum conductor cable 70 sqmm, 2 core suitable for outdoor applications 1100-volt grade armoured aluminum cable from AT to distribution box.

The price shall cover installation and connecting up of L.T. power supply cable, between the L.T. supply transformer at mast/switching stations and L.T. board on the mast. The price shall cover erection of suitable cable boxes, if required, and connectors at both ends.

NOTE regarding Extra on erection of NS Items for item no. 1 to 7 above, if any: The price under this item will cover extra charges over and above erection rate of items for erection of equipment in the vicinity of energized overhead equipment and feeders or erection of equipment with joints equipment already energized or on energized equipment which calls for a power block (shutoff of traction power). The price payable under this item shall be 100% extra over the erection rate of the items, or otherwise mentioned, 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 hours 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. This work will be executed in Power Block and Contractor shall submit the power block programme well in advance (one week before) to concerned SSE incharge for taking permission from operating department as well as from SSE/TPC, so that work may be executed well in time in power block.

SECTION-B
CHAPTER-I

GENERAL SPECIFICATIONS
GENERAL

2.1.1 INTRODUCTION:

(a) This part of Tender papers is divided into eight Chapters and contains general, technical and other specifications for design and erection of complete 25 kV A.C. 50 Hz single phase traction overhead equipment, switching stations, booster transformer stations, L.T. supply transformer stations complete with foundations, structures, return Conductors and 25 kV feeders, if any. This part also gives reference to technical specifications of materials and components, procedure for submission of designs and drawings of basic arrangements, components and fittings designs and other typical designs relating to overhead equipment, switching stations and booster transformer stations and Traction Sub-stations. A list of the standard drawings is included in Annexure-XXVII, Part-V of Tender Document.

(b) SCOPE OF WORK:

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

(c) Indian Railways Schedule of Dimensions:

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

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

2.1.3 WIND PRESSURE:

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

2.1.4 SYSTEM PARTICULARS:

The nominal voltage of the overhead equipment will be 25 kV A.C. 50 Hz, single phase. The supply voltage may, however, rise up to 27.5 kV. One terminal of the 25 kV system will be solidly earthed at the traction sub-station and also connected to the running rails. The other terminal will be connected to the overhead equipment through switchgear provided at the traction sub-station and at the feeding station.

2.1.5 ROLLING STOCK:

(a) LOCOMOTIVES

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

(b) OVERSIZE CONSIGNMENTS

The specific requirement in regard to movement of steam locomotives and over size consignments for each section are indicated in part-III.

2.1.6 POWER SUPPLY:

(a) TRACTION SUB-STATIONS

Electric power will be supplied at 25 kV A.C. 50 Hz. single phase from traction sub-stations to feeding stations spaced 50 to 80 km apart along the track.

(b) SWITCHING STATIONS

Power supply will be controlled to the different sections of traction overhead equipment by switching stations. At these stations the switching will be affected by means of "Interrupters" which are single pole, non-automatic oil circuit breakers capable of repeatedly interrupting normal full load current. There are three types of switching stations-

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

(c) FEEDING STATIONS

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

(d) SECTIONING STATIONS

The sub-stations cannot, as a rule be paralleled and consequently a neutral section of overhead equipment with insulated overlaps on either side will be provided approximately midway between two consecutive feeding stations. Neutral sections may also be provided at feeding stations. Facilities to bridge the neutral section between feeding stations will be provided at sectioning stations.

(e) SUB-SECTIONING STATIONS

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

(f) RETURN CONDUCTORS

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

(g) BOOSTER STATIONS

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

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

OVERHEAD EQUIPMENT

2.1.10 TRACK:

(a) GAUGE AND TRACK CENTERS

The track gauge is 1676 mm (5'6"). In multiple track zones, the normal distance between track centers varies between 4270 mm (14') and 4420 mm (14'6").

(b) SPEED

The overhead equipment which shall be of the simple polygonal type and pre-sag should be designed for a maximum speed of 160 km/h (Approx. 100 miles/h) if regulated and for a maximum speed of 80 Km/h (Approx. 50 miles/h) if unregulated, unless otherwise specified in Part-III for any particular section.

Note: (i) The OHE shall be with swiveling type of cantilever having tension in the conductors regulated automatically, with a pre-sag of 50/100 mm.

(ii) Contact wire gradient should be 1 mm per meter and difference in contact wire gradient between two adjoining spans shall be 0.5 mm per meter.

(c) CURVES

The minimum radius permissible is 175 m (573 ft.) i.e., a 10° curve. Inside station limits, the curvature at a 1 in 8.5 turnout is 8 degrees i.e., of radius 219m (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 (see para 2.3.10). For purposes of design and erection

of overhead equipment, the actual super elevation as existing at site or as indicated to the contractor shall be adopted.

(e) LOW JOINTS

For low or loosely packed rail joints a difference of 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 tracks may be separate (See relevant drawing listed in Annexure-1, Part-V).

(g) DISPLACEMENT

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

2.1.11 SECTIONING:

(a) INSULATED OVERLAPS

Insulated overlaps are provided for facility of isolation. Some of the overlaps may be provided with manually operated isolators switches. In addition, for connecting the overhead equipment to booster transformers, insulated overlaps are indicated in the sectioning diagrams (see part-III).

(b) YARD SUPPLY

The sectioning diagram/s also indicate the tracks in stations yards and siding whose equipments is electrically independent from those of other tracks.

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

(c) SECTION INSULATORS

Section insulators shall be provided as indicated in the sectioning diagrams, or cross-over between main tracks and to isolate sections of overhead equipment in yards and sidings. Section insulators may also be used to form neutral sections at special locations as indicated in the approved drawings.

(d) Deleted

(e) FEEDERS & RETURN FEEDERS 25 KV ALONG TRACK FEEDERS

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

(f) RETURN CONDUCTOR

Return conductor may, be run on traction structures or masts. A single 'SPIDER' conductor shall be used for such return conductors.

(g) SCHEMATIC ARRANGEMENTS

The different arrangements of feeders, return feeders, 25 kV along track feeders and return conductors are shown in the drawing listed in Annexure-XXVII of PART-V of Tender Document.

(h) SECTIONING DIAGRAM

The provisional sectioning diagram/s of the sections to be electrified is/are included in part-III.

2.1.12 PANTOGRAPHS:

(a) The outline of the pantograph, its dimensions and its current collecting area are shown in a drawing listed in Annexure-XXVII of PART-V of Tender Document.

(b) NUMBER AND PRESSURE

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

(c) SPACING IN MULTIPLE HEADED TRAINS

The distance between adjacent running pantographs in the case of multiple heading would normally be 20 metres. This distance may, however, be reduced to 7.9 metre between two pantographs in very exceptional cases.

(d) INSULATION CLEARANCE

The electrical clearances for the pantograph on tangent tracks and on curves for design and erection of overhead equipment shall be based on the schedule of Dimensions mentioned in Para - 2.1.1(c) "Indian Railways Schedule of Dimensions".

2.1.13 OVERHEAD EQUIPMENT:

(a) BRIEF DESCRIPTION

Essentially the traction overhead equipment shall consist of a standard catenary wire from which a grooved contact wire is suitably suspended by means of droppers. In order to cater for a speed of 160 kmph the contact wire is given a pre-sag of about 50/100mm for 72 m span and reduced suitably for other spans.

(b) CATENARY

The catenary wire shall be either of cadmium copper 19/2.10mm, 65mm².

(c) CONTACT WIRE

The contact wire shall be grooved and made of hard drawn copper having 107 sq.mm cross section.

(d) DROPPERS

Droppers shall be made of hard drawn round copper wire; approximately 5 mm dia. Droppers shall be spaced not more than 9 m apart (see Annexure-XXVII of PART-V of Tender Document).

(e) ENCUMBRANCE

As a general rule, the nominal "encumbrance" i.e., the center distance between the catenary and the contact wire at the support shall be 1.40 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) JUMPERS

All jumpers connected to OHE conductors shall be of copper only. The in-span jumpers potential equaliser jumpers at insulated overlaps and neutral section, shall be of 50 mm sq. nominal, 19/1.8mm size. Flexible jumpers of nominal section 105mmsq, 19/7/1.06 mm size shall be used at overlaps, turnouts, crossings etc.

(g) BRIDDLE WIRE

Briddle wire for supporting contact wire for regulated tramway equipment shall be of Cadmium copper 7/2.10 mm in size.

(h) ANTI THEFT JUMPER

Anti-theft jumper of 50 mm sq. nominal, 19/1.8 mm in size shall be used in out of run wire of conventional OHE and copper cadmium anticreep wire as an anti-theft measure.

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

2.1.14 TYPE OF EQUIPMENT:

The overhead equipment used shall normally be either of the regulated or unregulated type. Unregulated tramway type equipment (contact wire only) may be adopted where specially indicated by the purchaser.

(a) REGULATED

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

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

arrangement may consist of anchoring the 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-XXVII of PART-V of Tender Document. The Purchaser shall indicate the type of anti-creeps to be adopted in the pegging plans.

(b) UNREGULATED

The unregulated type of overhead equipment has no provision for automatic regulation of tension of either the catenary or the contact wire.

(c) TRAMWAY TYPE EQUIPMENT REGULATED CONTACT WIRE ONLY

In tramway type equipment regulated, only a contact wire is provided without a continuous catenary or droppers. The tension in the contact wire is regulated. At support, bridle wire is used for supporting the contact wire.

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

2.1.15 PLANE OF CONTACT:

(a) REGULATED

The regulated overhead equipment shall be so erected that the contact wire has the designed sag.

(b) UNREGULATED

In the case of unregulated equipment, the contact wire shall have no sag at an ambient temperature of 35°C.

(c) TRAMWAY TYPE

In tramway type equipment, the contact wire will have its own natural sag when erected.

(d) DROPPER

Dropper charts to be used for standard span of regulated and unregulated overhead equipment would be supplied by the Purchaser. Dropper for non-standard spans, span 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.

2.1.16 TENSIONS:

(a) REGULATED

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

(ii) Deleted

(b) UNREGULATED

In unregulated equipment the tension in the catenary and in the contact wire at 35 degree C without wind shall be, 1,000 kgf in each conductor.

(c) TRAMWAY TYPE

In regulated type tramway equipment, the tension shall be 1,250 kgf.

2.1.17 CLEARANCE:

(a) GENERAL

The distance between live parts and parts at earth potential (for parts likely to be earthed) shall be as large as possible. In all cases, the clearances must not infringe the values given in schedule of Dimensions mentioned in Para - 2.1.1 (c) "Indian Railways Schedule of Dimensions".

(b) OVER BRIDGES & TUNNELS

The clearances which are to be made available at over bridges, signal, gantries and other over line structures shall be based on the above rules.

(c) PLATFORM SHEDS AND OTHER STRUCTURES

In the course of checking the overhead equipment pegging plans, the Contractor shall prepare 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-XXVII of PART-V of Tender Document. If these clearances are not available, the Contractor shall advise the Purchaser in time to enable the later to take up necessary modifications.

2.1.18 HEIGHT OF CONTACT WIRE:

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

(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 1 mm per metre on main lines and 10 mm per metre on sidings. The end span of any section with a gradient of contact wire shall have a slope not greater than half the main slope. Contact wire gradient should be 1 mm per meter and difference in contact wire gradient between two adjoining spans shall be 0.5 mm per meter.

2.1.19 STAGGER:

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

2.1.20 TERMINATION:

(a) GENERAL

Traction overhead lines shall be terminated using components specified to Chapter 2.4. The termination may be carried forward by one or two spans if anchoring facilities so require.

(b) Terminating wires shall be electrically connected to the conductors 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 swept shall be located in such a manner as to clear the zone of the pantograph under the worst conditions and as far away as is possible from live conductors.

2.1.21 TYPES OF STRUCTURES:

(a) The overhead equipment of main tracks in case of multiple tracks section shall be electrically and mechanically independent of the one another by provision of independent cantilever masts to the maximum extent possible (see Annexure-XXVII of PART-V of Tender Document for general arrangement drawings).

(b) HEADSPANS - Deleted

(c) PORTALS

In cases where the tracks in a multiple track section do not permit location of independent masts and where automatic tensioning of overhead equipment is required, rigid portals may be used. Also, in the vicinity of points and crossings, portals may be used, provided it is not possible to have prescribed setting with independent cantilever masts. These structures shall be equipped with standard bracket assemblies for supporting individual equipment of different tracks. The use of such structures is to be avoided as far as possible and for this purpose, the Purchaser will arrange to slew the tracks, if practicable. A single portal shall normally not cover more than five tracks (See also 2.3.7). Portal structures shall also be employed at anticreep central locations and such portals will have necessary guy arrangement.

(d) FOUNDATIONS

Foundations for all structures shall be designed in an economical manner by following the methods of design indicated by the Purchaser and observing the schedule furnished by him (See SECTION-B, Chapter-II)

2.1.22 CANTILEVER ASSEMBLY:

The bracket assembly carrying overhead equipment shall be of the swiveling type. The assembly shall be such that the tubes adopted will permit easy adjustment of the whole equipment after erection to cater for displacement of the track during maintenance upto the extent of 100 mm on either side except as otherwise relaxed by the Purchaser (see Para 2.1.10 g). In special locations, pull-off arrangements may be used with the approval of the Purchaser (See Annexure-XXVII of PART-V of Tender Document for drawings of the bracket assembly and components).

2.1.23 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 metres.

(a) GENERAL

The two contact wires at the overlapping zone shall be parallel to each other in a plane parallel to the track and run separated from each other (see Annexure-XXVII of PART-V of Tender Document 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-XXVII of PART-V of Tender Document for general, arrangement drawings).

2.1.24 POINTS & CROSSINGS:

Arrangements of overhead equipment of different types e.g., regulated, unregulated or tramway at points and crossings shall be in accordance with the standard drawings listed in Annexure-XXVII of PART-V of Tender Document.

2.1.25 SECTION INSULATORS (See also Para 2.1.11(c) above):

(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 upto 70 KM/H. The outline of a section insulator is shown in a drawing listed in Annexure-XXVII of PART-V of Tender Document. The section insulators shall be of the single wire type.

(b) SIZE AND WEIGHT

The section insulator assembly shall be such that it should be possible to install the insulator in the overhead equipment provided the axial distance between the catenary and the contact wire with section insulator in position is not less than 450 mm. The weight of the complete assembly shall not be more than 45 kg for single wire type excluding the weight of the catenary insulator and the catenary ending clamps.

2.1.26 ISOLATORS:

Manually operated isolators single or double pole type, with or without earth contact assembly may be required to bridge certain section insulators or insulated overlaps (See para 2.1.11.). In certain large yards, isolators controlling different lines may be grouped together on a gantry (See Annexure-XXVII of PART-V of Tender Document).

2.1.27 RETURN CONDUCTORS:

At all Booster stations, the return conductor shall be provided with cut-in-insulators. At point mid-way between two booster stations, the return conductor shall be connected to the rail through suitable terminal lugs which will provide a means of isolation, when required. The drawings showing the general arrangement of connections to the return conductor are listed in Annexure-XXVII of PART-V of Tender Document. The connection from the isolating arrangement to the rail shall be by means of 2 M.S. flats, each of minimum size 40 mm x 6 mm and at feeding stations 4 M.S. flats each of minimum size 40 mm x 6 mm. The flats shall be given two coats of red oxide zinc chromate primer to IS:2074:1992 CNSL based and finished with two coats of Bitumen 85/25 blown grade. Return conductors may be taken under ground in special locations such as under overline structures with the approval of the Purchaser. The return

conductor shall also be connected with buried rail on either side of the overlap before the feeding post and cut-in-insulator should be provided on the return conductor before the feeding post within the overlap limits and two independent rail connection links from the mast on either side on the cut-in-insulator. The same practice is to be adopted on all the sub-sectioning posts and sectioning posts for the return conductor.

2.1.28 BRIDGES AND TUNNELS:

(a) OVERBRIDGES

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

(b) TUNNELS AND CUTTINGS

The arrangements proposed for the equipment in tunnels and cuttings shall take into account the special features of each location and shall be in accordance with general design specified in SECTION-B.

(c) SAFETY SCREENS

On over-bridges, metallic protective screens shall be provided in order to prevent any person from coming into contact with the live overhead equipment. Such screens shall be properly earthed.

(d) HEIGHT GAUGES AT LEVEL CROSSINGS

Height gauges will be provided at all level crossings in accordance with the general arrangement drawings listed in Annexure-XXVII of PART-V of Tender Document.

2.1.29 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 circuited rail unless it is provided with a continuous earth wire or it is individually earthed by means of an earthing station. For general arrangement drawings, see Annexure-XXVII of PART-V of Tender Document.

(d) DOUBLE RAIL TRACK CIRCUIT

Where track circuits are provided on both rails, traction masts/structures shall not be bonded to rails but shall be provided with an earth wire made of steel reinforced aluminum conductor consisting of 6 strands of aluminum and one strand of steel each of 4.09 mm dia. (RACCOON) [conforming to IS:398 Pt II (latest revision as indicated in Annexure-XXVII of PART-V of Tender Document)]. 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 a distance not exceeding 250 m on either side of the mid-point of the section to two 10 Ohm, earth stations which will be provided by the Contractor. Sections on which earth wire is required to be provided are indicated in Part-III.

2.1.30 L.T. SUPPLY TRANSFORMER STATIONS (See para 2.1.40(c) below):

2.1.31 LIGHTNING ARRESTORS:

No lightning Arrestors will be provided on the traction overhead equipment.

2.1.32 CERAMIC BEADED GLASS FIBER TYPE SHORT NEUTRAL SECTION ASSEMBLY:

Ceramic beaded glass fiber type section insulator assembly shall consist of resin bonded fiber glass (or equivalent) insulators covered with either Teflon (or equivalent) or ceramic beaded with PTFE spacers (or similar) adequately dimensioned and rated for the application. The insulators shall have suitable end fitting for connections to the contact wire through end fitting. For smooth passage of pantograph without any shock from contact wire to insulator and vice-versa, suitable runners preferably of stainless steel shall

be provided. The central position of the assembly along with arc trap shall be solidly earthed as the later with earthing clamp is provided to trap any arc current caused by break of contact between pantograph and live contact wire when it passes from contact wire to insulator. The distance between arc trap and nearest line position shall be adjustable upto a maximum of 320 mm Suitable means of suspension of the components of the assembly from the catenary conductor shall be provided. The complete assembly shall be as light as possible and so constructed those adjustments of components can easily be made during erection of maintenance and also for ensuring smooth passage of pantograph.

In the catenary conductor, resin bonded fiber glass insulators with suitable covering shall be provided. The insulators shall have suitable end fittings for connections to catenary wire through end fittings. The central portion shall be solidly earthed.

The neutral section assembly shall be suitable for erection symmetrically on either side of the cantilever bracket support with regulated or unregulated conventional/ composite OHE where one point each for suspension of catenary conductor and contact wire is available as also shown in GA drawing under Annexure-XXVII of PART-V of Tender Document.

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

2.1.40 DESCRIPTION:

(a) Switching Stations

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

(b) Booster Transformer

Booster stations are provided for each track at the insulated overlap spans. The primary terminals are connected directly in series with the traction overhead equipment and the secondary terminals directly in series with the return conductors by means of flexible jumpers. Normally each booster station will be provided with one booster transformer which will be mounted on a gantry structure with two masts as indicated in a drawing listed in Annexure-XXVII of PART-V of Tender Document.

Single booster station will be located on either side of the track in a double track section. In multi-track sections where space does not permit location of a booster station may be provided with cross feeders for connections to the overhead equipment and return conductors as indicated in the relevant general arrangement drawing listed in Annexure-XXVII of PART-V of Tender Document. Two 7.5 kV lightning arrestors for each booster transformer are also erected on the gantry and connected to the L.T. terminals of the booster transformer.

(c) L.T. supply transformer stations

The low-tension supply required at switching stations will be obtained through L.T. supply transformers included as part of switching stations, mounted on steel structures and connected to the 25 kV side through rigid bus-bars of aluminum. In special cases where the length of connection is small, 50 sq.mm copper wire may be used for connection, with the approval of the Purchaser. At locations other than at switching stations, wherever low tension supply is required, L.T. supply transformer stations included as a part of OHE may be provided alongside the track at isolated location.

L.T. supply transformer stations shall essentially comprise of a mast mounted transformer connected to the traction overhead equipment through dropout fuse switches. The 240 V side shall be connected to a distribution board located at the remote-control cubicle by means of 2 core 25 sq. mm aluminum cable (see 2.4.23(a) of Chapter-IV of SECTION-B). The general arrangement drawing for L.T. supply transformer stations for single double and multi-track sections is included in Annexure-XXVII of PART-V of Tender Document.

2.1.41 SCOPE OF WORK:

(a) Switching stations

The switching stations shall be complete in all respects in accordance with specifications. The work shall include-

- (i) Filling up and leveling the ground to the extend necessary.
- (ii) Provision of control cubicles for installation of remote-control equipment for switching stations.
- (iii) Provision of 240 V A.C. distribution board.
- (iv) Provision of lights, plug points inside the cubicles.
- (v) Trench work inside the cubicles.

The work shall not include:

- (i) S & T Terminal equipment, telephone and telephone equipment.
- (ii) Provision of bus-bars from the traction sub-station to the feeding station in the case of these feeding stations which are located within the traction substation premises. However, the provision of a tee connector in the feeding station bus-bars would form part of the switching station work (see the relevant drawing in Annexure-XXVII of PART-V of Tender Document).
- (iii) Provision of 110 V battery and battery chargers and terminal boards in the feeding stations.
- (iii) DELETED

Note: Supply and spreading of gravel at all Switching stations is included in the scope of work of the Contractor. It shall however be noted that no extra cost for this shall be payable to the contractor.

(b) Booster Transformer Stations -DELETED-

2.1.42 CLEARANCES:

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

2.1.43 SETTING OF GANTRIES:

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

2.1.44 DATUM LEVEL:

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

2.1.45 MOUNTING OF EQUIPMENT AND BUSBAR ARRANGEMENT:

- (a) The interrupters and isolators shall be mounted in such a way that these can be manually operated conveniently by a person standing on the ground. The indicators showing the 'OPEN' or 'CLOSED' position

of the equipment shall be so arranged as to be visible from out-side the fencing enclosure on the side of the main gantry.

(b) The bus-bar arrangement for typical switching stations is schematically indicated in a drawing included in Annexure-XXVII of PART-V of Tender Document.

2.1.46 FENCING & ANTICLIMBING DEVICES:

Every switching station, together with its associated control cubicle shall be enclosed by fencing except at feeding stations that are located within the traction sub-station premises. The fencing shall have an anti-climbing device also at top.

At booster transformer and L.T. supply transformer stations, suitable anti-climbing devices consisting of galvanised steel clamp fixtures shall be mounted on each mast. The device shall be fitted below the transformer supporting beam or steel work. The general arrangement drawings indicating the fencing and anti-climbing devices, are indicated in Annexure-XXVII of PART-V of Tender Document.

2.1.47 NUMBERING:

Each booster transformer, interrupter, potential transformer, L.T. supply transformer and isolator shall carry an enameled number plate of approved design (see Annexure-XXVII of PART-V of Tender Document). The Purchaser will furnish the actual numbers to be allocated to the various equipments as per specification No. ETI/OHE/53 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document).

2.1.48 INTERLOCKING ARRANGEMENTS:

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

2.1.49 EARTHING ARRANGEMENTS:

(a) Earthing of switching stations, booster transformer stations and L.T. supply transformer stations shall generally comply with the code of practice for earthing IS: 3043 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) except where otherwise specified below:

(b) Earthing system

(i) Switching stations

At each switching station, two separate and independent earth circuits shall be provided, one for earthing the HT equipment and the other for earthing the L.T. equipment. The general arrangement of earthing connections at a typical switching station is shown in the relevant drawing included in Annexure-XXVII of PART-V of Tender Document.

(ii) Earth Circuits

Each earth circuit shall take the form of a closed ring and shall be provided with a minimum of two earth electrodes. Each earth electrode shall consist of galvanised iron pipe, 40 mm nominal bore at least 3.1 m long provided with a spike at one end and welded lug suitable for taking minimum size of 50x6 mm mild steel flat, directly at the other. The pipe shall be embedded into the ground. The earth electrodes of the HT and the LT earth circuits shall be located as far apart as it is possible. The drawing of typical earth electrode is included in Annexure-XXVII of PART-V of Tender Document.

(iii) HT earth circuit

The resistance to earth of the HT earth circuit shall be less than 2 ohms. If this value cannot be achieved with a maximum of four separate but inter connected earth electrodes then the additional earth electrodes shall have the surrounding earth treated with charcoal and salt filling. All masts, structures,

fencing uprights and equipment pedestals shall be connected by the two separate and distinct connections to the closed loop of the earth bus. Earth bus and connections to it shall be of M.S. flats of a minimum size 50 mm x 6 mm. Potential transformers and lightning arrestors shall be bonded to masts/structures by 25 mm x 3 mm copper strips.

(iv) LT earth circuits

The LT earth circuit shall also comprise of a minimum of two inter-connected earth electrodes as described in para (iii) above and the total resistance to earth of the earth circuit shall be less than 2 ohms. This circuit will not form a part of this contract at those feeding stations that are located within the traction sub-station premises. All low-tension equipment control boards, one terminal of the secondaries of the potential and LT supply transformers, metal casing of battery chargers, each connection of 8 SWG galvanised iron wire to the LT earth bus. The section of the LT earth bus shall be the same as that of the HT earth circuit.

(v) Earth strips

The earth bus and connections of HT earth circuit shall be painted with two coats of red oxide zinc chromate primer to IS 2074 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) with a minimum thickness of 1.5 mils (40 microns) and with two finishing coats of bitumen 85/25 (blown grade to IS:702(Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) with 20% mica to a thickness of about 15 mils (375 microns) either by hot application or by brushing a solution of it with suitable viscosity to obtain the thickness in minimum number of coats and buried at a depth of 300 mm below the ground level.

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

(vi) Inter connection

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

(c) Booster Transformer stations

(i) Earthing system

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

(ii) Earth strips

The earth strips shall be painted with two coats of red oxide zinc chromate primer to IS:2074 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) with a minimum thickness of 1.5

mils (40 microns) and with two finishing coats of bitumen 85/25 (blown grade to IS:702: (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) with 20% mica to a thickness of about 15 mils (375 microns) either by hot application or by brushing a solution of it with suitable viscosity to obtain the thickness in minimum number of coats and buries at a depth of 300 mm below the ground level. The connection of earth strips to each other shall be made by 10 mm dia. steel rivets or by welding. The earth connections to the structural members shall be made at a height of about 150mm above the foundation.

(d) L.T. supply Transformer Stations.

The earthing arrangement of a pole mounted LT supply transformer station shall comprise interconnected earth electrode/electrodes having a resistance not exceeding 10 ohms. If this value cannot be achieved with two electrodes, additional electrodes shall have surrounded earth treated with charcoal and salt filling. The transformer and lightning arrestor shall be connected to the supporting steel structure by means of 2 independent connections at the top by means of 25 mm x 3 mm copper strip. At the bottom, the steel structures shall be connected to the inter-connected earth electrodes and to the nearest traction rail by means of two independent connections of mild steel flats having a minimum size of 50 mm x 6 mm. In addition, the earth electrode should be connected to the traction rail by means of a minimum size of 75 mm x 6 mm mild steel flat. The mild steel flat shall be painted with two coats of red oxide zinc chromate primer to IS:2074 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) with a minimum thickness of 1.5 mils (40 microns) and with two finishing coats of bitumen 85/25 (blown grade to IS :702 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) with 20% mica to a thickness of about 15 mils (375 microns) either by hot application or by brushing a solution of it with suitable viscosity to obtain the thickness in minimum number of coats.

2.1.50 CABLE CONNECTION:

(a) All PVC cables provided out-door shall be either laid in the trenches or neatly clamped to the structures as approved by the Purchaser.

(b) Termination of cables

The cable shall be terminated neatly and all the cores arranged and dressed properly. Suitable indexed terminal strips or ferrules shall be provided at all terminals to facilitate maintenance.

TRACTION SUB-STATIONS

2.1.51 INTRODUCTION

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

2.1.52 DEFINITION

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

- a) "Grid Sub-station" means the sub-station of a power supply authority which is connected to the grid network in the area and from which 220kV or 132kV or 110kV power is supplied to the Railway for electric traction.
- b) "Interrupter" means a single pole single phase non-automatic circuit breaker capable of interrupting normal full load current.
- c) "Return Feeder" means the conductor of the feeder line from a traction sub-station to the corresponding feeding station which is connected to the earth terminal of the 220 kV or 132 kV or 110kV /25kV traction transformer secondary winding.
- d) "Traction overhead equipment" means the overhead conductors and other associated equipment and structures erected over the track to supply power to the electric locomotives.
- e) "Traction sub-station" means a 220 or 132 or 110/25kV sub-station for supply of power to traction overhead equipment (installed by the Purchaser), in accordance with this specification.

- f) "25 kV Feeder" means the conductor or feeder line from the traction sub-station to the corresponding feeding station and which is connected to the unearthed terminal of the 220 or 132 or 110/25 kV traction transformer secondary winding.
- g) "Feeding station" means the 25 kV interrupters and other associated equipment as also structures erected near the track, within or outside the sub- station boundary, for feeding different sections of the traction overhead equipment.
- h) "Shunt Capacitor Bank" means shunt capacitor equipment, along with control gear, protective relays, series reactor and accessories erected on 25 kV side of a traction sub-station for the purpose of improvement of power factor and reduction of maximum demand.

2.1.53 FUNCTIONS

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

2.1.54 LOCATIONS

The locations of work to be executed are given in Part-III of Tender Document.

2.1.55 SYSTEM PARTICULARS

- a) Power will be received at 220 or 132 or 110/25 kV single phase, 50 cycles at the traction sub-stations as indicated in Part-III and stepped down to 25kV by means of single-phase traction transformer. On the primary side the traction transformers will be connected across two phases of the 220 kV or 132 kV or 110 kV, 3 phase system. On the secondary side one terminal of the transformer will be solidly earthed and also connected to the traction rails, the other terminal will be connected to the traction overhead equipment through 25kV switchgear.
- b) Adjacent sub-stations will normally be connected across different phases to reduce the unbalance on the three-phase power supply system. In order to keep the supply from two adjacent sub- stations separate, a neutral section is provided on the traction overhead equipment approximately midway between them. The neutral section is normally kept dead. Electric locomotives coast through the neutral section with power off.
- c) The traction sub-stations, will normally be unattended and all switching operations will be carried out by remote control from a Remote Control Center.
- d) The capacitor bank shall be of outdoor type, mounted on steel racks for connection to the 25kV bus through single pole isolator and circuit breaker. The capacitor bank shall consist of groups of individual capacitor units, connected in series parallel combination to deliver the rated output, at normal rated system voltage, rated frequency and other rated system conditions.
- e) **Series reactor (Harmonic suppression reactor)**

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

2.1.56 DESCRIPTION

A) TRACTION SUB STATION

- a) At the traction sub stations, normally one transformer will be in service to supply power to the overhead equipment while the other will be kept as standby. However, with the development of load at these traction substations, two transformers either existing or by installation of another where necessary may be connected and worked in parallel. The control and protection circuits shall be designed suitably to permit any change over or parallel working of transformers. The transformers are designed to take 50% overload for 15 minutes and 100% overload for 5 minutes.

- b) The incoming 220 kV or 132 kV or 110 kV transmission line will be terminated by the supply authorities on gantries erected inside the traction substation. The supply to the transformers will be controlled through single phase double pole circuit breakers. On the secondary side the transformers will be connected to the 25 KV bus through single phase single pole circuit breakers and associated isolators. From the busbars 25 KV supply will be extended to feeding station through circuit breakers called feeder circuit breakers. The feeder circuit breakers will form a part of the substation and will be covered by the specification.
- c) At the feeding station, the 25 kV supply will be fed to different sections of the traction overhead equipments by means of interrupters. All interrupters will be remote controlled.
- d) Normally, the traction substation will be located alongside the Railway track. The feeding stations will be located within the substation boundary and connected to the traction substation by extension of the 25 kV busbars. Where the traction substation is located some distance away from the track, the 26 kV supply will be extended to the feeding station by means of two overhead feeders carried on tower/masts. Each feeder line will comprise two conductors one called the 25 kV feeder and the other return feeder.
- e) A small masonry building called the control room will be provided at each substation to house the control and instrument panels, remote control equipment, batteries, battery chargers, telecommunication terminal equipment, telephones and AC and DC LT distribution boards.
- f) Fire protection baffle wall will be provided in between the two bays of the power transformer.
- g) The entire traction substation and the control room will be protected by a fenced enclosure. A Railway siding from the nearest Railway station will be terminated inside each substation, where feasible, to enable unloading of heavy equipment at site. Road access will also be provided wherever possible.

B) FEEDING STATION

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

C) SHUNT CAPACITOR BANK

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

2.1.57 AUXILIARY SUPPLIES

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

2.1.58 SCOPE OF WORK

- a) The traction sub-stations, feeding stations and 25 kV shunt capacitor banks when erected shall be in accordance with the specification and functionally complete in all respects. All works required in this connection shall be deemed to be a part of the contract, whether specifically stated or not in this Specification. The following works, however, are excluded from the contract.

- 1) DELETED.
- 2) 220 kV or 132 kV or 110 kV incoming lines and their termination on the gantries within the sub-station. The connections from the transmission line to the sub-station equipment shall, however, be made by the Contractor.
- 3) Filling and leveling the ground to the extent necessary.
- 4) Provision of Railway siding where necessary and road access.

- 5) Control Room building.
 - 6) Lights, fans and plug points inside the control room and yard lighting.
 - 7) Telecommunication terminal equipment and telephones.
 - 8) The works covered by item 2 to 8 will be arranged by the Purchaser or his agent at the cost of the Purchaser.
- b) The supply and erection of feeding station will come within the purview of this Contract. However, the gantry erection at feeding stations outside the premises of traction sub-stations will be done by the OHE contractor. Stringing of cross feeders and jumper wires at feeding stations shall, however, be done either by OHE contractor or TSS contractor whosoever does the work later or as decided by the purchaser depending upon the ground situation during the course of progress of OHE/TSS work. Necessary materials (other than Railway supply items) for the above stringing works will, however, be required to be arranged by OHE contractor in any case.
- (c) Supply and erection of 25kV shunt capacitor bank along with series reactor and other accessories will come within purview of the contract.

2.1.59 CLEARANCES

- a) No part of the installation which is ordinarily live shall be erected at a height less than:
- i) 4.6 m on the 220 KV or 132 KV or 110 KV side.
 - ii) 3 m on the 25 KV side.

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

- b) Clearances between any live part and parts at earth potential (or parts likely to be earthed) shall not be less than 1800 mm and 500mm for 220 KV or 132 KV or 110 KV and 25 KV respectively.
- c) On the 220 kV or 132 KV or 110 KV side clearance between phases shall not be less than 4 m. The centre distance of 220 KV or 132 KV or 110 KV bays shall not be less than 14 m.
- d) The layout of the sub-station shall be such as to provide suitable clearances to permit work on the equipment in one bay safely with the adjacent bay alive.

2.1.60 EQUIPMENT AND BUSBAR LAYOUT

The layout of equipment and busbar arrangement for typical sub-stations is shown schematically in drawing incorporated in Annexure-XXVII of PART-V of Tender Document.

2.1.61 NUMBERING

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

2.1.62 BUSBARS

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

2.1.63 EARTHING

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

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

c) HT earthing grid.

A combined resistance of earthing system, in any sub-station shall not be more than 0.5 Ohms. To ensure this, the HT earthing grid shall be formed by means of bare mild steel rods of appropriate size as indicated in Clause (d) below buried at a depth of about 600 mm below the ground level and connected to earth electrodes by means of two separate and distinct connections made with 75 mm x 8 mm MS flats. The connection between the MS flat and MS rod shall be made by welding, while that between, the earth electrodes and the MS flats through MS links by bolted joints. As far as possible the earthing grid conductor shall not pass through the foundation block of the equipments. All crossings between longitudinal conductors and transverse conductors shall be joined by welding. The transverse and longitudinal conductors of the earthing grid shall be suitably spaced so as to keep the step and touch potentials within acceptable limits. The overall length of the earthing grid conductor shall not be less than the calculated length as per the code of practice. The earth electrodes shall be provided at the outer periphery of the grid as indicated in the sketch enclosed in Specification No. ETI/PSI/120 (2/91) with A&C Slip No.1 or latest. The earth electrodes shall be embedded as far away as possible from each other. Mutual separation between them shall usually be not less than 6m. The contractor shall submit detailed design calculation for the earthing system and obtain approval of the design/drawings.

d) Earthing Grid Conductor.

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

e) Earth Electrodes.

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

f) Buried Rail.

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

g) System earthing .

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

h) Equipment earthing.

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

i) Earthing inside the control room.

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

j) Earthing of lightning arrestors.

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

k) Earthing of fencing uprights and panels.

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

l) Method of jointing

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

m) Painting of MS Flats.

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

2.1.64 EARTH SCREEN.

The area covered by outdoor sub-station equipment shall be shielded against direct strokes of lightning by an overhead earth screen comprising 45 tone quantity 7/9 SWG, 19/2.5mm galvanised steel stranded wire strung across pinnacles of the metallic structures as indicated in the drawings included in Annexure-XXVII of PART-V of Tender Document. The earth screen wires shall be fixed not less than 2.5 Mt above the live conductors so as to provide an angle of protection, not exceeding 30 degrees to the equipment/busbar below and shall be solidly connected to the sub-station earth circuit by means of 50 mm x 6 mm MS flats.

CHAPTER -II FOUNDATIONS

2.2.1 SCOPE :

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

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

2.2.2 DESIGN OF FOUNDATION:

(a) SOIL PRESSURE

For design of foundations for traction structures carrying overhead equipment, the Contractor shall determine the type and allowable bearing pressure of soil at suitable intervals and adopt the type and size of foundations, suitable for particular locations with the help of the approved employment schedules. In cases of particularly weak soil, the bearing pressure may have to be determined for each location where so advised by the Purchaser. Soil bearing pressure, using SPT (falling weight equipment) should be determined generally for every 5-kilometer interval or less wherever change of soil is encountered. In general, IS code of practice (IS 6403:1981) should be followed. In addition, at every 250 m the soil bearing pressure should be determined by dial gauge type penetrometers. Dial gauge type penetrometers shall also be made available by the Contractor at each foundation site so as to facilitate cross check at each individual location.

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

(b) STRUCTURES CARRYING OVER-HEAD EQUIPMENT

Foundations for traction structures carrying overhead equipment shall be either of the side bearing side gravity or new pure gravity type according to their location, formation of the sub-grade and bearing pressure of the soil. In new filled up soil or cinder formation, pure gravity sand-filled core foundations, or foundations with cast-in-site reinforced concrete piles, or cantilever types foundation with counter-weights or guyed foundations may be adopted.

(c) ON BRIDGE PIERS

Complete design of foundations for traction structure on bridges to suit different locations and local conditions will be furnished by the Purchaser.

(d) MASTS & FABRICATED STRUCTURES AT SWITCHING STATIONS/TSS

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

(e) FENCING POSTS

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

(f) TYPICAL DESIGN

Typical design and drawings of side bearing and new pure gravity and side gravity type foundations are included in the drawings listed in Annexure-XXVII of PART-V of Tender Document. Employment schedules for standard foundations for traction structures for various locations and types are also included in the drawings listed in Annexure-XXVII of PART-V of Tender Document

(g) SPECIAL FOUNDATIONS

- (i) In the case of foundations at locations not covered by the employment schedules furnished by the Purchaser, the Contractor shall prepare special designs and furnish full design calculations justifying the choice of the type of foundations for such locations. In black cotton soil especially pile foundations of under reamed type as per RDSO'S standard designs (Reference RDSO'S Drawing No. ETI/C/0062 MOD-B or latest) or any other approved design may have to be cast at limited locations for trial purpose. The tenderer may furnish the technical details of alternative design, construction methods proposed to be adopted and their previous background/experience if any.
- (ii) **Foundation in Contact/Buried under Non-aggressive Soil/Ground Water :**
- (iii) The Foundation Concrete shall be of M-15 Grade. The Core concrete shall be M-20 Grade. It shall be adopted in the areas where concrete is in contact/buried under non-aggressive soil/Ground water as per IS: 456-2000.
- (iv) **Foundation in Coastal Areas:**
- (v) The Foundation Concrete shall be of M-20 Grade. The Core concrete shall also be M-20 Grade.
- (vi) It shall be followed in the areas where concrete is exposed to Coastal Environment as per IS: 456-2000.
- (vii) For casting the OHE foundation in Soft Rock and Hard Rock, RDSO drawings mentioned at Sl. No. - 123 of LIST OF STANDARD DRAWINGS AND SPECIFICATIONS (Annexure-XXVII of PART-V of Tender Document).

The decision of the Purchaser with regard to feasibility and suitability of adoption of the alternative design for each type of foundation will be final.

(h) EQUIPMENT PEDESTALS

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

(j) CABLE TRENCHES

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

2.2.3 BEARING PRESSURE:

(a) GUIDING INFORMATION

Subject to Para 2.2.2 (a) above, the following allowable bearing pressures may generally be expected for various kinds of soil. The information is given for general guidance only.

- (i) Average good soil in banks and cutting ... 11,000 kg/sq.m.
- (ii) Moorum soil in cutting ... 22,000 kg/sq.m
- (iii) New banks & bad soils in banks and cutting ... 5,500 kg/sq.m.

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

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

2.2.4 CONCRETE:

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

IS: 456-2000 (latest version)

TABLE - 3: PROPORTIONS FOR NOMINAL MIX CONCRETE (Clause 9.3 and 9.3.1)

Grade of concrete	Total quantity of dry aggregate by mass per 50 kg of cement, to be taken as the sum of the individual masses of the fine and coarse aggregates kg max.	Proportion of fine aggregate of coarse aggregate (by mass)	Quantity of water per 50 kg of cement (max. Liters)
M 5	800	Generally, 1:2 but subject to an upper limit of 1 : 1.5 and a lower limit of 1 : 2.5	60
M 7.5	625		45
M 10	480		34
M 15	350		32
M 20	250		30

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

Example:

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

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

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

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

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

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

NOTE: (a) Test specimen of works tests shall be taken at the site of work from mixture of concrete ready for pouring into the foundation hole. All tests shall be carried out in accordance with IS: 516 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) . The sample of concrete from which test specimens are made shall be representative of the entire batch.

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

2.2.5 SIZE AND GRADING OF AGGREGATES :

The graded coarse aggregate 40 mm nominal size (table 2 of IS: 383 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document)) shall be used for foundation. A coarse aggregate for grouting muffs and embedding shall be of 20 mm graded nominal size as per table 2 of IS: 383 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) (specification for coarse and fine aggregate from natural sources for concrete).

Fine aggregate shall be graded from 10 mm downwards. The maximum size of aggregate for under reamed pile foundation shall be 20 mm graded nominal size.

2.2.6 SAND CORED FOUNDATIONS :

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

2.2.7 SINKING OF CONCRETE SHELLS:

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

2.2.8 TYPE OF FOUNDATION IN BLACK COTTON SOIL :

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

2.2.9 CEMENT:

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

CHAPTER - III STRUCTURES

2.3.1 SCOPE :

(a) This chapter deals with the design of steel structures and steel work for overhead equipment, switching stations, booster transformer stations and L.T. supply transformer stations and the specification for steel and prestressed concrete trial mast.

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

2.3.2 TYPES :

Structures and gantries may consist of any or more of the following types :-

- (i) Broad flange beams.
- (ii) Rolled steel joists (I section).
- (iii) Fabricated steel Structures (welded/bolted).

Structure/uprights shall generally be embedded in concrete foundation blocks in special cases Structures may be secured by means of holding down bolts. Limited quantity (approx. 700 nos.) of circular spun prestressed concrete masts may also be used at the sole discretion of the Purchaser.

2.3.3 DESIGN :

2.3.3.1 FOR OHE :

(a) STEEL STRUCTURES

Designs for steel Structures shall, except where otherwise Provided, comply with the Indian standard code of practice for use of structural steel in General Building Construction- IS: 800 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document). The thickness of smallest steel sections used shall be 5 mm for galvanised members.

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

2.3.3.2 FOR TSS :

(a) GENERAL

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

(b) DESIGN

a) All the steel structures like gantries/portals, other supporting members, small part steel work etc. shall be galvanised after fabrication with a minimum value of average mass of zinc coating being not less than 610 g/m² as per RDSO's specification No. ETI/OHE/13 (4/84) with Amendment No.1,2 & 3.

b) All designs for special steel work shall be furnished by the Contractor, for approval of the Purchaser. Designs for steel structures shall except where otherwise provided, comply with the "Indian Standard Code of Practice for use of Structural steel in General Building Construction" - IS : 800 - 1984, other relevant IS Specifications and statutory regulations.

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

d) Steel Structures

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

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

f) Uprights and fencing posts.

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

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

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

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

2.3.4 CANTILEVER MASTS:

(a) LOAD

For purposes of design the worst possible combination of all loads that may occur shall be considered. The load shall include the following (weights to be assumed for design of Structures are shown against important items).

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

(ii) Weight of bracket supporting the overhead equipment (60 kg/normal bracket)

(iii) Weight of a man (60 kg)

(iv) Weight of an earth wire (0.32 kg/metre).

(v) Weight of feeder, return conductor or other special equipment wherever they occur.

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

(vii) Wind loads perpendicular and parallel to the track. The wind pressure adopted shall be taken as that indicated in SECTION-C.

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

(ix) Weight of the mast itself.

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

(b) DEFLECTION

Notwithstanding the provisions contained in IS:800 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) referred to in para 2.3.3 above regarding permissible deflection, the following shall apply.

(i) The deflection at the top of the mast due to permanent loads shall not exceed 8 cm and the mast shall be so erected that it becomes reasonably vertical after application of permanent loads.

(ii) The additional deflection under maximum wind pressure shall not exceed 8 cm at the level of the contact wire.

(c) TORSION

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

(d) TYPICAL DESIGN

The typical design of a traction mast is included in the set of standard drawings listed in Annexure-XXVII of PART-V. Employment schedules for standard masts for various locations and types are included in the standard drawings listed in Annexure-XXVII of PART-V, to enable selection of suitable type for different locations and local conditions.

2.3.5 ANCHOR MASTS:

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

(b) DWARF MASTS

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

2.3.6 HEAD SPANS (See paras 2.1.21 and 2.4.19):

(a) LOAD

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

(b) SAG FOR HEAD SPAN WIRE

The sag of the head span wire shall be approx. one-tenth (1/10) of the span.

(c) MINIMUM TENSION IN CROSS SPAN & STEADY SPAN WIRES -

For purpose of design, a minimum tension of 200 kg, shall be ensured in the span wires for worst combination of temperature and wind load.

(d) DEFLECTION OF MAST

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

(e) TYPICAL DESIGN

Typical design for head span mast carrying overhead equipment for 4 tracks will be furnished to the contractor.

2.3.7 PORTALS (See 2.1.21) :

(a) GENERAL

Portals shall be of fabricated steel of standard types of purchaser's designs. The most important designs are covered by Drawings listed in Annexure-XXVII of PART-V.

(b) LOAD

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

2.3.8 STRUCTURES ON BRIDGES :

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

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

2.3.9 SPECIAL STRUCTURES :

In the case of structures at locations not covered by the employment schedules furnished by the Purchaser, the contractor shall furnish complete design calculations justifying the choice of the type of structures for such locations.

2.3.10 SETTING OF STRUCTURES:

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

(b) On straight and outside of curve, the standard setting shall be as per the relevant drawing included in Annexure-XXVII of PART-V. Minimum setting of structures shall be 2.8 M plus curve allowance as required. Whenever this distance cannot be provided, specific approval of Purchaser shall be obtained before erection. Setting of portal upright overlap/ turn-out structures, anchoring structures and other masts carrying more than one OHE will be 3.0 m wherever possible.

(c) EXTRA CLEARANCE ON CURVES

The minimum setting of structures on curves shall be determined by adding to the above minimum figures an extra clearance indicated in the table included in the set of standard drawings listed in Annexure-XXVII of PART-V of Tender Document.

(d) STRUCTURES WITH COUNTER WEIGHTS

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

(e) STRUCTURES ON PLATFORM

The setting of structures on platform shall be not less than 4.75 m.

(f) STRUCTURES NEAR SIGNALS

In the vicinity of signals, structures shall be located in a manner which shall ensure good visibility where necessary, the setting shall be increased as per the relevant drawing included in Annexure-XXVII of PART-V of Tender Document.

(g) SETTING OF STRUCTURES

The value of setting of masts/structures shall be painted on each mast/ structure. The figure shall be 25 mm in size in white on a red background. In addition, the track level shall also be marked on the mast/structure by a horizontal red painted stroke.

2.3.11 NUMBERING OF STRUCTURES CARRYING OVERHEAD EQUIPMENT :

All structures shall be numbered in accordance with the numbering given in the approved overhead equipment layout plans. Enameled/Retro-Reflective number plate shall be provided on each mast or structure as per approved designs (See Annexure-XXVII of PART-V).

2.3.12 STEEL WORK FOR SWITCHING STATIONS AND GANTRIES:

(a) HORIZONTAL MEMBERS OF GANTRY

Horizontal member of main as well as auxiliary gantry carrying isolator switches, insulators, potential transformers etc. shall be made from steel sections viz. channels, angles and small joists, single or fabricated. They shall preferably be attached to masts by means of clamps to avoid drilling of masts sections.

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

- (i) Weight of insulators, instrument transformers, isolator switches, busbars, and their accessories.
- (ii) Loads caused by feeders, along and across tracks, return feeders etc.
- (iii) Loads caused by anchorage due to guying of anchored masts (where applicable).
- (iv) Pull or Push on the structures due to anchorage and radial tension (where applicable).
- (v) Wind load on the different structures, conductors and equipment. The wind pressure shall be taken as that indicated in part-III.
- (vi) Weight of men working on the structures.
- (vii) Weight of structure itself.
- (viii) Erection loads.
- (ix) Any other load or loads which may occur due to special equipment wherever they occur.

(c) TENSION OF CONDUCTORS

For purpose of designs, the maximum tension of different conductors, without wind load, shall normally be as under:-

- (i) Deleted.
- (ii) Maximum tension in the cross feeders at switching stations under worst conditions:-
 - (1) For spans less than 18 m - 100 kgf.
 - (2) For spans more than 18 m - 200 kgf.
- (iii) Maximum tension in longitudinal feeders running parallel to the track at the switching stations under worst conditions - 1500 kgf.
- (iv) Tension in anchored overhead equipment in case of sectioning and paralleling stations 2,000 kgf.

(d) DEFLECTION OF GANTRY MASTS

Deflection under the permanent loads (at an average temperature of 35°C without wind) at the top of the fabricated structures of mast shall be limited to one eightieth (1/80) of its height above foundation.

(e) Masts of the gantry at which feeder or overhead equipment will be anchored at the switching stations shall normally be provided with suitable guys, but struts shall not be permitted.

(f) CHAIRS AND BRACKETS

Chairs, brackets and supporting steel work carrying potential transformers, lighting arrestors, insulators, etc., shall be made of fabricated steel and be mounted on the main auxiliary gantry preferably by means of clamps to avoid drilling of mast sections.

(g) UPRIGHTS AND FENCING

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

2.3.13 STEEL:

Steel conforming to IS: 2062 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) shall be used for all fabricated steel work.

CHAPTER-IV

EQUIPMENTS, COMPONENTS AND MATERIALS

2.4.1 GENERAL:

(a) This chapter deals with the details and specifications of the equipment, components and materials to be used for traction overhead equipment, switching stations, booster transformer stations and L.T. supply transformer stations. This chapter does not cover structures and foundations, which are dealt with in SECTION-B, Chapter-II and III. In general, based on the specifications issued by various bodies, such as Bureau of Indian Standards, British Standard Institution etc. Specifications have been issued by the Purchaser. Such specification may be bought separately from the office of the Purchaser. All these specifications are included in the set of drawings and specifications referred to in Annexure-XXVII of PART-V of Tender Document.

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

2.4.2 COMPLIANCE WITH STANDARD SPECIFICATION :

In the technical specifications of equipments, components and materials, references are made to the following standard specifications:

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

Tenderers may, however, offer equipment in accordance with the appropriate national standard specifications of the country of manufacture, as decided by Sr. DEE/TRD/MB. In case of doubt, the Purchaser shall decide the clause and specification applicable and the contents of the specification and standard mentioned above shall guide such decisions.

2.4.3 QUALITY ASSURANCE:

The provisions of Para 25, 26 of PART-III of Tender Document for quality assurance will apply.

2.4.4 PROTO TYPE TESTS :

(a) FITTINGS, COMPONENTS AND MATERIALS

All the fittings, components and materials to be supplied by the contractor, in terms of this contract, the requisite number of prototypes of components shall be supplied free of cost to the Purchaser for tests and approval. The tests will be conducted in a laboratory selected by the Purchaser.

(b) EQUIPMENTS

This comprises inspection and tests conducted on the first equipment of a specified manufacturer, which the Purchaser considers sufficient to prove that the design is in conformity with the specification at the manufacturer's factory. The type tests shall be conducted on each equipments as indicated in the individual specifications referred to in para 2.4.1 above, in the presence of the Purchaser's representative. The contractor shall arrange to get these tests conducted at his own cost.

(c) RESPONSIBILITY

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

(d) EXEMPTION FROM PROTOTYPE TESTS

If prototype samples of equipments, components or fittings of any manufacturer have already been approved in connection with the electrification of other sections of Indian Railways, on the 25 KV 50 HZ single phase A.C. system prototype samples of such equipments, components or fittings will be exempted

from the tests. Supply of bulk quantities shall, however, be affected only after the Purchaser's prior approval is obtained in writing.

(e) The results of prototype tests will be communicated to the Contractor as expeditiously as possible. Any delay in this respect will be ground for extension of time for completion under para 17-A of PART-II of GCC, Apr 2022.

2.4.5 INSPECTION AND TESTS:

These comprise inspection and tests conducted at the manufacturer's factory for ensuring quality of manufactured items as part of the quality Assurance Programme.

2.4.6 TEST CERTIFICATES:

Three copies of the test certificates of successful prototype tests carried out at the manufacturer's factory on all equipments shall be furnished to the Purchaser within a month after completion of the prototype tests. Three copies of the routine tests carried out on each equipment shall also be furnished, after the equipment is passed by the Purchaser's representative for inspection (Refer Para 25, 26 of PART-III of Tender Document).

2.4.7 BULK MANUFACTURE:

Bulk manufacture may be undertaken only after specific written approval of the Purchaser or his representative has been obtained indicating that tests on the prototypes are satisfactory. Where prototypes have already been approved in connection with its manufacturer may proceed after exemption from prototype tests is received from the Purchaser in writing.

2.4.8 INTER CHANGEABILITY:

All equipments, components and fittings shall be inter-changeable and supplies shall be in accordance with the Purchaser's designs unless otherwise specifically approved by him. Components such as fuses, indication lamps etc. should be replaceable with substitutes available indigenously, as far as possible.

2.4.9 TECHNICAL SPECIFICATIONS:

Please see at Annexure-XXVII of PART-V of Tender Document. List of standard RDSO drawings, RDSO specifications and IS specifications for important materials, components and equipments.

2.4.10 NOMENCLATURE AND MARKING:

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

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

2.4.11 STEEL WORK AND PROTECTION AGAINST RUST:

(a) GALVANISING

All ferrous materials and fittings shall be hot dip galvanised according to the specification ETI/ OHE/13 (4/84) (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document).

(b) PAINTING

Some components or parts may, with the approval of the Purchaser, be protected only by paint and parts so protected shall be given two coats of composite Aluminum primer and two coats of Aluminum paints. The second coat of Aluminum paint shall be applied after erection.

(c) RECTIFICATION AT SITE

In case of modifications which would damage the protective coat, repairs to such damage would be allowed only in exceptional circumstances. The part damaged shall be protected in accordance with the

method indicated in specification **ETI/OHE/13 (4/84)** (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) or any other method approved by the Purchaser. The Contractor shall in all such cases obtain prior permission from the Purchaser before carrying out repairs.

2.4.12 BRACKET ASSEMBLY COMPONENTS (see para 2.1.22) :

(a) ARRANGEMENT FOR NORMAL OHE

The arrangement of the different fittings and structural components of bracket assemblies are shown in drawings listed in Annexure-1, Part-V. The employment schedule of bracket will be furnished to the Contractor.

(b) BRACKET

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

(c) TUBULAR STAY ARM

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

(d) REGISTER ARM

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

(e) STEADY ARM

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

Bent steady arms of aluminum alloy tube conforming to Spec. **ETI/OHE/21 (9/74)** (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) shall be used for neutral section overlap and in the central mast of a 4-span insulated overlap.

(f) BRACKET FOR UNREGULATED TRAMWAY TYPE EQUIPMENT

Brackets provided on cantilever masts for tramway type unregulated equipment shall normally span two tracks and the contact wires carried on V-type clamps suspended from a span wire. The span wire shall be provided with a turn buckle at only one end.

2.4.13 DROPPERS (see para 2.1.13) :

(a) GENERAL DESIGNS

The droppers shall generally be designed as shown in standard drawings and made of copper wire about 5 mm diameter conforming to **IS:282** (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) and shall be attached to the catenary wire by a copper dropper clip. The contact wire shall be held by a clip of aluminum bronze as shown in the standard drawings. The distribution of dropper shall be in accordance with standard designs.

(b) LOADING

The droppers shall be able to withstand a vertical load of 200 kg at the point of attachment to the contact wire and the clip shall not slide under a horizontal load of 120 Kgf.

(c) The permissible tolerance in the overall length of a dropper will be ± 5 mm.

2.4.14 INSULATORS :

(a) All insulators except those on return conductors and earth wires shall be of the solid core type. Disc insulators shall be used on return conductors and earth wires or other locations as desired by the Purchaser. All solid core insulators shall conform to TI/SPC/OHE/INS/0070 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) or Specification No.TI/SPC/OHE/INSCOM/0991 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) is for Composite Insulators wherever applicable.

(b) INTER-CHANGEABILITY

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

(i) **Stay arm Insulators:** These insulators will be used in conjunction with tubular stay arm of all bracket assemblies.

(ii) **Bracket Insulators:** These will be used at the base of each bracket assembly in conjunction with bracket tubes.

(iii) **9-Tonne Insulators:** These will be used at all places for cut-in and Terminal insulation including those in return conductors, but excluding those in earth wire.

iv) **Solid core post insulators :** These will be used at all places for supporting isolators mechanisms, -bus-bars, -jumpers etc. of 25 kV.

(v) **Disc insulators 255 mm :** Clevis type 255 mm disc insulators will be used for return conductor suspension and for earth wire cut-in insulator.

(vi) **11 kV post insulators :** These will be used at all places for supporting bus-bars, jumpers etc. In conjunction with return conductor/return feeders.

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

2.4.15 ENDING FITTINGS AND SPLICES:

(a) GENERAL DESIGNS

Terminating or ending fittings and splices on copper conductor shall be of the cone type clamping on both the inner and outer strands of conductor except for contact wire ending clamps which may be of wedge type. The arrangement shall be easy to install and also be such as would apply the clamping pressure gradually without shock (See **TI/SPC/OHE/Fittings/0130**) (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document). For Aluminum Alloy/conductor, the end fittings shall be either cone type, strain clamp type or any other type as approved by the Purchaser.

(b) LOADING

All the parts shall be capable of withstanding without damage, a load greater than the ultimate strength of the wires to which they are fitted. In the case of thread no damage shall occur when they are subjected to a load equal to two third of the ultimate strength of the wires.

(c) RESTRICTED USE OF SPLICES

The use of splices shall generally be avoided and their use shall be restricted to the minimum necessary. Over main tracks, there shall be no splice in the contact wire on first erection. Elsewhere, not more than one splice be used in any tension length (i.e., anchor to anchor) for which prior approval shall be taken from the Purchaser. Additional splices may, however, be provided to enable retention of conductors which are found defective during and/or after erection. Splices may also be permitted for repair of damage due to thefts or Railway accidents.

(d) STRENGTH OF ASSEMBLED FITTINGS

The strength of fittings assembled with appropriate conductors or wires shall be not less than that of the conductor or wire itself.

(e) ADDITIONAL TERMINATING WIRES

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

2.4.16 ELECTRICAL CONNECTIONS FOR OHE:

(a) GENERAL DESIGNS

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

(b) JUMPERS

Copper jumpers shall be of any of the followings:

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

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

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

(c) BUSBARS

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

(d) FEEDERS

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

(e) RETURN CONDUCTOR

The return conductor shall be of all Aluminum conductor 19/3.99 mm (SPIDER). The arrangement of return conductor carried on traction structures is shown in a drawing listed in Annexure-XXVII of PART-V of Tender Document.

(f) The general characteristics of all wires and conductors is included in a drawing listed in Annexure-XXVII of PART-V of Tender Document.

(g) Earth wire shall be of steel reinforced Aluminum conductor 7/4.09 mm (RACCOON) conforming to **IS:398-(part-II)** (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document).

2.4.17 TERMINAL CONNECTORS FOR EQUIPMENTS:

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

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

2.4.18 REGULATING EQUIPMENT :

(a) GENERAL

A general arrangement is shown in the standard drawings listed in Annexure-1, Part IV. The regulating equipment should have a minimum adjustment range of 950 mm. Stainless steel wire rope in accordance with TI/SPC/OHE/WR/1060 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) shall be used in these equipments and these shall be sufficiently flexible for the purpose.

(b) COUNTER WEIGHT

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

(c) REDUCTION RATIO

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

2.4.19 HEADSPAN CONSTRUCTION (See para 2.1.21 and 2.3.6) :

(a) SIZE AND FACTOR OF SAFETY

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

(b) TURN BUCKLES

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

(c) ADDITIONAL INSULATORS

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

2.4.20 ISOLATORS:

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

2.4.21 INSULATION LEVEL :

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

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

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

2.4.22 BUSBARS:

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

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

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

2.4.23 CABLING:

(a) CABLE FOR L.T. SUPPLY

240V A.C. supply from L.T. supply transformer at switching stations shall be brought and terminated on the L.T. A.C. distribution board in the remote-control cubicles at the switching stations by 1100 Volt grade 150 sq.mm aluminum two-core PVC insulated PVC sheathed and steel armoured heavy-duty cable conforming to IS:1554(part-I) (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document).

(b) CONTROL AND INDICATIONS CIRCUITS

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

PURPOSE	RUN	CIRCUIT VOLTAGE	CORE SIZE & MATERIAL	NO OF CORES
FOR SWS:				
Control & indication of interrupters	From each Interrupter to terminal board	110 V/D.C.	2.5 sq.mm copper	7
Catenary indication	From each P.T. line indication type to terminal board	110 V/A.C.	2.5 sq.mm copper	2
Heater supply for interrupters control mechanism cabinet	i) From interrupter to interrupter	240 V A.C.	4.0 sq.mm Aluminum	2
	ii) From each interrupter to fuse box.	-do-	-do-	-do-
	iii) From fuse box. to distribution board.	-do-	-do-	-do-
	i) 110V battery charger to 110V battery	110 V/D.C.	2.5 sq.mm copper	-do-
	ii) 110V battery to 15A, DC fuse box.	110 V/D.C.	2.5 sq.mm copper	-do-
	ii) 15A, DC fuse box to terminal board.	-do-	-do-	-do-
	From each circuit breaker to control board.	110 V DC	7x2.5	Three cables to be used.
	From each transformer to control board.	110 V DC	10x2.5	Five cables to be used.
	From each transformer to control board.	110 V DC	4x4.0	One cable for each bushing CT to be used.
	From each current transformer to control board.	110 V DC	2x4.0	One cable for each core of CT/Neutral CT
	From each potential transformer to control board.	110 V DC	2x2.5	One cable to be used

	(i) Connection between battery chargers & DC distribution board.	110 V DC	4x4.0	One cable to be used with two core connected in parallel
	(ii) Connection between batteries & DC distribution board.	110 V DC	4x4.0	One cable to be used with two core connected in parallel
	(iii) Connection from DC distribution board to control board.	110 V DC	4x4.0	Two cables to be used with each circuit breaker and one cable for DC supply to control boards.
	From interrupter to control board.	110 V DC	7x2.5	Two cables to be used.
	Connection from AC distribution board to control board.	240 V AC	2x2.5	One cable to be used

c) Cables for heater circuits.

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

d) Cables for battery charger.

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

e) Cables for blower fans.

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

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

NOTE: (i) In case of feeding stations which are located within the traction sub-station premises, the cables shall be run from individual equipment and terminated inside the sub-station control room.

(ii) Notwithstanding the sizes of cables given above, the Tenderer shall assure himself that various cables would suit the ratings of equipments offered by him.

(g) SPECIFICATION

The cables shall be resistant to decay, abrasion, acids, alkalies and other corrosive materials. All indoor wiring on walls shall be clamped neatly on teak wood battens fixed to the wall by means of wall plugs/wooden pegs. The cable run layout at a typical switching station is shown in the relevant drawing already included in Annexure-XXVII of PART-V of Tender Document.

2.4.24 LITERATURE FOR EQUIPMENT:

The Contractor shall, within six months of issue of Letter of Acceptance of Tender, supply 5 copies of booklets containing manufacturer's instructions for operation and maintenance of each of the items of equipments the supply of which is, Herded by the contract. In addition, 25 copies of detailed schedule of components, catalogues and drawing of all parts of the equipment shall also be supplied.

CHAPTER - V

DESIGNS AND DRAWINGS

2.5.1 GENERAL :

- (a) This chapter deals with the procedure for approval of designs and drawings.
- (b) The type designs shall be as few as possible to cover the largest field of application consistent with economic consideration.
- (c) In all drawings as far as possible only such symbols as are in international use, shall be used.

2.5.2 CONTRACTOR'S DRAWINGS :

- (a) The Contractor shall submit to the Purchaser for approval except where otherwise specified below, all detailed designs and drawings which are necessary to ensure correct supply of equipments, components and materials and to enable correct and complete erection of overhead equipment, switching stations, booster transformer stations and L.T. Supply transformer stations and complete supply and erection of Traction Sub-Stations in an expeditious and economic manner.

(b) RESPONSIBILITY

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

2.5.3 STANDARDS FOR DRAWINGS :

All designs, legends note on drawings and schedules of materials shall be in English and shall be prepared in the metric system. All designs and drawings shall conform to specification RE/OHE/ 25 and ETI/PSI/31(5/76)(Latest version as indicated in Annexure-XXVII of PART-V of Tender Document).

2.5.4 BASIC DESIGNS :

(a) STANDARD DESIGNS

Where the Contractor adopts designs and drawings conforming to the standard designs, drawings, and specifications of the Research, Designs and Standards Organization. Manak Nagar, Lucknow-226 011 (RDSO) for basic arrangements, equipments, components and fittings of traction overhead equipment, switching stations booster transformer stations and LT supply transformer stations and TSS adopts employment schedules furnished by the Purchaser, he shall verify such designs, drawings and employment schedules and satisfy himself that these are correct before use. Within two months of the issue of letter of Acceptance of Tender the contractor shall indicate to the Purchaser, the list of standard basic arrangements, components and fittings drawings and employment schedules, which he will adopt for the purpose of the work.

(b) DEVIATIONS

Normally deviations from the standard drawings of the Purchaser will not be accepted. However, in exceptional cases where the Contractor desires to suggest improvements as a result of his experience or other development, he shall justify his proposals with supporting explanatory notes.

(c) STANDARD DRAWINGS EMPLOYMENT SCHEDULES ETC. -DELETED-

2.5.5 SPECIAL DESIGNS :

- (a) In cases where standard designs, drawings or employment schedules do not cover requirement of special locations or site conditions, the Contractor shall submit his own designs or drawings along with supporting calculations and notes for scrutiny and approval of the Purchaser.
- (b) Such special designs shall generally be in conformity with basic designs furnished by the Purchaser and in accordance with the specifications. If the Contractor wishes to adopt special designs which do not

conform to the general basic designs of the Purchaser, he shall submit alternative designs and drawings justifying his proposals.

2.5.6 PARTICULAR DESIGNS & WORKING DRAWINGS:

2.5.6.1 FOR OHE:

(a) PURCHASER'S PEGGING PLANS

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

(b) CONTRACTOR'S PEGGING PLANS

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

(c) PRINCIPLES OF LAYOUT

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

(d) PROVISIONAL LAYOUT PLANS

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

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

(e) OHE PROFILE DRAWINGS

After completion of the overhead equipment layout plans, the Contractor shall prepare an overhead equipment profile drawing showing the actual height of the contact wire under each overline Structure the gradient and height of the contact wire on either side of the Structure and the encumbrances at Structures until normal height of contact wire and encumbrances are restored.

(f) CROSS SECTION DRAWINGS

While the layout plans are being finalised, the Contractor shall submit for approval, in-so-far as yards between outer most points and crossing are concerned, cross-section drawings for each Structure showing guy rods, if any, indicating the cross-section of the formation, height and nature of soil, type of foundation block, structure proposed, reverse deflection of the Structure and all necessary particulars for erection of the foundation and the Structures. In the preparation of drawings, care shall be taken to show all obstructions such as signal wires, points rods and their correct location in references to track/tracks as well as underground obstructions like pipes cables, etc. after collecting such information from the site.

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

CROSS SECTION FOR THE OPEN ROUTE SECTION -----Km. ----- to -----

Sl. No.	1 2 3 4 5 6 7 8 10 11 12 13 14 15
LOCATION No.	
CHAINAGE	
DETAILS	SETTING DISTANCE IN 'm'
	STEP DISTANCE IN 'm'
	F.B.M. CODE
	SOIL TYPE & PRESSURE
	FOUNDATION TYPE AND SIZE
	MAST SIZE & LENGTH IN 'm'
	MAST EMBEDDED LENGTH 'M'
	REVERSE DEFLECTION in cm
	SUPER MAST LENGTH (m)
	CROSS ARM LENGTH (m)
	ANY OBSTRUCTION

(g) FINAL LAYOUT PLANS

After all the cross-section drawings in a section covered by the layout plan are finalised and foundations are cast, the Contractor shall revise the layout plans to take into account any modifications to the locations of Structures during the process of casting of foundations.

(h) STRUCTURE ERECTION DRAWINGS

The Contractors shall then submit Structure erection drawings for each structure incorporating all the details included in the cross section drawing for the structure and as erected at site and the details of the bracket assembly, mast extensions, isolator mounting frame and anchorage of overhead equipment, feeder or return conductors proposed for each structure together with all particulars necessary for the correct erection of overhead equipment at the structure. For structure with isolators, the details of electrical connections shall also be incorporated. In open line sections the Contractor shall submit structure erection particulars in the typical proforma as given below separately for each main line track in addition to particular details as indicated in the proforma for cross-section drawings. Modification to this proforma is found necessary will be finalised at time of structure erection drawings.

Sl.No.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
LOCATION No.	
CHAINAGE	
1. ENCUMBRANCE	
2. CONTACT WIRE HEIGHT.	
3. STAGGER	
i) CATENARY	
ii) CONTACT	
4. STAY ARM	
i) (a)	
ii) CODE	
5. BRACKET	
i) (b) M	
ii) CODE	
6. REGISTER :	
i) C/D (M)	
ii) CODE	

7.	STD/BENT CODE	
8.	IDENTIFICATION MARK (SEE PARA 2.5.11)	
	OTHER REFERENCES/CODES FOR MISC. ITEMS LIKE STEEL WORK FOR STAY/BRACKET ATTACHMENT MISC. SINGLE/DOUBLE CAT. ETC. WILL BE INDICATED. ITEMS :-	

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

Sl. No.	Item	Limits/Tolerances
(i)	Register Arm Tube Projection	150 - 200 mm in case of Push off locations. For Pull off locations, it shall project over Contact Wire Plane.
(ii)	Bracket Tube Projection	150 - 200 mm
(iii)	Dip between Register Arm Tube & Steady Arm	200 - 250 mm on Tangent Track. (BFB Steady Arm). 250 - 320 mm on Curves. (BFB Steady Arm & Bend Tubular Steady Arm).
(iv)	Encumbrance	± 50 mm
(v)	Length of 'A' Dropper (1 st Dropper from Support)	± 5 mm
(vi)	Spacing of 'A' Dropper (1 st Dropper from Support)	± 30 mm
(vii)	Length of Other Droppers	± 5 mm
(viii)	Spacing of Other Droppers	± 50 mm
(ix)	Stagger of Catenary Wire	± 30 mm
(x)	Height of Catenary Wire	± 50 mm
(xi)	Stagger of Contact Wire	± 10 mm
(xii)	Position of Compensation Plate	It shall be in vertical plane.
(xiii)	Difference between mainline Contact wire and the Crossover Contact Wire at Support.	50 mm (minimum)

(j) SUB-STATION FEEDER DRAWINGS - Deleted.

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

2.5.6.2 FOR TSS:

a) Purchaser's location plans

(A) FOR TRACTION SUB-STATIONS

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

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

(B) FOR FEEDING STATIONS

The location plans and schematic diagrams of connections for all the feeding stations will be furnished by the Purchaser to the Contractor. These will indicate the following as applicable:-

- Overhead equipment layout in the vicinity of feeding stations.

- ii) Location of main masts.
- iii) Arrangement of cross feeders and longitudinal feeders to be anchored on the gantry if any, including jumper connections to the overhead equipment.
- iv) Scheme of connections of interrupters.
- v) Position of the remote-control cubicle with respect to the feeding stations.

C) SHUNT CAPACITOR BANK

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

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

b) Contractor's responsibility.

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

2.5.7 PARTICULAR DESIGNS & WORKING DRAWINGS FOR SWITCHING STATIONS & BOOSTER STATIONS:

(a) PURCHASER'S LOCATION PLAN ETC.

The location plans and schematic diagrams of connections for all the switching stations, booster transformer stations and L.T. supply transformer stations will be furnished by the Purchaser to the Contractor. These will indicate the following as applicable:-

- i) Overhead equipment layout in the vicinity of switching or other stations.
- ii) Location of main masts.
- iii) Arrangement of cross feeders and longitudinal feeders to be anchored on the gantry if any, including jumper connections to the overhead equipment.
- iv) Scheme of connections of interrupters.
- v) Position of the remote-control cubicle with respect to the switching stations.
- vi) Fencing outline at the switching stations.

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

(b) DETAILED DRAWINGS

(A) OHE WORKS :

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

(i) Cross-section drawings for each switching stations indicating the cross section of the formation transverse to the track at each location of main mast and longitudinal section parallel to the track along the center line of the interrupters. These drawings shall be prepared after an accurate survey at site and shall indicate the nature of the soil, its bearing capacity, compactness and in case of loose soil, transverse section of the parent soil. In the preparation of the drawings care shall be taken to show all obstructions to be removed, such as signal wires, rods and their correct location with reference to the track/s as well as under-ground constructions like pipes, cables etc. after collections such information from the site.

(ii) GENERAL ARRANGEMENT DRAWINGS

General arrangement drawings for switching stations indicating the general arrangement of all equipments, run of bus bars, position of pedestal insulators, steel frame work and fencing. The drawings shall also give a schematic connection/diagram and an isometric view of busbars and connections. The drawings shall include an elevation view of the switching stations from behind a transverse cross section and plan sectional views at the level of feeder anchors insulator beams, potential transformer beams and ground. Each drawing shall have a schedule of all equipments required at the switching station along with drawing references of details of these equipments.

(iii) STRUCTURAL DRAWINGS

Structural assembly drawing for switching stations indicating the steel frame work assembly. The drawings shall include one elevation view of the steel frame work assembly from behind, a transverse cross-section and plan views at various levels such as at the level of feeder anchors, insulator beams/and ground. In the

assembly each component member shall be marked with its reference number. The drawing shall also have a schedule of component members along with drawing reference various members. The weight of the component members shall be indicated in a separate weight schedule. The drawings shall be prepared for the various structural components. An individual drawing shall be made for each component and this shall include all fixing bolts, nuts and washers whose sizes will be mentioned on the drawings. Unit isolator beams, potential transformer beams weight of the component shall also be given in the drawings.

(iv) FOUNDATION LAYOUT AND CROSS-SECTION DRAWINGS

Foundation layout & cross-section drawings for each switching station indicating layout of all foundations in plan, transverse cross-section of various foundations through center line of main masts, interrupters, fencing uprights and L.T. supply transformers, if any, and longitudinal sections parallel to tracks through the center line of the cable trench. All foundations shall be marked serially on the drawing and listed in a schedule on the drawing indicating the volume of concrete for each foundation block.

(v) FENCING LAYOUT DRAWINGS

Fencing layout drawings for each switching station indicating the layout of the entire fencing and anti-climbing device in plan. Each upright, fencing panel and fixture on the upright shall be indicated on the drawing by its reference number. A schedule of components viz. Uprights, panel's fixer, and barbed wire shall be included in the drawings indicating the drawing references of components. An individual drawing shall be made for each type panel, fencing post and fixture for mounting the anti-climbing device. The drawing of each fencing post shall indicate the unit weight of the fencing post.

(vi) EARTHING LAYOUT DRAWINGS

Earthing layout drawing for each switching station indicating the layout of full earthing system in plan. The drawing shall show the location of earth electrodes and mark the runs of earthing strips and connections to each equipment, mast, fencing post and fencing panel. All components shall be marked with their reference numbers, for further details of the run of conductors and connections, separate drawings which may be common to all switching stations may be made and references to these drawings marked on the layout. A schedule of components shall be made out in the drawing giving drawing references of components.

(vii) CABLE RUN LAYOUT.

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

(viii) EQUIPMENT DRAWINGS

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

1. Fixing or mounting hole dimensions and arrangement;
2. Net weight of the equipment.
3. Characteristic and rating of equipment
4. Circuit diagrams;
5. Overall dimensions and other important dimensions;
6. Height and vertical and horizontal dimensions of all exposed live parts; and
7. Notes explaining the operation of the equipment

(ix) MISCELLANEOUS DRAWINGS

Miscellaneous drawings applicable to all switching stations. These drawings shall include drawings or sketches made for study of clearances, isolator alignment details, scheme of interlocks, number plates of various equipments and "U" bolts for cable mounting, caution or instruction boards, outriggers for busbar supports and non-standard busbar connectors.

(x) EMPLOYMENT SCHEDULES AND CHARTS

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

1. Employment schedule for pure gravity type of foundations for main masts for various direct loads and bending moments;
2. Employment schedule for all other foundations for various depths of parent soil from the datum level.
3. Sag tension charts for cross feeders for various spans and tensions.

(B) FOR TSS WORKS:

Contractor shall submit for approval the following drawings.

a) Cross section drawings.

Cross section drawings for each traction sub-station, indicating the transverse and longitudinal cross-section of the soil along the center line of the equipments, busbar supports and cable trenches. These drawings shall be prepared after an accurate survey at site and shall indicate the nature of the soil, its bearing capacity, compactness and in case of loose soil, cross-section of the parent soil. In the preparation of the drawings, care shall be taken to show all obstructions to be removed, such as telegraph posts, underground pipes, cables etc. after collection of such information from the site.

b) General arrangement drawings.

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

c) Structural drawings

Structural drawings for each supporting steel frame work of pedestal. The drawing shall include one elevation view of the steel frame work assembly from behind, a transverse cross section and plan view. In the assembly each component member shall be marked with its reference number. The drawing shall also have a schedule of components members along with drawing references of various members. The weight of the component members shall also be indicated. The drawings shall be prepared for the various structural components. An individual drawing shall be made for each component and this shall include all fixing bolts, nuts and washers whose sizes will be mentioned on the drawing. Unit weight of the components shall also be given in the drawing.

d) Foundation layout and cross section drawings.

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

e) Earthing layout drawings.

Earthing layout drawing for each traction sub-station indicating the layout of full earthing system in plan. The drawing shall show the location of earth electrodes and mark the runs of earthing leads and connections to equipment, gantry/portal columns, fencing uprights, structural supports etc. All components shall be marked with their reference numbers. For further details of the run of conductors and connections, separate drawings which may be common to all traction sub-stations may be made and references to these drawings marked on the layout. A schedule of components shall be made out in the drawing giving drawing references of components. These drawings shall be prepared duly taking into account the actual soil resistivity of the respective traction sub-station area, measured in the presence of the Purchaser's representative in accordance with the procedure laid down in IS:3043 -1966. The necessary design calculations for the proposed earthing system of the traction sub-station shall also be submitted by the Contractor for Purchaser's approval.

f) Cabling & Wiring drawings.

Cabling and wiring diagrams for each traction sub-station indicating the schematic arrangement and physical disposition of equipment, run of cables and wires for inter-connections between various

equipments indoor and outdoor, colour coding and the index scheme adopted for terminals. The drawings shall also indicate the sizes of wires and grades of insulation. The quantity of various cables required shall be indicated on the drawings.

g) Fencing layout drawings.

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

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

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

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

i) General Drawings.

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

j) Schedule of quantities.

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

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

(C) FOR FEEDING STATIONS

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

a) CROSS SECTION DRAWINGS

Cross-section drawings for each feeding stations indicating the cross section of the formation transverse to the track at each location of main mast and longitudinal section parallel to the track along the center line of the interrupters. These drawings shall be prepared after an accurate survey at site and shall indicate the nature of the soil, its bearing capacity, compactness and in case of loose soil, transverse section of the parent soil. In the preparation of the drawings care shall be taken to show all obstructions to be removes, such as signal wires, rods and their correct location with reference to the track/s as well as under-ground constructions like pipes, cables etc. after collections such information from the site.

(b) GENERAL ARRANGEMENT DRAWINGS

General arrangement drawings for feeding stations indicating the general arrangement of all equipments, run of bus bars, position of pedestal insulators, steel frame work and fencing. The

drawings shall also give a schematic connection/diagram and an isometric view of busbars and connections. The drawings shall include an elevation view of the feeding stations from behind a transverse cross section and plan sectional views at the level of feeder anchors insulator beams, potential transformer beams and ground. Each drawing shall have a schedule of all equipments required at the feeding station along with drawing references of details of these equipments.

(c) STRUCTURAL DRAWINGS

Structural assembly drawing for feeding stations indicating the steel frame work assembly. The drawings shall include one elevation view of the steel frame work assembly from behind, a transverse cross-section and plan views at various levels such as at the level of feeder anchors, insulator beams/and ground. In the assembly each component member shall be marked with its reference number. The drawing shall also have a schedule of component members along with drawing reference various members. The weight of the component members shall be indicated in a separate weight schedule. The drawings shall be prepared for the various structural components. An individual drawing shall be made for each component and this shall include all fixing bolts, nuts and washers whose sizes will be mentioned on the drawings. Unit isolator beams, potential transformer beams weight of the component shall also be given in the drawings.

(d) FOUNDATION LAYOUT AND CROSS-SECTION DRAWINGS

Foundation layout & cross-section drawings for each feeding station indicating layout of all foundations in plan, transverse cross-section of various foundations through center line of main masts, interrupters, fencing uprights and L.T. supply transformers, if any, and longitudinal sections parallel to tracks through the center line of the cable trench. All foundations shall be marked serially on the drawing and listed in a schedule on the drawing indicating the volume of concrete for each foundation block.

(e) EARTHING LAYOUT DRAWINGS

Earthing layout drawing for each feeding station indicating the layout of full earthing system in plan. The drawing shall show the location of earth electrodes and mark the runs of earthing strips and connections to each equipment, mast, fencing post and fencing panel. All components shall be marked with their reference numbers, for further details of the run of conductors and connections, separate drawings which may be common to all feeding stations may be made and references to these drawings marked on the layout. A schedule of components shall be made out in the drawing giving drawing references of components.

(f) CABLE RUN LAYOUT

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

(g) EQUIPMENT DRAWINGS

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

1. Fixing or mounting hole dimensions and arrangement
2. Net weight of the equipment.
3. Characteristic and rating of equipment
4. Circuit diagrams
5. Overall dimensions and other important dimensions
6. Height and vertical and horizontal dimensions of all exposed live parts
7. Notes explaining the operation of the equipment

(h) MISCELLANEOUS DRAWINGS

Miscellaneous drawings applicable to all feeding stations. These drawings shall include drawings or sketches made for study of clearances, isolator alignment details, scheme of interlocks, number plates

of various equipments and "U" bolts for cable mounting, caution or instruction boards, outriggers for busbar supports and non-standard busbar connectors.

(i) EMPLOYMENT SCHEDULES AND CHARTS

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

1. Employment schedule for pure gravity type of foundations for main masts for various direct loads and bending moments;
2. Employment schedule for all other foundations for various depths of parent soil from the datum level.
3. Sag tension charts for cross feeders for various spans and tensions.

(j) SCHEDULE OF QUANTITIES

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

- i) Schedule of number of foundations, types, volume of different foundation and total volume. foundations will be treated as one foundation;
- ii) Schedule of number of masts, types, weight of different masts, and the total weight of masts of each gantry.
- iii) Schedule of steel work, types, weight of each member and total weight; and
- iv) Schedule of quantities of various items of work of schedule 1, Section-8 & 9 not included in Item (i), (ii), and (iii) above.

(D) FOR SHUNT CAPACITOR BANK

Contractor shall submit for approval of the following drawings:-

a) Cross section drawings

Cross section drawings for each capacitor bank installation indicating the transverse and longitudinal cross-section of the soil along the centre line of the equipments, busbar supports and cable trenches. These drawings shall be prepared after an accurate survey at site and shall indicate the nature of the soil, its bearing capacity, compactness and in case of loose soil, cross section of the parent soil. In the preparation of the drawings, case shall be taken to show all obstructions to be removed, such as telegraph posts, underground pipes, cables etc. after collection of such information from the site.

b) General arrangement drawings

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

c) Structural drawings

Structural drawings for each supporting steel framework of pedestal. The drawing shall include one elevation view of the steel framework assembly from behind, a transverse cross section and plan view. In the assembly each component member shall be marked with its reference number. The drawing shall also have a schedule of components members along with drawing references of various members. The weight of the component shall also be indicated. The drawings shall be prepared for the various structural components. An individual drawing shall be made for each component and this shall include all fixing bolts, nuts and washers whose sizes will be mentioned on the drawing. Unit weight of the components shall also be given in the drawing.

d) Foundation layout and cross-section Drawings

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

e) Earthing layout drawings

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

f) Cabling and Wiring drawings

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

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

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

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

h) General drawings

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

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

The Contractor shall submit for approval to the purchaser drawings for booster transformer stations and L.T. supply transformer stations, similar to those detailed for switching stations in 2.5.7(b). The following drawings may, however, be combined together:

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

2.5.9 BILL OF QUANTITIES:

(a) Within one month of issue of Letter of Acceptance of Tender, the Contractor shall assess the quantities of various items of work including various components and fittings as covered in TENDER FORM-5 of PART-I of Tender Document and submit the same after assessment for approval of the Purchaser. Such an assessment shall be revised at suitable intervals after the previous assessment is approved till the work is completed.

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

- i) Schedules of number of masts, types, weight of different masts and total weight of masts;

- ii) Schedules of number of foundations, types, volume of different foundations and total volume;
- iii) Schedule of quantities of various items of work other than masts and foundation under TENDER FORM-5 of PART-I of Tender Document.
- iv) Schedule of net tension lengths of contact, catenary and feeder wires and lengths required to be ordered;
- v) Schedule of lengths of other wires and conductors required to be ordered;

and

- vi) Schedules of small parts steel work to be supplied; either by the Contractor or the Purchaser.

(b) SWITCHING/BOOSTER STATIONS

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

- i) Schedule of number of foundations, types, volume of different foundation and total volume. Overlapping foundations will be treated as one foundation;
- ii) Schedule of number of masts, types, weight of different masts, and the total weight of masts of each gantry;
- iii) Schedule of steel work, types, weight of each member and total weight; and
- iv) Schedule of quantities of various items of work of TENDER FORM-5 of PART-I of Tender Document not included in Item (i), (ii), and (iii) above.

(c) TRACTION Sub-Stations:

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

- i) Schedule of foundations, showing volume of each type and total volume.
- ii) Schedule of steel work, types, weights of each member and total weight.
- iii) Schedule of quantities of various items of work of TENDER FORM-5 of PART-I of Tender Document not included in item (i) and (ii) above.

2.5.10 SUBMISSION OF DRAWINGS & SCHEDULES:

(a) The submission of designs and drawings for approval shall be done in the manner indicated (See also Annexure-XXVII of PART-V of Tender Document).

(b) DEVIATION FROM STANDARD DESIGN -DELETED-

(c) SPECIAL DESIGNS

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

(d) PURCHASER'S PEGGING PLANS

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

(e) CONTRACTOR'S PEGGING PLANS

When the Contractor is called upon to survey and prepare pegging Plans, he shall send three copies of such plans, while submitting them for approval.

(f) CROSS-SECTION DRAWINGS

Cross-section drawings shall be submitted for approval in two copies for a convenient section at a time separately for sections within station limits and section outside station limits. Such drawings shall be submitted progressively and as far as possible without gaps (see para 2.5.6 above).

(g) OHE LAYOUT PLANS AND PROFILE DRAWINGS

Overhead equipment layout plans, provisional and final and profile drawings shall be submitted for approval in three copies (See para 2.5.6 above).

(h) STRUCTURE ERECTION DRAWINGS

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

(j) SCHEDULE OF QUANTITIES

Schedules of quantities for each approved layout plan/switching station shall be submitted for approval in two copies.

(k) SUB-SECTION FEEDER DRAWINGS -Deleted.

(l) All drawings for switching stations, booster transformer stations and L. T. supply transformer stations shall be submitted for approval in three copies.

(m) DISTRIBUTION COPIES

On receipt of purchaser's unqualified approval to the Contractor's Drawings, Schedule of quantities, the Contractor shall submit original tracings of those drawings and schedules for the signature of the purchaser in token of approval within seven days of the receipt of approval and the purchaser shall as far as possible return the same to the Contractor within 7 working days thereafter. On receipt of these tracings from the purchaser, the Contractor shall submit copies for distribution to field officers and other departments as indicated below within 7 days of receipt of approved tracings:

i) Standard designs including fittings drawings as per para 2.5.10(b)	8 copies
ii) Special designs	8 copies
iii) Final 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) Deleted	
ix) Schedule of quantities	6 copies
x) Drawings for switching stations, booster transformer stations & L.T. transformer stations.	9 copies

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

2.5.11 COMPLETION DRAWINGS & SCHEDULES:

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

2.5.12 ADDRESSES:

Addresses to which designs and drawings should be submitted are indicated in SECTION-C.

CHAPTER - VI

ERECTION AND INSTALLATION OF EQUIPMENT

SECTION - 1 : PRINCIPLES

2.6.1 SCOPE :

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

2.6.2 METHODS OF ERECTION :

All work shall be done in accordance with methods of erection and installation of equipment approved by the Purchaser. In the case of switching station, booster transformer stations, L.T. supply transformer stations and Traction Sub-Stations, standard methods adopted for erection and installation of electrical equipment shall be adopted.

2.6.3 SECTIONING :

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

2.6.4 INSPECTION :

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

2.6.5 MEASUREMENTS :

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

2.6.6 BOLTS, NUTS ETC. :

All bolts, nuts, locknuts, screws, locking plates & split cotter pins etc. shall be properly tightened and secured. Contractor shall carry out systematic inspection of this aspect of work after all adjustments to overhead equipment/installation are completed and prior to offering completed sections of equipment/Sub-Station to the purchaser for inspection and testing. No bolts may project more than 10mm beyond the nut/locknut after full tightening.

2.6.7 DAMAGE TO GALVANISING PAINTING :

In loading, transport and erection, all galvanized/ painted materials shall be handled with care to avoid damage to galvanising/painting. If galvanising/painting is damaged inspite of all care taken, the damaged part of component shall be put up for inspection, to obtain permission from the purchaser to carry out repairs as per para 2.4.11(c).

2.6.8 FOUNDATIONS :

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

(b) LOCATION

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

(c) METHOD OF INSTALLATION

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

(d) EXCAVATION

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

(e) CONCRETING

All concreting or grouting shall be done in accordance with para 2.2.4 of SECTION-B of PART-II of Tender Document with ballast graded for the purpose specified in para 2.2.5 of SECTION-B of PART-II of Tender Document. The concrete shall be poured and temped properly in accordance with the method approved by the purchaser. The Contractor shall arrange to provide concrete testing samples for tests once every week or as and when required by the Purchaser, to determine crushing strength after 7 days or 28 days curing as required. Testing shall be arranged by the Purchaser at his own cost.

(f) MUFFS

(i) FOR OHE:

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

(ii) FOR Foundation Level of TSS:

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

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

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

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

2.6.9 MASTS AND STRUCTURES :

(a) ERECTION

In case traction masts or structures are erected in cored foundations, till such time they are grouted, they shall be properly wedged to prevent them leaning towards the track and endanger safety of moving vehicles. In case traction masts or structures are erected simultaneously with the casting of the foundations, the Contractor shall provide suitable temporary supports approved by the Purchaser. The masts/structure shall be embedded in the foundation blocks for the correct length specified in approved drawings.

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

(b) REVERSE DEFLECTION

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

(c) INFRINGEMENT TO STANDARD DIMENSIONS

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

(d) ALINGMENT OF MAST AT GANTRIES

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

2.6.10 OVERHEAD EQUIPMENT :

(a) A suggested method for erection of traction overhead equipment which would ensure good speed and quality erection is included in section 2 of this chapter. The Contractor may, however, follow other methods which they consider would speed up and ensure good quality work, subject to the approval of the Purchaser. Any wiring method should take into consideration appreciable stretch of the catenary and contact wires in the initial days after they are strung and put under tension.

(b) BRACKET TUBES

In the erection of bracket assemblies, it shall be ensured that the free length of the bracket tube beyond the catenary suspension bracket is at least 200mm to facilitate adjustment during maintenance.

(c) STAY ARMS

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

(d) INSULATORS

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

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

(e) STRINGING CATENARY

Care shall be taken to avoid kinking or bird caging of the catenary wire in stringing and subsequent operations. While stringing the wire shall be suspended from pulley blocks hung from the suspension clamp eye of bracket assemblies. The pulleys shall be fitted with ball bearing and shall be of the swiveling type to permit free movement in all directions to prevent damage to the strands of the wire. The design

shall also be such that it will prevent slipping off of the wire during stringing operations. The designs of the pulley shall be submitted to the Purchaser for approval. After initial stringing of the catenary, it shall be maintained at the 'no load tension' (see section 2 of this chapter) for a minimum duration of 48 hours before the pulley blocks are removed and the catenary is clamped to suspension clamps of bracket assemblies. Shorter periods may, however, be allowed by the Purchaser.

(f) STRINGING CONTACT WIRE

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

(g) LOCATION OF DROPPERS

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

(h) CLIPPING DROPPERS

The dropper shall be clipped on the contact wire only after a minimum duration of 48 hours from the time the automatic tensioning device is brought into action. Shorter periods may, however, be allowed by the Purchaser.

(i) -NIL-

(j) AUTO TENSIONING DEVICE

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

(k) CUT-IN-INSULATORS

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

(l) SECTION INSULATORS

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

(m) ANTI -WIND CLAMP

Anti-wind clamp shall be provided as shown in drawing (Annexure-XXVII of PART-V of Tender Document).

(n) CONNECTIONS

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

(o) SEPARATION BETWEEN OHE

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

(p) GRADIENT OF CONTACT WIRE

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

(q) ADJUSTMENT AT TURNOUTS ETC

Careful adjustment of equipment shall be made on equipments at Turnouts, cross overs, diamond crossings, overlaps and special Locations, for position of bracket assemblies, stay arms and height of

contact wire to ensure that pantographs of electric rolling stock on the run will not foul with any parts of the bracket assemblies and changeover of the contact wire is affected smoothly.

(r) For wiring in large Yards, the Contractor shall, prior to the execution of works, submit to the Purchaser's Engineer for the approval the sequence of stringing of catenary and contact wires to arrange for proper crossing of wires. Endeavor will be made to arrange for traffic blocks to suit approved sequence of wiring.

2.6.11 ISOLATORS :

Isolator switches shall normally be so mounted that when the switches are operated, the operator faces the directions of the motion of trains. The operating handles and contact blades shall be correctly aligned for easy operation.

2.6.12 BUS BARS AND CONNECTIONS :

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

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

2.6.13 EARTHING :

FOR OHE:

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

FOR TSS:

Typical clamping arrangement of M.S Flat inside Control Room is shown in the relevant drawing in Annexure-XXVII of PART-V of Tender Document. The joints on mild steel flats shall be welded type. The welds shall be treated with barium chromate before painting the welded surfaces. The connections to the various items of equipments shall be made with galvanised steel bolts (16mm dia), nuts with locknuts or spring washers as required. The earth connections to the structural members shall be made at height not exceeding 150 mm from the ground level. The steel flats shall be bent and shaped neatly before connection to the structures or frame work of equipment. The earth flats to run along the structures for connections of equipments to earth mat shall be properly supported on the structures with galvanised steel bolts (12mm dia), nuts with lock-nuts or spring washers, as required, at suitable intervals.

2.6.14 TOLERANCE :

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

(a) MEASUREMENTS

The span length shall not vary more than ± 50 mm as measured along the appropriate rail (see para 2.6.5 above).

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

(b) SETTING OF STRUCTURES

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

(c) HEIGHT OF CONTACT WIRE

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

(d) STAGGER : Generally, ± 200 mm will be permitted for stagger.

(e) DROPPER LENGTHS : ± 5 mm will be permitted for dropper lengths.

(f) DROPPER LOCATION : ± 100 mm will be permitted for dropper locations.

2.6.15 SUPPLEMENTARY INSTRUCTIONS :

Further working instructions will be issued if considered necessary by the Purchaser should be considered that the standard of work of the Contractor requires to be improved.

2.6.16 EQUIPMENT :

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

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

2.6.17 CABLING :

a) Laying of cables.

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

b) Termination of cables.

The cables shall be terminated neatly and the cores arranged and dressed properly. Suitable terminal strips and ferrules made of PVC or other durable materials shall be provided on terminals and wire ends

respectively to facilitate identification. The marking on the terminals strips and ferrules shall be either engraved or punched so as to be indelible.

c) Indoor wiring.

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

SECTION 2: WIRING PROCEDURE

2.6.20 WIRING PROCEDURE :

This section deals with wiring procedure which may be adopted for erections 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 energisation and commissioning is virtually eliminated.

2.6.21 GENERAL :

In the case of regulated overhead equipment when the regulating equipments are in action, the tension in the conductors should remain constant, irrespective of variations in the ambient temperature. As the regulating equipments are brought into action a few days after the stringing of conductors the equipments is unregulated in the intervening period. Any of the following two procedure 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 is tensioned to 1,000 kgf, the stipulated tension at the mean temperature of 35° C, whatever may be the ambient temperature during the stringing operations. In this case, at the time of clamping the catenary to the bracket, the brackets should be placed at angular positions corresponding to temperature at the time of clamping, and proportionate to their distance from the anti-creep.
- (ii) The aluminum alloy catenary is tensioned at the calculated tension to correspond to 1000 kgf, the stipulated tension at the mean temperature of 35°C whatever may be the ambient temperature during the stringing operations.
- iii) The catenary is strained to a stringing tension corresponding to the ambient temperature for the equipment span of the tension length. In this case, the brackets are placed in the mean position, i.e., at right angles to the track, when the catenary is clamped or the regulating equipment commissioned.

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

2.6.22 ERECTION OF BRACKETS :

After the brackets are fabricated correctly in the Contractor's Depot, in accordance with the approved structure erection drawings, and provided with indelible labels or/painted marking indicating the intended locations 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 the right angles to the track and secured in that position by means of steel wires tied to similar brackets located on the opposite side of the track or other suitable means.

2.6.23 ANTICREEP :

The anti-creep of the tension length is then installed in its final positions.

2.6.24 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 degrees centigrade.

2.6.25 TEMPORARY ARRANGEMENT :

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

2.6.26 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 then 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.

2.6.27 TENSIONING OF CATENARY :

The catenary is strained up to the 'Stringing tension' corresponding to the 'equivalent' span of the tension length and the ambient temperature at the time of stringing with the aid of a dynamometer, and terminated at the tension. For this purpose, the ambient temperature shall be deemed to be the temperature registered by a thermometer tied to a length of catenary wire 3 to 4 meters long, laid flat on the top platform, on one of the wagons of the wiring train. Subsequently, the tension in the wire is checked by measurement of sag with the help of leveling the attached to suspension points and to the catenary at midspan by a ladder working party. The sag shall be measured in two spans, each preferably greater than 54 meters, and situated on either side of anti-creep approximately midway between the anti-creep and the termination points. The value of sag measured by this method should be within $\pm 5\%$ of the theoretical value for the corresponding stringing tension, and the temperature at the time of this measurement. In case the discrepancy is more, the tension should be adjusted again and sag re-checked as above (see note 1). 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, into first block, the catenary is strained to the stringing tension with the aid of dynamometers and the catenary is terminated. In a subsequent block, the sag is checked and the tension readjusted with ladders, if necessary.

2.6.28 CLAMPING THE CATENARY :

The catenary is clamped on the brackets placed at right angles to the track " See Note 2 under Para 2.6.34).

2.6.29 DROPPERING :

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

2.6.30 STRINGING 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 point at the other end of the tension length is reached (See Note 3). In curves, the contact wire shall be registered on pulleys located at traction masts or supports corresponding to the approximate final position of the wire. The axes of these pulleys should be more or less vertical.

2.6.31 TENSIONING OF CONTACT WIRE :

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

2.6.32 REGULATING EQUIPMENT IN ACTION :

The regulating equipment is put into action with the counter weight at the correct height above rail level and with distance between pulleys 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.

2.6.33 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 (See Note 4). The temporary pulleys are removed and the conductors terminated in the permanent ending fittings, compensating plates, insulators and turn buckles (See Note 5). The equalizer plate is kept vertical or at a slightly inclined position (by 2 or 3 cm the contact wire being shorter than the catenary) and the position of the regulating equipment is checked in relation to, the temperature at the time. The contact wire is clipped on to the 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.

2.6.34 CONCLUDING REMARKS :

If the above method is followed with care no further adjustment may be needed.

NOTE:

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

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

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

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

(iii) It obviates the necessity initial tensioning of the catenary accurately thus permitting a deduction 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 equalisation of tension in the different spans.

Before clamping the catenary to the brackets, the sag should however, be checked in two spans as indicated in Para 2.6.27.

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

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

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

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

(iv) The adjustment of tension and checking of sag of the catenary wire is carried out as if the contact wire had not been strung. Only after adjustment of tension and checking of sag is completed, the contact wire is transferred to the pulleys attached to the droppers or to hooks suspended from the catenary and the tension is adjusted as indicated in Para 2.6.31.

(4) When the contact wire is under tension, creep takes place which results in a increase in the length of wire and, consequently, the droppers and the equaliser plates would become oblique.

Though creep may continue for a long time, about a year, the bulk of it would occur during the days following stringing. If sufficient period of time is allowed the contact wire may be clipped to the droppers and the equaliser plates, all in the vertical position, and the necessity for any further adjustments before energisation and commissioning of the OHE may be reduced to a great extent. If this precaution is not taken, at the time of energisation of the OHE, the droppers may not all be vertical and staff would have to be detailed for shifting the dropper clips which is attendant 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 ensure that two marks are in the same relative longitudinal position as they were before the removal of the temporary arrangement.

CHAPTER - VII

INSPECTIONS AND TESTING

2.7.1 SCOPE :

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

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 (See para 2.1.10 of SECTION-B) and without undue heating in the case of other equipments.

2.7.3 RESPONSIBILITY :

The general tests of overall performance stipulated below are only supplementary to other tests on structures, foundations, equipment, components and fittings as specified in SECTION-B, Chapter - II, III and IV. Any testing and acceptance by the Purchaser of overall performance shall be subject to the general terms of guarantee which shall continue to be valid as provided for in SECTION-A.

2.7.4 TESTS OF OHE :

(a) GENERAL

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

(b) INSULATION

The strength of the insulation and the dielectric strength of the entire equipment as installed shall be tested with a 2500V Megger.

(c) CONTINUITY

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

(d) ELECTRICAL INDEPENDENCE

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

(e) SWITCHES

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

(f) TENSION DEVICES

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

(g) STAGGER AND HEIGHT

The stagger and height of contact wire over the entire section of completed overhead equipment and the clearances available shall be measured and the measurement shall be checked against approved drawings. These measurements shall be carried out at low speed with a vehicle or device to be arranged by the Purchaser, the movement of which will follow the track levels as closely as possible. Tolerance that will be permitted on the dimensions indicated in the approved drawings are shown in SECTION-B, Chapter - VI.

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

(h) MECHANICAL BEHAVIOR

The mechanical behavior of the entire equipment shall be tested at various speeds under normal pantographs pressure without energising the overhead equipment.

(i) ENERGISING

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

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

2.7.5 INSPECTION AND TESTING OF SWITCHING STATIONS ETC.:

(a) GENERAL

As soon as a switching station, booster transformer station or LT supply transformer station and Traction Sub-Station is ready for inspection and testing, the Contractor shall advise the Purchaser in writing. Testing will be carried out by the Purchaser at his cost jointly with the Contractor. These shall include the tests which the Purchaser may like to conduct with a view to assure himself of the soundness of the equipments and their erection in compliance with this specification. However, testing equipments such as those indicated below and staff required for the tests shall be provided by the Contractor free of charge.

- (i) Oil testing equipment.
- (ii) 5000V/2500 V & 500 V meggers.
- (iii) Earth megger and accessories.
- (iv) Continuity test apparatus.
- (v) Avometer
- (vi) Relay testing kit.
- (vii) Primary injection test set.

The Contractor shall take full responsibility for these tests inter-alia his other responsibilities.

(b) VISUAL INSPECTION

Visual inspection which shall include check for satisfactory workmanship shall cover all connections, Painting, Plastering, Cleanliness of all insulators etc. and compliance with Indian Electricity Rules.

(c) OPERATIONS TEST

This 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, i.e., in the particular case of isolators the fixed contact and knife blade have been correctly aligned and operations does not cause undue strain on the equipment. The operation tests will be carried out with the high-tension installation dis-connected from the supply, but by actuating power devices where such are provided. Continuity test of high-tension connections after setting such interrupter and isolator in their respective positions shall also be conducted as part of the operation test.

(d) INSULATION

The strength of insulation of the various items of equipment and of the entire installation as a whole shall be tested with a 5000V/2500 V/500 V megger, as required.

(e) DI-ELECTRIC STRENGTH OF OIL

The di-electric strength of the oil of the Instrument Transformers (except if they are of sealed construction), Booster transformer Circuit Breaker & LT supply transformer, at each station shall be tested before commissioning in accordance with IS:335 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) should this be found not correct, the Contractor shall arrange at his own expenses to have it rectified.

(f) ISOLATORS

All isolators will be tested for smooth and trouble-free operation. Correct functioning of interlocking device shall be checked.

(g) INTERRUPTORS

Operation of trip and close coils for interrupters shall be tested for satisfactory performance with the respective equipments de-energised.

(h) Instrument transformer

Tests shall be conducted to check the polarity of current and potential transformers.

(i) Ammeter and Voltmeter

The Calibration of ammeters and voltmeters provided on the control board shall be checked.

(j) Protective relays

The Contractor, shall arrange for all protective relays to be tested and calibrated in a recognized test laboratory at his own cost, just prior to installation on the control board, and shall submit six copies of the test certificates to the Purchaser.

(k) Primary & secondary injection tests

Operation of all protective relays, auxiliary relays and trip and close coils for circuit breakers shall be tested for satisfactory performance with the respective equipments de-energised. Correct functioning of all electrical interlocks inter- tripping etc. shall also be checked during these tests.

(l) Performance tests

To verify the performance of the complete capacitor bank, tests as specified in respective clause of RDSO specification No. TI/SPC/PSI/FC & SR/0100 (01/2010) shall be carried out at site after installation.

2.7.6 EARTHING :

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

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

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

(d) Earth resistance will be measured separately for each earth electrode and when they are connected together and to the equipment at each sub-station, feeding station and shunt capacitor bank.

2.7.7 DETAILS PROCEDURE FOR TESTS :

The detailed procedure for inspection and testing will be furnished to the contractor. The contractor shall submit the results of tests in the proforma which will be furnished by the Purchaser, in quadruplicate.

CHAPTER - VIII

SWITCHING STATION BUILDING

2.8.1 GENERAL :

This chapter deals with details and specifications for design and construction of switching station buildings and associated electrical works. This chapter also gives reference to technical specifications of materials and components and procedure of designs and drawings for above works. A list of standard drawings is included in Annexure-XXVII of PART-V of Tender Document.

2.8.2 EARTH WORK:

(a) Earth work in cutting or embankment in the premises of switching station buildings is included in the scope of construction of building. The buildings will be adequately levelled with earth duly consolidated in the premises or as directed by the purchaser.

(b) Mechanical Compaction:

Depending upon the height of the embankment, the type of soil, time available for completing the embankment and other relevant factors, purchaser's Engineer shall decide whether mechanical compaction is to be done for the full or part height of embankment. Suitable method for compaction as decided by purchaser, shall be adopted.

(c) Excavation:

All cuttings shall be taken down carefully to the precise level and section as shown in the drawings or as ordered by the purchaser. In case, the bottom of the cutting is taken down deeper than is necessary by oversight or neglect of the contractor, the hollow must be filled up to true depth with selected material and rammed, if approved by purchaser. Cuttings with the formation in rock will be excavated to 15 cm below the true formation and filled up to true level with cutting spoil to ensure that no lumps of solid rock project above formation level.

(d) Drainage of cuttings:

In excavating cuttings, special precautions are to be taken to ensure that the excavations drain themselves automatically. To ensure this, the central block of earth or gullet is to be excavated first. This will be done in such a manner that the bottom of the excavation shall where possible, slop downwards from the center of the cutting towards the ends. It will be made in such cuts or steps as may from time to time, be directed. Generally, in deep cuttings the first cut or step will approximately follow the surface of the ground where this will secure the necessary slope for drainage, and will be excavated to such depth not exceeding 3 m as may be ordered, with perpendicular sides leaving pathways for workmen along the sides of the cut parallel to the central line about every 15m. In shallow cuttings, not exceeding 2m in the deepest part, the gullet may be cut out at once to formation level.

(e) Catch water drains:

Where required, catch water drains shall be constructed on the uphill side leaving a berm of one metre from the boundary of the railway land. The cross-sectional area of the catch water drain shall normally not exceed 0.75 sq.m. The spoil from the catch water drain will be thrown up on the side towards the cutting.

(f) Berms and spoil banks:

No spoil shall be deposited within a distance of 6 m from the top edge of the slope of any cutting.

(g) The spoil heap shall be roughly but neatly dressed off to a slope of 1-1/2:1 and shall form a continuous bund along the top of the cutting. In country where there is any cross fall sufficient spoil shall be thrown on the uphill side of the cutting to supplement the catch water drains and assist in keeping drainage out. This work must be done first.

(h) All material excavated from cutting suitable for pitching, ballast, masonry or any other purpose whatever, shall be the property of the Railway, and shall be stacked, as also disposed of, as directed by the Purchaser.

(i) Springs or Inflow:

Should springs or inflow of water appear in cuttings, or should they be flooded, the contractor must arrange for bailing, pumping or drainage of water, without obstruction to adjacent works.

(j) Blasting:

If any blasting operations are necessary, they shall be carried out following all safety measures.

2.8.3 FOUNDATIONS :

(a) Foundations shall be designed by the contractor in accordance with SECTION-B Chapter-II of this tender document. The contractor shall get the relevant drawings approved by the purchaser. The foundation work may involve wet excavation also, for which all due precautions by way of pumping and other operations, preventing blowing are to be adopted.

(b) Plinth filling:

Plinth filling shall be done with earth in 15 cm layers, duly consolidated, watered & rammed unless otherwise specified. In black cotton soil, the soil shall be removed for a depth of 60 cm and top 30 cm filling shall be done with sand.

(c) Wherever it is necessary in case of deep trenches, shoring or timbering for such trenches shall have to be provided to avoid collapsing of earth.

(d) Apron:

For protection of plinth, an apron as specified in drawing **No.RE/Civil/BS-11/95** (Latest version) shall be provided.

2.8.4 REINFORCED CEMENT CONCRETE WORK :

(a) R.C.C. of the switching station shall be cast on the controlled concrete technology for M-20 grade conforming to IS:456 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document). The design of all R.C.C. work shall be prepared by the contractor and got approved from purchaser well in time. Test concrete specimen shall be casted at the site of work and tested in accordance with the relevant specification.

(b) If unavoidable due to site conditions, concrete may have to be laid in water as per laid down procedure.

(c) All RCC works shall be finished smooth.

2.8.5 SUPER STRUCTURES :

(a) Brick work

Besides following relevant specification, well burnt bricks shall only be used. The brick work shall be laid in ENGLISH BOND. The brick work below plinth shall be done in Cement mortar of ratio 1:4 (1 cement, 4 sand). The brick work above plinth shall be done in cement mortar of ratio 1:6. Curing of the brick work shall be done for a minimum period of fourteen days.

(b) Plastering on inside and outside surface shall be done in Cement mortar of ratio 1:3 and shall have a thickness of 10 mm.

(c) All external surface shall be treated with snowcem over two coats of cement primer of approved quality and all internal surfaces of wall and ceiling shall be white washed with three coats.

2.8.6 FLOORING:

(a) Following pattern of the flooring shall be adopted:

(i) **Base concrete** - 100 mm thick cement concrete of ratio 1:4:8 with under layer of 100 mm thick sand filling over well compacted earth.

(ii) **Top layer** - 40 mm thick cement concrete of ratio 1:2:4, laid in panels with glass dividing strips of 25 mm x 3 mm.

Top surface of the flooring shall be finished smooth.

(b) Suitable anti-termite treatment, pre and post treatment as approved by the purchaser, shall be provided.

2.8.7 ROOFING :

R.C.C. roof, complete in all respects in accordance with RDSO drawing No. ETI/C/0067 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) shall be provided. Water proofing of roof

shall be responsibility of the contractor. Type of water proofing treatment if required, will be got approved from the purchaser. The contractor shall ensure at the time of handing over of the building that roofs are leak proof and water tight. The contractor shall also provide C.I. rain water pipes of specified size.

2.8.8 DOORS, WINDOWS, VENTILATORS :

Pressed steel doors, windows, ventilators and grills etc. shall be provided in accordance with the drawing No.RE/Civil/S-129/2001(Latest Mod). All steel work shall be painted with two coats of ready mixed paint of approved quality and shade with Red Oxide primer coat.

2.8.9 BUILDING MATERIALS:

Building materials if not already specified above, shall be used in accordance with Chapter II, Part-II of this tender document.

2.8.10 WIRING:

(a) The contractor shall follow recessed conduit wiring system for internal wiring of the switching station buildings. Stove enameled, jet black, steel seamless conduit pipes of standard diameter, conforming to IS:9537(Part-2)/ (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) with latest amendments shall be used. No conduit pipes having a diameter of less than 19 mm shall be used. All conduit accessories like bends, inspection boxes, elbows, draw boxes, junction boxes shall be of threaded type and shall conform to **IS:3837** (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) with latest amendments. The conduits shall be recessed in the wall/ceiling.

The conduit of each circuit or section shall be complete before conductors are drawn in. The entire system of conduit after erection shall be tested for mechanical and electrical continuity throughout and permanently connected to earth by means of a special approved type of earthing clamp efficiently fastened to conduit pipe. A G.I. wire of 6/8 SWG and conforming to IS:4826 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) shall be provided along with laying of recessed conduit to facilitate drawing of wires in the conduit.

(b) The wiring shall include circuit wiring and point wiring. The circuit wiring shall include wiring from distribution board up to first switch board along the run of wiring. The point wiring shall include complete wiring of a switch circuit from tapping point on the distribution circuit to the following via the switch.

- (a) Connector in case of exhaust fan point.
- (b) Ceiling rose.
- (c) Socket outlet.
- (d) Lamp holder.

Looping system shall be used for the wiring. Phase or live conductors shall be looped at switch box and neutral conductor can be looped from the light, fan or socket outlet. All switches shall be placed in the live conductor of the circuit. Power/heating wiring shall be kept separate and distinct from lighting and fan wiring. Light and fan circuit shall not have more than ten points of light, fan & 5 Amp socket outlets or a load of 800 watts whichever is less. A power circuit shall be designed for a maximum of two outlets of a load of 1000 watts each. The contractor shall prepare a wiring diagram, indicating clearly in plan, main & distribution board, position of all points with their classification and controls and get it approved from the purchaser.

(c) PVC insulated, single core, multi stranded Aluminum conductor, 660/1100 Volt grade cables conforming to IS:694 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) shall be used for the wiring. The standard sizes shall be as follows.

- (i) 2.5 sq.mm for light/fan point wiring.
- (ii) 4 sq.mm for Power point wiring.
- (iii) 6 sq.mm for connection between main switch and distribution board.

(d) Electrical fittings, plug points and appliances as indicated in following table shall be provided in a switching station. The contractor shall get the locations of the electrical fittings/ appliances approved from purchaser.

TABLE

SNO	DESCRIPTION OF ITEM	QUANTITY
1.	5 Amp. 3 pin flush type socket outlet with switch	1 No.
2.	15 Amp. 3 pin flush type socket outlet with switch	2 No.
3.	Fluorescent fitting complete with choke, starter, PF improving capacitor inside the reflector cover and a fluorescent tube	1 No inside the building
4.	Outdoor luminaire fitting suitable for 150 Watt HPSV lamp with all accessories including a 150 Watt HPSV lamp	1 No outside the building
5.	230 AC, 300 mm, 940 RPM exhaust fan.	1 No. in battery room

2.8.11 MAIN SWITCHGEAR AND SWITCH BOARD : Main Board

(a) Main board consisting of main switch and distribution board shall be situated as near as practicable to the termination of service line and shall be easily accessible without use of external aid. Switch boards of adequate sizes as approved by the purchaser shall be made of mild steel and recessed in the wall. Front of the boards shall be fitted with 3 mm thick phenolic-laminated sheet similar to Hylem one. All the metal switchgears and switch boards shall be painted, prior to erection with two coats of approved enamel paint, as required on all sides accessible.

(b) Main Switch

Main switch shall be 230 Volt, 32 Amp, metal clad, composite switch fuse unit, single pole with rewirable type fuses and neutral link. It shall conform to IS: 13947 (Part.3) (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document). It shall have cable entry holes, cover handle interlocking, sealing arrangements and weather proof enclosures.

(c) Distribution Board

Distribution board shall be 230 V, 16 Amp. metal clad boards conforming to IS:2675 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) with latest amendments with hinged type metallic cover, cable entry holes and weather proof enclosures. It shall have reusable type fuse units.

(d) Switches shall be 230 V, 5/15 Amp, one-way flush type, piano type switches, conforming to **IS:3854** (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) with latest amendments and shall be ISI marked.

Three pin socket outlets shall be 230 Volt, 5/15 Amp, flush type, conforming to **IS:1293** (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) with latest amendments and shall be ISI marked.

Ceiling roses shall be 230 V, 5 Amp, 2 pole bakelite ceiling roses, conforming to **IS:371** (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) and shall be ISI marked.

2.8.12 EARTHING:

Earthing systems including earth electrode in accordance with **IS:3043** (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) shall be provided. Loop earthing with G.I. wire of not less than 8 SWG shall be provided for all mountings of the main board and other metal clad switches and distribution boards.

2.8.13 ELECTRICAL FITTINGS AND APPLIANCES:

(a) Fluorescent lamp fittings conforming to IS:1777 (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) with latest amendments and suitable for 1x40 Watt fluorescent tube shall be provided. The fittings shall be complete with copper wound choke, lamp holders, starter with base, power factor improving capacitor, 40 Watt fluorescent tube etc. The fittings shall be mounted on the walls with suitable mounting arrangements.

(b) EXHAUST FAN

The contractor shall provide single phase, 230V, 50 Hz, 6 pole, 940 RPM propeller type exhaust/ventilating fans having a size of 300 mm and with a mounting ring but without regulator and louver shutters. The fan

shall conform to **IS:2312** (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) and shall be ISI marked.

(c) OUTDOOR LUMINAIRES

(i) The contractor shall provide weather proof street light/outdoor luminaire fittings of two-piece construction, comprising of cast Aluminum control gear housing and deep drawn stove enameled lamp housing with anodised Aluminum side reflectors, clear acrylic bowl, held by antirust, robust toggle.

The luminaire fitting shall be suitable for a 150-watt HPSV lamp and shall be complete with control gear box with ballast, PF improving capacitor, connector block, fuse cutout, earthing terminal and a 150-watt HPSV lamp.

(ii) INSTALLATION

The control gear box, mounted on a teakwood board of appropriate size and shall be installed on wall inside the building at an accessible height and connected to the switch board through a ceiling rose.

The luminaire fitting shall be installed on a pre-erected 3-meter-long medium class G.I. pipe of 50 mm diameter.

The pipe shall be grouted on the outside wall of the building with the help of M.S. clamps such that height of G.I. pipe above the roof of the buildings is not less than 2.5 meters. The fitting shall be mounted with the help of a 25 mm dia G.I. pipe, given a bend of 120 deg. from horizontal plane and MS clamps. Flexible copper wire of suitable size shall be provided to connect the control gear & the fitting. The control gear box and the fitting shall be properly earthed.

2.8.14 TESTING AND COMMISSIONING:

On completion, all works including wiring, electrical fittings and appliances shall be tested jointly with the representative of the purchaser in accordance with **IS:732** (Latest version as indicated in Annexure-XXVII of PART-V of Tender Document) and commissioned.

SECTION-C

PARTICULAR SPECIFICATIONS

3.1 Introduction

This part of the specification is complementary to SECTION-B. This work includes – **TRD work i.c.w. interlocking of LC gates with TUV>20000 over Moradabad Division.**

3.2 Location

The work is to be executed at **various level crossing gates under jurisdiction of ADSTE/HRI and ADSTE/MB over Moradabad Division** or as per instructions of Sr. DEE/TRD/MB or his authorized representative.

L.C. gates in the section of ADSTE/HRI of Moradabad Division				
S No	Major Section	Block Section	LC No.	Location (KM/EP)
1	LKO-SPN	AMG-KKJ	224	1082/17-19
2	LKO-SPN	MLD-DIL	235	1101/19-21
3	LKO-SPN	DIL-RBD	239	1107/3-5
4	LKO-SPN	DIL-RBD	240	1108/17-19
5	LKO-SPN	RBD-SAN	242	1112/21-23
6	LKO-SPN	RBD-SAN	244	1115/17-19
7	LKO-SPN	DLQ-BLM	257	1140/17-19
8	LKO-SPN	BLM-BGH	259	1143/21-23
9	LKO-SPN	BLM-BGH	260	1145/27-29
10	LKO-SPN	BLM-BGH	261	1147/15-17
11	LKO-SPN	BGH-MST	266	1154/27-29
12	LKO-SPN	MST-KAR	269	1159/15-17
13	LKO-SPN	KAR-HRI	274	1169/01-03
14	LKO-SPN	KAR-HRI	277	1173/27-29
15	LKO-SPN	HRI-KUF	282	1180/17-19
16	LKO-SPN	KUF-BEG	285	1186/00-01
17	BLM-ON	MKHI-SFPR	19	26/13-14
18	BLM-ON	SFPR-BGMU	25	32/08-09
19	BLM-ON	BGMU-MLW	50	57/09-10
L.C. gates in the section of ADSTE/MB of Moradabad Division				
S No	Major Section	Block Section	LC No.	Location (KM/EP)
1	MB-SRE	AWP-MTB	427	1415/20-22
2	MB-SRE	SEO-CAJ	449	1448/16-18
3	MB-SRE	SEO-CAJ	450	1449/03-05
4	MB-SRE	CAJ-DPR	452	1452/32-34
5	MB-SRE	CAJ-DPR	453	1454/16-18
6	MB-SRE	PNI-NGG	466	1470/00-02
7	MB-SRE	NGG-BEK	473	1477/23-25
8	MB-CH	MCV-KD	4	11/6-7
9	MB-CH	MCV-KD	5	12/14-15
10	MB-CH	MCV-KD	6	15/11-12
11	BE-CH	DUB-AFR	28	52/5-6
12	CH-ALJN	CH-BJ	39	74/10-11
13	CH-ALJN	CH-BJ	40	77/2-3
14	CH-ALJN	BJ-DN	49	93/4-5
15	CH-ALJN	DN-BBA	54	105/9-10
16	CH-ALJN	DN-BBA	56	109/5-6
17	CH-ALJN	DIB-AUR	66	129/5-6
18	CH-ALJN	AUR-HGJ	75	144/10-11

However, Railway reserves right to change the site of work anywhere in area of the work in Scope of work in the jurisdiction of Moradabad Division under **Sr. Divisional Electrical Engineer/TRD, Northern Railway, Moradabad** and the contractor shall be bound to execute the work without any extra cost.

3.3 Tracks to be Equipped

- (a) The total track length of various section to be equipped with overhead equipment is given in Tender FORM-5 and NIT.
- (b) **Schematic Diagram** - The tentative schematic electrical sectioning of the tracks to be wired will be supplied to the successful Tenderer, if required.

3.4 General Particulars

- (a) The section passes through populated localities. The bearing capacity of the soil is likely to vary from 5500 to 22000 Kgf/Sq. m. The actual bearing capacity shall however be determined in accordance tests as provided in SECTION-B Chapter-II of Tender Document.
- (b) **Access Road** – Majority of the section is approachable by Road/Rail.

3.5 Climatic Data Temperature

- (a) For the overhead equipment, which will be in the open space a minimum temperature 4 degree C and a maximum temperature of 65 degree C are to be considered. The mean temperature should be taken as 35 °C.
- (b) **Rain Fall** – Rains occur generally from June to September.
- (c) **Humidity** – The maximum relative humidity is nearly 85%.
- (d) **Wind pressure** – Basic wind pressure of 112.5 Kgf/Sq m is adopted for OHE design. Any revision in these figures for wind pressure will be advised in due course.
- (e) **Thunder Strom** – The region is subject to storm and rain fall during the monsoon from June to September.

3.6 Rolling Stock

Steam locomotives with chimney height not exceeding 4.27m (14 ft), electric locomotive with height not exceeding 4.398 m with the pantograph in the locked down position and diesel locomotives 4.42m (14 feet 6 inches) high, would run on this section.

3.7 Over Dimensional Consignments

The maximum height of over dimensional consignment which apply on this section is 4.8 M (15'-9") at present. No restriction in the height of consignment will be imposed after electrification for movement under power condition.

3.8 Type Of OHE

The existing OHE will be of 25 KV Conventional type, regulated Over Head Equipment with pre sag of 0.8 mm per mtr.

3.9 Labour & Materials

Un-skilled labour is available almost all over the section while skilled labour would be available generally at the main towns in the section .

3.10 Contractor's Office

It is obligatory on the part of the Contractor to establish a fully equipped office with land line phone/mobile phone, latest Computer, UPS and Printer (to be handed over to Purchaser on successes full completion of work) at a convenient place for, planning, designs and for expedition finalization of particular designs & working drawings. The office should be headed by a qualified Engineer whose credentials shall be approved by the purchaser's Engineer. In addition, the Contractor would have to establish

field construction office at convenient and approved locations for co-ordination and progressing of Field works.

3.11 Contractor's Depots

Suitable space shall be made available for the Contractor to set up one main depot.

3.12 Duration of Traffic Blocks

Normally track occupation may be granted at any time during day light or night hours to suit convenience of traffic operation and will ordinarily be granted on one track at a time over a distance covered by one or two consecutive block shadows. Normally the duration of block on any section will be about 2 hours in a day for all the tracks in the section taken together. In special case, track occupation may be granted during night hours. Blocks provided may be utilized for one or more working gang or track lorries or ladder trolleys to suit convenience of work.

If Blocks are granted during night hours, the contractor will make his own arrangements of lighting at his own cost for execution of work. Adequate number of Discharge Rods of approved design & make will be provide by the contractor at site during power block period.

3.13 Cranes

One diesel rail crane of adequate capacity including diesel/electric loco required to haul the crane will be provided by the purchaser for erection/ removal of portal booms at different locations free of all charges including pay and allowances of the crew in all running expenditure. In case of damage due to accident/ mis-handling during the period when the crane is in the custody of the contractor, contractor shall carryout all the repairs/rehabilitation exclusively at his own cost. The diesel required for crane will be provided by the contractor. However, contractor shall make his own arrangement for loading/unloading of all material at his depot or at work site.

The expenditure for hauling diesel rail crane like arrangement of loco, crew, guard etc. shall be borne by Railway.

3.14 Tower Wagon

The tower wagon will be given free of cost by the Railway to the contractor only for adjustment of turnouts, crossovers, section insulators and tower wagon checking with the Division. If Railway administration feels necessity of checking of OHE of existing line with tower wagon after load transfer, the tower wagon may also be provided for the same by Railway.

3.15 Addresses

The address to which correspondence and documents relating to the Contract, should be sent is as under:

Sr. Divisional Electrical Engineer/TRD, DRM Office
Northern Railway, Moradabad – 244001
Email ID: srdeetrdmb@gmail.com

3.16 Quantities Approximate:

TENDER FORM-5 of PART-I of Tender Document gives the approximate quantities for various items of OHE/TSS works.

PART-III

SPECIAL CONDITIONS OF THE CONTRACT

1. The tenderer shall be governed by **General Condition of Contract, April 2022** or latest with all amendments shall be followed.
2. The contractor shall Complete the work within **9 months** from the issue of LOA.
3. Tenderer are advised to visit work site before quoting his/her rates.
4. If there are varying or conflicting provision in the documents forming part of the contract, Sr. DEE/TRD/MB shall be deciding authority with regard to the intentions of the provision and decision will be final and binding on the contractor.
5. **Right of Railway to Deal with Tenders:** The Railway reserves the right of not to invite tenders for any of Railway work or works or to invite open or limited tenders and when tenders are called to accept a tender in whole or in part or reject any tender or all tenders without assigning reasons for any such action.
6. As per Railway board letter no. 2018/CE-1/CT/4 dt: 17.10.2018 contractor shall mandatorily update the labour data on **Railway Shramikkalyan portal** on monthly basis. The detailed guidelines are given in **Clause 5.4 of PART-I** of Tender Document. 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 labourers engaged in connection with this contract and payments made to them during the wage period in Shramikkalyan portal at 'www.shramikkalyan.indianrailways.gov.in' till ____month ____Year."
7. By signing on this tender, it is deemed that the contractor has read, understood and agreed to the terms and conditions given in this tender document and **Indian Railways General Conditions of Contract - 2022** with latest amendments.
8. The tenderer will be required to visit the site at his own expenses by prior appointment with Sr. DEE/TRD/MB or his authorized representative and ascertain himself for local conditions, storage facilities, extent of work and other limitations. Railway transport or any sort of transport facility will not be provided from Railway side in connection with execution of this work.
9. **Scheme of work:** Within a period of **15 days** beginning from the date of issue of Letter of Acceptance of Tender, the contractor shall submit the detailed time schedule for the work and various documents in tender papers to the purchaser.
10. Railway reserves **right to change site of work anywhere in adjacent/adjoining area of work and contractor shall be bound to execute the work without any extra cost.**
11. The work will be carried out under the supervision of Railway's representative authorized by Sr. DEE/TRD/MB.
12. The consignee of the work shall be whosoever nominated by Sr. DEE/TRD/MB.
13. The contractor shall ensure the staff engaged by him possess identity card, entry pass, duty pass signed by the authority designated by Engineer of contract In-charge.
14. To and fro transportation, loading and unloading of all the materials from the firm's work place to different Railway site and vice-versa shall be arranged by the contractor.
15. The contractor shall deploy one no. of **qualified diploma engineer** or equivalent, during execution of work at site as laid down in Clause 26A of Part-II of GCC-2022. In case the tenderer fails to deploy qualified Engineer, then a penalty of **Rs. 25,000 per month** or part thereof for the default period shall be levied.
16. Any work falling under the Power/Traffic Block will be determined by Railway Supervisor and the Power/Traffic Block will be arranged by the Railway supervisor. The contractor has to work with minimum Power/Traffic Block, as decided by the Railway supervisor and penalty can be imposed on the contractor for exceeding the arranged Power/Traffic Block. Any dispute in this regard can only be decided by Sr. DEE/TRD/MB and his decision will be final and binding on the contractor.

17. All the contractor staff shall work with all the safety precautions. Contractor shall ensure that all safety equipments like safety belts, safety helmet etc. shall be available with deployed staff. Railways will not be responsible for any incident or damage caused to contractor staff while working near OHE.
18. The contractor shall ensure that staff deployed shall have knowledge of working near 25 KV AC OHE. The contractor shall ensure that all T&P materials required shall be made available by contractor.
19. **Lighting arrangements:** Contractor will have to arrange for adequate lighting for night working, if required.
20. Railway will not be bound to allow Power/Traffic Block on the day asked by the contractor. Power/Traffic Block will be allowed, if margin available.
21. In view of **COVID-19 pandemic**, the staff deployed shall take all necessary precautions while execution of work. If a staff is feeling unwell in duty, the contractor shall immediately replace such staff. The contractor shall provide necessary equipments and items such as mask, gloves, sanitizer, soap etc. to be used by contractor staff as precautionary measures. No claim in this regard will be entertained by Railways. The contractor staff shall follow all the norms circulated by GOI for COVID-19.
22. The **advertised rates are including GST @18%**. The tenderer should quote their/his rates **including GST and all other applicable taxes. Bidder should quote the rates considering the rate of GST applicable**. Carefully read the Clause 3.0 'Care in submission of Tenders' of PART-I of Tender Document regarding GST.
23. Any typographical error shall not be constructed to be benefit of the contractor, in such cases the interpretation and decision of Sr. DEE/TRD/MB shall be final and binding upon the tenderer.
24. Contractor shall return all the released material if any, to the concerned OHE depot of Railways.
25. **Quality of Work:-**
 - (a) **Material:** All material used in the work shall be of best quality and class most suited for the purpose specified and procured from the sources approved by RDSO/CORE. The requisite facilities for testing prototypes supplied against this contract should be available with the manufacturer. In the case of those equipments, components or fitting for which the requisite facilities for testing of prototypes are not available with the manufacturer, the manufacturer shall arrange to carry out the prototype tests on his own cost in a testing laboratory approved by the Purchaser.
 - (b) **Erection:** All erection work shall be carried out as per latest RDSO Specification/CORE specification as on the date of opening of tender even if mentioned otherwise elsewhere in the tender. The erection work will be subjected to inspection by the Sr. Divisional Electrical Engineer/TRD or his authorized representative to ensure that the work is done in accordance with the specification and approved drawing.
26. **Inspection:**
 - 26.1 All the equipments and material shall be of best quality and will be tested / inspected by the Sr. Divisional Electrical Engineer/TRD or his authorized representative or RITES representative at manufacture premises/work site as decided by Sr. DEE/TRD/MB. All material should be purchased from RDSO/CORE's approved sources only. If the contractor uses any equipment's materials without the prior approval of Railways these are liable to be rejected. Any reasonable delay in inspection will be reasonable ground for extension of time for completion of the work. Instruments used by the firm for should have valid calibration certificates from NABL accredited lab wherever applicable.
 - 26.2 The Railways particularly for the following aspects shall accept the works after inspection.
 - 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.
- 26.3** The cost of the inspection will be on Railway 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. The cost of conducting tests at manufacturer premises shall be borne by manufacturer or contractor.
- 26.4** The contractor shall provide without any extra cost to the Railways all materials, testing equipments, machine, plant, tools and labour etc. of every kind of which the Railways inspecting officer may consider necessary for any test and examination to be made at site or elsewhere.
- 27. Rejection:** The works which shall be rejected by the inspecting officer of the Railway, the contractor shall replace such rejected equipments/assemblies of the work forthwith but in any event not later than a period of two 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.
Note: 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.
- 28. Location of Work:** The works are to be executed **various level crossing gates under jurisdiction of ADSTE/HRI and ADSTE/MB over Moradabad Division** of Northern Railway. The list of LC gates is given in Clause 3.2 Section C (Particular Specifications) of PART-II of Tender Document. However, Railway reserves right to change the site of work anywhere in area of the work in Scope of work in the jurisdiction of Moradabad Division under Sr. Divisional Electrical Engineer/TRD, Northern Railway, Moradabad and the contractor shall be bound to execute the work without any extra cost.
- 29. Defective equipments to be changed**
- a) Notwithstanding issue of Provisional Acceptance Certificate and partial or full use of any equipment, if completed equipment or any portion thereof before it is finally taken over at the end of the guarantee period be found to be or to have become defective in course of usage by the Railway due to faulty material, design or workmanship, or otherwise fails to fulfill the requirement of the Contract and/or its purpose, Purchaser shall normally give Contractor prompt notice setting forth particulars of each defects or failure and Contractor shall forthwith make the defects good or modify or replace the equipment, as may be directed by Purchaser's Engineer, at his own cost in all respects to make it comply satisfactorily with said requirements. Should the Contractor fail to do within a reasonable time service of the said notice upon him or should time not permit of service of such notice, the Purchaser may repair or reject and replace the whole or part of such defective equipment as the case may be, at cost of the Contractor. Contractor's full liability under this clause shall be satisfied by payment to Purchaser of extra total cost, if any, of such replacement delivered and erected as provided for in original Contract, such extra cost being the ascertained difference between the price paid by Purchaser under provisions above mentioned for such replacement and Contractor's price for the plant so replaced, plus the sum, if any, paid by Purchaser to the Contractor in respect of such defective equipment. Should Purchaser not so replace rejected equipment within a reasonable time, the Contractor's liability under this clause shall be satisfied by the repayment by Contractor of all moneys paid by the Purchaser to him in respect of such rejected equipment. Rejected/defective materials shall be returned to Contractor to extent possible.
 - (b) Provisions of this para will apply only in respect of equipment and components supplied by Contractor or his sub-Contractor.

30. Use of Rejected Equipments

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

31. Guarantee

1. Contractor shall guarantee that all equipment and works executed under this contract shall be free from all defect and faults in material, design, workmanship and manufacture and shall be of acceptable standards for contracted work and in full conformity with technical specifications, drawings and other contract stipulations, for a period of **12 months** from date of commercial operation or from date of Provisional Acceptance by Purchaser whichever is earlier.

Note: For OEM supplied items, if the guarantee provided by manufacturer is more than **12 months**, then the same guarantee period shall prevail for that item. Contractor shall provide guarantee certificate issued by OEMs for those items.

2. During period of guarantee Contractor shall keep available an experienced engineer and necessary equipment to attend to any defective installations resulting from defective erection and/or defects in equipment supplied by Contractor. This engineer shall not attend to rectification of defects which arise out of normal wear and tear and come within the purview of routine maintenance work. Contractor shall bear the cost of modifications, additions or substitutions that may be considered necessary due to faulty materials, design or workmanship for satisfactory working of the equipment. The final decision shall rest with Sr. DEE/TRD/MB.
3. During period of Guarantee the Contractor shall be liable for replacement at site of any parts which may be found defective in equipment whether such equipment be of his own manufacture or those of his sub-contractor whether arising from faulty design, materials, workmanship or negligence in any manner on part of Contractor provided always that such defective parts as are not repairable at site are promptly returned to Contractor if so, required by him at his (Contractor's) own expenses. In case of type defects in Contractor's equipment and components detected during guarantee period, contractor should replace all such Items irrespective of fact whether all such Items have failed or not. The Contractor shall bear cost of repairs carried out on his behalf by Purchaser at site. In such a case, contractor shall be informed in advance of works proposed to be carried out by Purchaser.
4. If it becomes necessary for Contractor to replace or renew any defective portion of equipment under para-aforesaid then provision of said para shall also apply to portions of equipment so replaced or renewed until expiration of six month from date of such replacement or renewal or until end of above-mentioned period whichever is later. Such extension shall not apply in case of defects of a minor nature, decision of Sr. DEE/TRD/MB being final in the matter. If any defect be not remedied within a reasonable time during aforesaid period Purchaser may proceed to do work at Contractor's risk and expense, but without prejudice to any other rights and remedies which Purchaser may have against the Contractor in respect of such defects or faults.
5. Repaired or renewal parts shall be delivered and erected at site free of charge to purchaser.
6. All materials, fittings, components or equipments supplied by contractor shall be covered by provisions of this paragraph.
7. In case of materials, components, fittings and equipment supplied by Purchaser no liability will rest on contractor for failures on account of defective materials or workmanship and for any consequential damages.

32. Final Acceptance

- (a) Final acceptance of entire equipment installed shall take effect from date of expiry of period of guarantee as defined in clause 32 above.
- (b) If on other hand contractor has not so complied with his obligation under clause 29 in respect of any section, Purchaser may either extend period of guarantee in respect of that section until necessary works are carried out by Contractor or carry out those works or being them carried out suo moto on behalf of Contractor at Contractor's expenses. After expiry of period of guarantee for each section, a certificate of final acceptance for section shall be issued by Purchaser and last of such certificate will be called last and final acceptance certificate. Contract shall not be considered as completed until issue of final acceptance certificate by Purchaser.
- (c) Purchaser shall not be liable to Contractor for any matter arising out of or in connection with contract or execution of work unless Contractor shall have made a claim in writing in respect thereof before issue of final acceptance certificate under this clause.

Notwithstanding issue of final acceptance certificate, the Contractor and the Purchaser (subject to sub-clause as above) shall remain liable for fulfillment of any obligation incurred under provision of contract prior to issue of final acceptance certificate which remains unperformed at time such certificate is issued and for determining nature and extent of such obligation contract shall be deemed to remain in force between parties hereto.

PART-IV

PRICES AND PAYMENT

1. Payments for the work shall be made in accordance with approved designs and drawings and measured in relevant units, except where provided for otherwise. In case the dimensions of the work are more than those shown in approved designs and drawings, the contractor shall not be entitled to any extra payment unless the dimensions are increased on account of physical impossibility of carrying out the work in accordance with approved designs and drawings, subject to approval by the Railway before execution. In case the dimensions of work are less than those shown in the approved designs and drawings and the work is accepted without being rejected, payment will be made for the quantity of work actually executed and accepted.

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

3. SCHEDULE OF PRICES :

(i) PRICES FOR ITEM WITH S.O.R.-

The rates given against various items of work in **Section-1 to 5** of NIT and Tender Form-5 of PART-I of Tender Document are the standard schedule of rates (S.O.R.). The tenderers are required to quote a single percentage below/at par/above against the S.O.R. cost of each section separately. The actual payment to be made against any item of any S.O.R., shall be derived after loading the SOR prices of those sections with the tenderer's quoted percentage for the same section. The prices so obtained shall be the unit prices for the various items of work given in **Section-1 to 5**.

(ii) Non-Schedule Items-

Tenderer shall quote a single percentage below/at par/above against the non-schedule cost of each section in **Schedule F-NS Items** of NIT. All prices as above shall be FIRM irrespective of minor variations in basic quantities and use of alternative types of various components and fittings approved by the Purchaser. Minor changes in the basic designs shall not affect unit prices, so long as such changes are mutually agreed to by the Purchaser and the Contractor.

4. Payment to the contractor shall be made as under:

(a) 80% of the item price (material cost) on receipt of materials in Railway custody after successful inspection and due certification by Engineer's representative. If for any item of work, price of material and erection is not separately available then 80% of the cost of item of work will be considered as material cost.

(b) Further payment of material & erection cost to cover 90% of the contract price on successful completion of erection including Testing & Commissioning after due certification by Engineer's representative.

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

5. Payment will be made only after verification & certification by the concerned incharge and field officer.

6. The contractor shall accept the payment after deduction of penalty/fine if any.

Penalty:

(a) The contractor shall deploy one no. of **qualified diploma Engineer or equivalent**, during execution of work at site as laid down in Clause 26A of Part-II of GCC-2022. In case the tenderer fails deploy qualified Engineer, then a penalty of **Rs 25,000 per month** or part thereof for the default period shall be levied.

(b) If during execution of work, power block is busted by contractor staff then a penalty of **Rs 5000/-** or more as decided by Sr. DEE/TRD/MB depending upon the severity of the incident.

(c) Any other penalty as decided by Sr. DEE/TRD/MB during execution of OHE work shall be

applicable.

7. All payment in respect of the contract during currency of the contract shall be made through ECS/EFT. The successful tenderer on award of contract must submit ECS/EFT mandate form attached with tender document complete in all respect. However, if the facility of ECS/EFT is not available at a particular location, the payment shall be made by cheque. In such case successful tenderer, on award of contract shall furnish, bank account number and name of branch against which all payments, in respect of the contract during the currency of contract shall be made.

8. Deduction of taxes from contractor's bills

Wherever the law makes it statutory for the purchaser to deduct any amount towards GST/Income tax, etc on works contract, the same will be deducted and deposited with the concerned authority. Income tax as applicable shall be deducted from bill and necessary I.T. deduction certificate will be issued by Sr. DFM, Northern Railway, DRM's Office, Moradabad. Applicable recoveries are also given in **Annexure-XIII** of PART-V of Tender Document.

8. Mode of payment through Letter of Credit (LC) in works tender:-

- 1) For all the tenders having advertised cost of Rs 10 lakh or above, the contractor shall have the option to take payment from Railways through a letter of credit (LC) arrangement.
- 2) This option of taking payment through LC arrangement has to be exercised in IREPS (Indian Railway Electronic Procurement System - the e-application on which tenders are called by Railways) by the tenderer at the time of bidding itself, and the tenderer shall affirm having read over and agreed to the terms and conditions of the LC option.
- 3) The option so exercised, shall be an integral part of the bidder's offer.
- 4) The above option of taking payment through LC arrangement, once exercised by tenderer at the time of bidding, shall be final and no change shall be permitted, thereafter, during execution of contract.
- 5) In case tenderer opts for payment through LC, following shall be the procedure to deal release of payment through LC:
 - (a) The LC shall be a sight LC.
 - (b) The contractor shall select his Advising/Negotiating bank for LC. The incidental cost towards issue of LC and its operation thereof shall be borne by the contractor.
 - (c) SBI, New Delhi, Main Branch will be the nodal branch for issue of LCs based on online requests received from Railway Accounts Units for tenders opened in financial year 2018-19. SBI branches where the respective Railway Accounts Office has its Account (local SBI branch) will be the issuance/reimbursing branch for LC issued under this arrangement. The Bank shall remain same for this tender till completion of contract. The incidental cost @ 0.15% per annum of LC value, towards issue of LC and operation thereof shall be borne by the contractor and shall be recovered from his bills.
 - (d) The LC shall be opened initially for duration of 180 to 365 days in consultation with contractor. The LC shall be extended time to time as per the progress of the contract, on the request of the contractor. The value of LC to be opened initially as well as extended thereafter shall be finalized by the engineer in consultation with the contractor on the basis of expected progress of work.
 - (e) The LC terms and conditions shall inter-alia indemnify and save harmless the Railway from and against all losses, claims and demands of every nature and description brought or recovered against the Railways by reason of any act or omission of the contractor, his agents or employees, in relation to the Letter of Credit (LC). All sums payable/borne by Railways on this account shall be considered as reasonable compensation and paid by contractor.
 - (f) The LC terms and conditions shall inter-alia provide that Railways will issue a Document of Authorization (on prescribed format) after passing the bill for completed work, to enable contractor to claim the authorized amount from their bank.
 - (g) The acceptable, agreed upon document for payments to be released under the LC shall be the Document of Authorization.

- (h) The Document of Authorization shall be issued by Railway Accounts Office against each bill passed by Railways.
 - (i) On issuance of Document of Authorization, a copy of Document of Authorization shall be posted on IREPS for download by the contractor. A digitally signed copy of Document of Authorization shall also be sent by Railway Accounts Office to Railway's bank (Local SBI Branch).
 - (j) The contractor shall take print out of the Document of Authorization available on IREPS and present his claim to his bank (advising Bank) for necessary payments as per LC terms and conditions. The claim shall comprise of copy of Document of Authorization, bill of exchange and Bill.
 - (k) The payment against LC shall be subject to verification from Railway's Bank (Local SBI Branch).
 - (l) The contractor's Bank (advising bank) shall submit the documents to the Railway's Bank (Local SBI Branch).
 - (m) The railway's bank (issuing bank) shall, after verifying the claim so received w.r.t. the digitally signed Document of Authorization received from Railway Accounts Office, release the payment to contractor's bank (advising bank) for crediting the same to contractor's account.
 - (n) Any number of bills can be dealt within one LC, provided the sum total of payments to contractor is within the amount for which LC has been opened.
 - (o) The LC shall be closed after the release of final payment including PVC amount, if any, to the contractor.
 - (p) The release of performance guarantee or security deposit shall be dealt directly by railway with the contractor i.e., not through LC.
6. For opening of LC, executive department shall make a request letter to concerned Accounts Department on a prescribed format.
 7. Necessary changes in IREPS and IPAS e-applications have already been carried out, for having option for payment to contractors through LC.
 8. These issue with the concurrence of Finance Directorate of Ministry of Railways.

{Authority: Railway Board's letters no. 2018/CE-I/CT/9, Dated 04.06.2018}

PART-V ANNEXURES

2. Agreement for Zone Contract:

Annexure-II

AGREEMENT FOR ZONE CONTRACT

CONTRACT AGREEMENT No. _____, DATED _____. ARTICLES OF AGREEMENT made this _____ day of _____ between the President of India acting through the _____, _____ Railway hereinafter called the "Railway" of the other part and _____ hereinafter called the "Contractor" of the other part.

WHEREAS the Contractor has agreed with the Railway during the period of _____ months from _____ to _____ for the performance of :

(a) New Works, additions and alterations to existing structures, special repair works and supply of building materials subject to the contract value for such works not exceeding Rs. _____.

(b) All ordinary repair and maintenance works at any site between kilometer _____ and kilometer _____ as will be set forth in the work orders (which work orders shall be deemed and taken to be part of this contract) that will be issued during the said period at _____% above/below the Standard Schedule of Rates (SSOR) of the _____ Railway, corrected up to the latest Correction Slips and Standard Specifications of the _____ Railway corrected up to latest Correction Slips and the Special Conditions and Special Specifications, if any in conformity with the drawings (if any) that will be issued with the work order, aforesaid AND WHEREAS the performance of the said work is an act in which the public are interested.

NOW THIS INDENTURE PRESENTS WITNESSETH That in consideration of the payment to be made by the Railway, the Contractor will duly perform the works set forth in the said Work Order and shall execute the same with great promptness, care and accuracy, in a workman like manner to the satisfaction of the Railway and will complete the same on or before the respective dates specified therein in accordance with the said specifications and said drawings (if any) and said conditions of contract and will observe, fulfill and keep all the conditions therein mentioned, (which shall be deemed and taken to be part of this contract as if the same had been duly set forth herein), AND the Railway both here-by agree that if the Contractor shall duly perform the said work in the manner aforesaid and observe and keep the said terms and conditions, the Railway will pay or cause to be paid to the Contractor for the said works on the completion thereof the amount due in respect thereof at the rates specified above.

Contractor _____ Designation _____ Railway

Address _____ (For & on behalf of President of India)

Date _____

Witness 1:

Signature.....

Name.....

(In Capital)

Address.....

Witness 2:

Signature

Name

(In Capital)

Address.....

3. Work orders for Zone Contract:

Annexure-III

WORK ORDER UNDER ZONE CONTRACT (Valued not exceeding Rs. 5,00,000)

WORK ORDER NO. _____, DATED _____ UNDER CONTRACT AGREEMENT NO. _____
_____, DATED _____.

Name Of Work _____ (S I T E) _____

Schedule of Drawings _____

Authority _____ Allocation _____

The Contractor(s) _____ is / are hereby ordered to carry out the following works at _____ % above/below the Standard Schedule of Rates (SSOR) of _____, updated with correction slips issued upto date of inviting tender or as otherwise specified in the tender documents under Zone Contract Agreement here-in-before referred to :

SN	Item No.	Description of Item of Work	Approximate Quantity	Unit	Rates in Figures and Words (Rs.)	Amount (Rs.)
1	2	3	4	5	6	7
Total Approximate Value of Work = Rs. _____						

The works herein mentioned are required to be completed on or before _____ (Date). The quantities provided herein are approximate and subject to variation under Clause 42 of the Standard General Conditions of Contract updated with correction slips issued upto date of inviting tender or as otherwise specified in the tender documents.

Divisional Railway Manager/Divisional _____ Engineer
_____ Division
_____ Railway

Date _____

(For & on behalf of President of India)

I agree to complete the works herein set forth on or before the date specified under the Zone Contract Agreement herein before referred to in conformity with the drawings hereto annexed and in accordance with the General and Special (if any) Conditions of Contract updated with correction slips issued upto date of inviting tender or as otherwise specified in the tender documents and the Standard Specifications of _____ Railway updated with correction slips issued upto date of inviting tender or as otherwise specified in the tender documents.

I also agree to maintain such works for the period specified below from the date of completion:

- Repair and maintenance work including white/colour washing: three calendar months from date of completion.
- All new works except earth work: Six calendar months from date of completion.

Contractor _____ (Signature)

Railway : Designation _____

(For & on behalf of President of India)

Address _____

Date _____

Date _____

Witness 1:

Signature.....

Name.....

(In Capital)

Address.....

.....

Witness 2:

Signature.....

Name.....

(In Capital)

Address.....

.....

4. Contract Agreement for Works:

Annexure-IV

NORTHERN RAILWAY

CONTRACT AGREEMENT OF WORKS

CONTRACT AGREEMENT NO. _____ DATED _____

ARTICLES OF AGREEMENT made this _____ day of _____ 20____ between President of India acting through the Railway Administration hereafter called the "Railway" of the one part and _____ herein after called the "Contractor" of other part.

WHEREAS the Contractor has agreed with the Railway for performance of the works _____ set forth in the Bill(s) of Quantities hereto annexed upon the Standard General Conditions of Contract, updated with correction slips issued upto date of inviting tender or as otherwise specified in the tender documents and the specifications of _____ updated with correction slips issued upto date of inviting tender or as otherwise specified in the tender documents and the applicable Standard Schedule of Rates (SSOR) of _____, updated with correction slips issued upto date of inviting tender or as otherwise specified in the tender documents and the Special Conditions and Special Specifications, if any and in conformity with the drawings here-into annexed AND WHEREAS the performance of the said works is an act in which the public are interested.

NOW THIS INDENTURE WITNESSETH that in consideration to the payments to be made by the Railways, the Contractors will duly perform the said works in the said Bill(s) of Quantities set forth and shall execute the same with great promptness, care and accuracy in a workman like manner to the satisfaction of the Railway and will complete the same in accordance with the said specifications and said drawings and said conditions of contract on or before the _____ day of _____ 20____ and will maintain the said works for a period of _____ Calendar months from the certified date of their completion and will observe, fulfill and keep all the conditions therein mentioned (which shall be deemed and taken to be part of this contract, as if the same have been fully set forth herein), AND the Railway, both hereby agree that if the Contractor shall duly perform the said works in the manner aforesaid and observe and keep the said terms and conditions, the Railway will pay or cause to be paid to the Contractor for the said works on the final completion thereof the amount due in respect thereof at the rates specified in the Bill(s) of Quantities hereto annexed.

Contractor _____ (Signature)

Railway : Designation _____

(For & on behalf of President of India)

Address

Date :-

Date _____

Witness 1:

Signature.....

Name.....

(In Capital)

Address.....

.....

.....

Witness 2:

Signature.....

Name.....

(In Capital)

Address.....

.....

.....

Annexure-V

FORMAT FOR CERTIFICATE TO BE SUBMITTED / UPLOADED BY TENDERER ALONGWITH THE TENDER DOCUMENTS

I.....(Name and designation)**appointed as the attorney/authorized signatory of the tenderer (including its constituents), M/s_____ (hereinafter called the tenderer) for the purpose of the Tender documents for the work of _____ as per the tender No._____ of _____(Railway)**, do hereby solemnly affirm and state on the behalf of the tenderer including its constituents as under:

1. I/we the tenderer (s) am/are signing this document after carefully reading the contents.
2. I/We the tenderer(s) also accept all the conditions of the tender and have signed all the pages in confirmation thereof.
3. I/we hereby declare that I/we have downloaded the tender documents from Indian Railway website **www.ireps.gov.in** . I/we have verified the content of the document from the website and there is no addition, no deletion or no alteration to the content of the tender document. In case of any discrepancy noticed at any stage i.e. evaluation of tenders, execution of work or final payment of the contract, the master copy available with the railway Administration shall be final and binding upon me/us.
4. I/we declare and certify that I/we have not made any misleading or false representation in the forms, statements and attachments in proof of the qualification requirements.
5. I/We also understand that my/our offer will be evaluated based on the documents/credentials submitted along with the offer and same shall be binding upon me/us.
6. I/We declare that the information and documents submitted along with the tender by me/us are correct and I/we are fully responsible for the correctness of the information and documents, submitted by us.
7. I/we certify that I/we the tenderer(s) is/are not blacklisted or debarred by Railways or any other Ministry / Department of Govt. of India from participation in tender on the date of submission of bids, either in individual capacity or as a HUF/ member of the partnership firm/LLP/JV/Society/Trust.
8. I/we understand that if the contents of the **certificate** submitted by us are found to be forged/false or incorrect at any time during process for evaluation of tenders, it shall lead to forfeiture of the Bid Security and may also lead to any other action provided in the contract including banning of business for a period of upto two year. Further, I/we (insert name of the tenderer) **_____and all my/our constituents understand that my/our offer shall be summarily rejected.
9. I/we also understand that if the contents of the **certificate** submitted by us are found to be false/forged or incorrect at any time after the award of the contract, it will lead to termination of the contract, along with forfeiture of Bid Security/Security Deposit and Performance guarantee

and may also lead to any other action provided in the contract including banning of business for a period of upto two year.

10. I/We have read the clause regarding restriction on procurement from a bidder of a country which shares a land border with India and certify that I am/We are not from such a country or, if from such a country, have been registered with the competent Authority. I/We hereby certify that I/we fulfil all the requirements in this regard and am/are eligible to be considered (evidence of valid registration by the competent authority is enclosed)

SEAL AND SIGNATURE
OF THE TENDERER

Place:

Dated:

****The contents in Italics are only for guidance purpose. Details as appropriate are to be filled in suitably by tenderer.**

NOTE:

- 1. Submission of copy of certificate as per *Annexure-V* is not mandatory if the bidder has confirmed and certified the same online at the time of submission of bids.**
- 2. Submission of copy of certificate as per *Annexure-V(A)* is mandatory for each member of a Partnership Firm/ Joint Venture (JV)/ Hindu Undivided Family (HUF)/ Limited Liability Partnership (LLP) etc., as the case may be.**

Annexure-V(A)

(This certificate is to be given by attorney/authorized signatory/each member of Partnership firm/Joint Venture (JV)/Hindu Undivided Family (HUF)/Limited Liability Partnership (LLP) etc.)

I/We _____(Name), attorney/authorized signatory of the (constituent firm /constituent partner) and member/partner of the (tendering firm) hereby solemnly affirm and state as under:

1. I/we certify that _____ (constituent firm/constituent partner) is/are not blacklisted or debarred by Railways or any other Ministry/ Department of Govt. of India from participation in tender on the date of submission of bids, either in individual capacity or as a HUF/ member of the partnership firm LLP/JV/Society/Trust.
2. I/We have read the clause regarding restriction on procurement from a bidder of a country which shares a land border with India and certify that I am/We are not from such a country or, if from such a country, have been registered with the competent Authority. I/We hereby certify that I/we fulfil all the requirements in this regard and am/are eligible to be considered (evidence of valid registration by the competent authority is enclosed).

SEAL AND SIGNATURE OF THE CONSTITUENT FIRM/CONSTITUENT PARTNER

Place:

Dated:

Annexure-VI

6. Work orders for Works: (In case of composite work chargeable to different Allocation)

S. No.	Name of work	Particulars
1.	Acceptance letter with date	
2.	Agreement no with date	
3.	Cost of work	
4.	Security Deposit	
5.	Performance guarantee	
6.	Period of Completion	
7.	Estimate no with Allocation	

S. No.	USSOR Item no/ NS item	Description of Items	Rates	Unit	Qty	Amount

Annexure-VII

7. TENDERER'S CREDENTIALS (BID CAPACITY)

NORTHERN RAILWAY

For tenders having advertised value more than Rs. 10 crores wherein eligibility criteria includes bid capacity also, the tenderer will be qualified only if its available bid capacity is equal to or more than the total bid value of the present tender. The available bid capacity shall be calculated as under:

Available Bid Capacity = $[A \times N \times 2] - 0.33 \times N \times B$

Where,

A = Maximum value of construction works executed and payment received in any one of the previous three financial years or the current financial year (up to date of inviting tender), taking into account the completed as well as works in progress.

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

B = Existing commitments and balance amount of ongoing works with tenderer as per prescribed proforma of Railway for statement of all works in progress and also the works which are awarded to tenderer but yet not started upto the date of inviting of tender.

Note:

(A) The Tenderer(s) shall furnish the details of -

- (i) Maximum value of construction works executed and payment received in any one of the previous three financial years or the current financial year (up to date of inviting tender) for calculating A, and
- (ii) Existing commitments and balance amount of ongoing works with tenderer as per the prescribed proforma of Railway for statement of all works in progress and also the works which are awarded to tenderer but yet not started upto the date of inviting of tender for calculating B. In case of no works in hand, a 'NIL' statement should be furnished.

The submitted details for (i) and (ii) above should be duly verified by Chartered Accountant.

(B) In case if a bidder is JV, the tenderer(s) must furnish the details of

- (i) Maximum value of construction works executed and payment received in any one of the previous three financial years or the current financial year (up to date of inviting tender) by each member of JV for calculating A, and
- (ii) Existing commitments and balance amount of ongoing works with each member of JV either in individual capacity or as a member of other JV as per the prescribed proforma of Railway for statement of all works in progress and also the works which are awarded to each member of JV either in individual capacity or as a member of other JV but yet not started upto the date of inviting of tender for calculating B. In case of no works in hand, a 'NIL' statement should be furnished.

The submitted details for (i) and (ii) above should be duly verified by Chartered Accountant.

(C) Value of a completed work/work in progress/work awarded but yet not started for a Member in an earlier JV shall be reckoned only to the extent of the concerned member's share in that JV for the purpose of satisfying his/her compliance to the above-mentioned bid capacity in the tender under consideration.

(D) The arithmetic sum of individual "bid capacity" of all the members shall be taken as JV's "bid capacity".

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

(F) The available bid capacity of tenderer shall be assessed based on the details submitted by the tenderer. In case, the available bid capacity is lesser than estimated cost of work put to tender, his offer shall not be considered even if he has been found eligible in other eligibility criteria/tender requirement.

Annexure-VIIA

Reference -Para 3.5.2 of GCC-2022

(Bid Security)

Bank Guarantee Bond from any scheduled commercial bank of India

(On non-judicial stamp paper, which should be in the name of the Executing Bank)

Name of the Bank: -----

President of India,
Acting through,
..... Railway,

Beneficiary: Railway

Date:.....

Bank Guarantee Bond No.:

Date:-----

In consideration of the President of India acting through----- (**Designation & address of Contract Signing Authority**), Railway,, (hereinafter called "The Railway") having invited the bid for _____ through Notice inviting tender (NIT) No.._____, We have been informed that **[Insert name of the Bidder]**..... (hereinafter called "the Bidder") intends to submit its bid (hereinafter called "the Bid") .

WHEREAS, the Bidder is required to furnish Bid Security for the sum of **[Insert required Value of Bid Security]**, in the form of Bank Guarantee, according to conditions of Bid.

AND

WHEREAS,**[Insert Name of the Bank]**, with its Branch**[Insert Address]** having its Headquarters office at..... **[Insert Address]**, hereinafter called the **Bank**, acting through**[Insert Name and Designation of the authorised persons of the Bank]**, have, at the request of the Bidder, agreed to give guarantee for Bid Security as hereinafter contained, in favour of the Railway:

1. KNOW ALL MEN that by these present that I/We the undersigned **[Insert name(s) of authorized representatives of the Bank]**, being fully authorized to sign and incur obligations for and on behalf of the Bank, confirm that the Bank, hereby, unconditionally and irrevocably guarantee to pay to the Railway full amount in the sum of **[Insert required Value of Bid Security]** as above stated.
2. The Bank undertakes to immediately pay on presentation of demand by the Railway any amount up to and including aforementioned full amount without any demur, reservation or recourse. Any such demand made by the Railway on the Bank shall be final, conclusive and binding, absolute and unequivocal on the Bank notwithstanding any disputes raised/ pending before any Court, Tribunal, Arbitration or any Authority or any threatened litigation by the Bidder or Bank.
3. The Bank shall pay the amount as demanded immediately on presentation of the demand by Railway without any reference to the Bidder and without the Railway being required to show grounds or give reasons for its demand of the amount so demanded.
4. The guarantee hereinbefore shall not be affected by any change in the constitution of the Bank or in the constitution of the Bidder.
5. The Bank agrees that no change, addition, modifications to the terms of the Bid document or to any documents, which have been or may be made between the Railway and the Bidder, will in any way absolve the Bank from the liability under this guarantee; and the Bank, hereby, waives any requirement for notice of any such change, addition or modification made by Railway at any time.

6. This guarantee will remain valid and effective from.....*[insert date of issue]* till*[insert date, which should be minimum 90 days beyond the expiry of validity of Bid]*. Any demand in respect of this Guarantee should reach the Bank within the validity period of Bid Security.
7. The Bank Guarantee is unconditional and irrevocable.
8. The expressions Bank and Railway herein before used shall include their respective successors and assigns.
9. The Bank hereby undertakes not to revoke the guarantee during its currency, except with the previous consent in writing of the Railway. This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 758.
10. The Bank hereby confirms that it is on the SFMS (Structured Financial Messaging System) and shall invariably send the advice of this Bank Guarantee to the following bank details –

IFSC CODE	SBIN000RAIL
IFSC TYPE	BRANCH
BANK NAME	STATE BANK OF INDIA
BRANCH NAME	RAIL
CITY NAME	NAVI MUMBAI
ADDRESS	SECTOR-11, CBD BELAPUR, NAVI MUMBAI
DISTRICT	NAVI MUMBAI
STATE	MAHARASHTRA
BG ENABLED	YES

11. The Guarantee shall be valid in addition to and without prejudice to any other security Guarantee(s) of Bidder in favour of the Railway. The Bank, under this Guarantee, shall be deemed as Principal Debtor of the Railway.

Date

Place.....

Bank's Seal and authorized signature(s)

[Name in Block letters]

[Designation with Code No.].....

[P/Attorney] No.

Witness:

1 Signature, Name & Address & Seal

2 Signature, Name & Address & Seal

Bank's Seal

*[P/Attorney]*No.

Note: All italicized text is for guidance on how to prepare this bank guarantee and shall be deleted from the final document.

Annexure-VIIB

FORMAT FOR DECLARATION OF AVERAGE ANNUAL TURNOVER

Each Bidder or each member of a JV must fill in this form separately:

NAME OF BIDDER/JV PARTNER:

Annual Contractual Turnover Data for the Previous 3/4 Years (Contractual Payment only)			
Year	Amount Currency	Exchange Rate	Indian National Rupees Equivalent
Average Annual Contractual Turnover for last 3 years			

1. The average annual contractual turnover shall be calculated as an average of "total contractual payments" in the previous three financial years. However, in case balance sheet of the previous year is yet to be prepared/ audited, the audited balance sheet of the fourth previous year shall be considered for calculating average annual contractual turnover.
2. The information supplied shall be substantiated by data in the audited balance sheets and profit and loss accounts for the relevant years in respect of the bidder or all members constituting the bidder.
3. Contents of this form should be certified by a Chartered Accountant duly supported by Audited Balance Sheet duly certified by the Chartered Accountant.

SEAL AND SIGNATURE OF THE BIDDER

Certified that all figures and facts submitted in this form have been furnished after full consideration of all observations/notes in Auditor's reports. _____

(Signature of Chartered Accountant)
Name of CA: _____
Registration No: _____
(Seal)

Annexure-VIII

8. Guidelines for submitting tenders by Partnership Firms and their Eligibility Criteria (Head Quarter letter No: 74-W/0/Pt.XXV/WA Dated 03.06.2011).

- 1 The Partnership Firms participating in the tender should be legally valid under the provisions of Indian Partnership Act.
- 2 The partnership firm should have been in existence or should have been formed prior to submission of tender. Partnership firm should have either been registered with the competent registrar or the partnership deed should have been notarized prior to date of tender opening, as per Indian partnership Act, prior to submission of tender.
- 3 Separate identity/name should be given to the partnership firm. The partnership firm should have PAN/TAN number in its own name and PAN/TAN number in the name of any of the constituent partners shall not be considered. The valid constituents of the firm shall be called partners.
- 4 Once the tender has been submitted, the constitution of firm shall not normally be allowed to be modified/alterd/terminated during the validity of the tender as well as the currency of the contract except when modification becomes inevitable due to succession laws etc., in which case prior permission should be taken from Railway and in any case the minimum eligibility criteria should not get vitiated. The reconstitution of firm in such cases should be followed by a notary certified Supplementary Deed. The approval for change of constitution of the firm, in any case, shall be at the sole discretion of the Railways and the tenderer shall have no claims what so ever. Any change in the constitution of Partnership Firm after submission of tender shall be with the consent of all partners and with the signatures of all partners as that in the Partnership deed. Failure to observe this requirement shall render the offer invalid and full Bid Security shall be forfeited.
If any partner/s withdraws from the firm after submission of the tender and before the award of the tender, the offer shall be rejected and Bid Security of the tenderer will be forfeited. If any new partner joins the firm after submission of tender but prior to award of contract, his/her credentials shall not qualify for consideration towards eligibility criteria either individually or in proportion to this share in the previous firm. In case the Tenderer fails to inform Railway beforehand about any such changes/modification in the constitution which is inevitable due to succession laws etc. and the contract is awarded to such firm, then it will be considered a breach of contract conditions, liable for determination of contract under Clause 62 of the Standard General Condition of Contract.
- 5 A partner of the firm shall not be permitted to participate either in his individual capacity or as a partner of any other firm in the same tender.
- 6 The tender form shall be purchased and submitted only in the name of partnership firm and not in the name of any constituent partner. The Bid Security shall be submitted only in the name of partnership firm. The Bid Security submitted in the name of any individual partner or in the name of authorized partner(s) shall not be considered.
- 7 One or more of the partners of the firm or any other person(s) shall be designated as the authorized person(s) on behalf of the firm, who will be authorized by all the partners to act on behalf of the firm through a "Power of Attorney", specifically authorizing him/them to submit & sign the tender, sign the agreement, receive payment, witness measurements, sign measurement books, make correspondences, compromise, settle, relinquish any claim(s) preferred by the firm, sign "No Claim Certificate", refer all or any dispute to arbitration and to take similar such action in respect of the said tender/contract. Such "Power of Attorney" should be notarized/registered and submitted along with tender.
- 8 On issue of Letter of Acceptance (LOA) to the partnership firm, all the guarantees like Performance Guarantee, guarantee for various Advances to the Contractor shall be submitted only in the name of the partnership firm and no splitting of guarantees among the partners shall be acceptable.
- 9 On issue of LOA, contract agreement with partnership firm shall be executed in the name of the firm only and not in the name of any individual partner.

10 In case, the contract is awarded to a partnership firm, the following undertakings shall be furnished by all the partners through a notarized affidavit, before signing of contract agreement:-

- (a) Joint and several liabilities: The partners of the firm to which the contract is awarded, shall be jointly and severally liable to the Railway for execution of the contract in accordance with general and special conditions of the contract. The partners shall also be liable jointly and severally for the loss, damages caused to the Railway during the course of execution of the contract or due to non-execution of the contract or part thereof.
- (b) Duration of the partnership deed and partnership firm agreement : The partnership deed/partnership firm agreement shall normally not be modified, altered, terminated during the currency of contract and the maintenance period after the work is completed as contemplated in the conditions of the contract. Any change carried out by partners in the constitution of the firm without permission of Railway, shall constitute a breach of contract liable for determination of contract under clause 62 of Standard General Conditions of Contract.
- (c) Governing Laws: The partnership firm agreement shall in all respect be governed by and interpreted in accordance with the Indian laws.
- (d) No partner of the firm shall have the right to assign or transfer the interest right or liability in the contract without the written consent of the other partner and that of the Railway in respect of the tender/contract.

11 The tenderer shall clearly specify that the tender is submitted on behalf of a partnership firm. The following documents shall be submitted by the partnership firm, with the tender-

- (a) A notarized copy of the Partnership Deed or a copy of the Partnership deed registered with the Registrar
- (b) A notarized or registered copy of Power of Attorney in favour of the individual to tender for the work, sign the agreement etc. and create liability against the firm.
- (c) An undertaking by all partners of the partnership firm that they are not blacklisted or debarred by Railways or any other Ministry / Department of the Govt. of India from participation in tenders / contracts as on the date of submission of bids, either in their individual capacity or in any firm/LLP in which they were / are partners/members. Any Concealment / wrong information in regard to above shall make the bid ineligible or the contract shall be determined under Clause 62 of PART-II of the General Conditions of Contract.
- (d) All other documents in terms of **clause 3.5 (Eligibility Criteria) of PART-I** of Tender document.

12 Evaluation of eligibility of a partnership firm.

Technical and financial eligibility of the firm shall be adjudged based on satisfactory fulfillment of the eligibility criteria laid down in para 3.5 in Tender document.

Annexure-IX

9. Details of Plant and Machinery already available with the firm.

SN	Particulars of equipment	No. of Unit.	Kind & make	Capacity	Date by which the plant would be available for use on this work	Age & condition	Work on which it is being used.
	1	2	3	4	5	6	7
1							
2							

Annexure-X

10. List of engineers/personnel already available/ proposed to be employed for deployment on this work:

SN	Name & Designation	Qualification	Professional experience	Organization with whom working	Date by which personnel will be available for this work.
	1	2	3	4	5
1					
2					

Annexure-XI

11. Statement of works being executed/in hand by the contractor/s

S N.	Name and place of work	Authority/agency for whom the work is being carried out	Date of award & agreement No. & Date	Date of completion (Original/ actual)
	1	2	3	4
1.				
2.				
3.				

Agree mental cost of work cost/likely cost	Principal/ Technical features work in brief	SN at which relevant certificate/Documents are attached	Payment taken till.
5	6	7	8

Annexure-XII

12. Details of Beneficiary for Electronic Transfer of Funds

1	Beneficiary Name	:	
2	Beneficiary Address	:	
3	Bank Name	:	
4	Branch Address	:	
5	IFSC Code	:	
6	MICR Code	:	
7	Account Type	:	
8	Account Number	:	
9	City :	:	
10	Tel./Fax No. (if any)	:	
11	PAN No.	:	
12	Service Tax Registration number linked with PAN no		
13	GSTIN NO.	:	
14	Signature of Beneficiary		

Signature of Bank Official with Stamp

Annexure-XIII

13. Applicable charges/recoveries/Advance etc.

S. no.	Item	Description
1.	Water charges	In case of contractor using Railway's water sources, water charges will be deducted @1% of the cost of the item(s) where water is being consumed.
2.	BOCW cess	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. For enactment of this Act, the tenderer shall be required to pay BOCW 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 ". Recoverable amount of BOCW cess at the rate of 1% shall be credited under Suspense Head Deposit Misc (BOCW cess) before arranging payment to the contractor as per directive of Railway Board issued vide letter No. 2008/CE-I/CT/6 dated 08.11.2012 with the concurrence of "Finance Directorate of Ministry of Railway" .
3.	Deployment of Technical supervisor	<p>In terms of provisions of new clause 26 A.1 to the General Conditions of Contract (GCC), Contractor has to deploy following Qualified Engineers during execution of work:</p> <p>(i) one qualified Graduate Engineer when cost of work to be executed is Rs. 200 lacs and above, and</p> <p>(ii) One qualified Diploma Engineer when cost of work to be executed is more than Rs. 25 lacs, but less than Rs. 200 lacs</p> <p>Graduate /Diploma holder Engineer will be available at site as and when or for the period as directed by Engineer's representative.</p> <p>Further, in case the Contractor fails to employ the Qualified Engineer, as aforesaid in above Paras, in terms of clause 26 A.1 of Part-II of General Conditions of Contract-2022, shall be liable to pay an amount of Rs. 40,000.00 and Rs. 25,000.00 for each month or part thereof for the default period. (Railway Board's letter no: 2012/CE-I/CT/0/20 Dated: 10.05.2013)</p>
4.	Income Tax	As applicable
5.	GSTIN NO	As applicable
6.	Brick bat	Quantity X rates of item no: 055140 + Tender % + 12.5% +7.5%+5%

7.	Tools and plants	The hire charges of tools and plants provided to the contractor will be as per letter no 64/W2/CT/56 dated. 27-03-1967 and 64/W2/CT/56 dated: 20.11.79.
8.	Mobilization advance	It will be applicable as per Railway Board letter no: 2007/CE-I/CT/18 Pt.3 dated 23.05.2012
9.	Stage Payment for Steel supplied by the contractor	It will be applicable as per Railway Board letter no: 2007/CE-I/CT/183 dated: 07.3.2008
10.	PVC clause	Price Variation clause will be applicable only in tenders having advertised value above Rs 2 Crore . Detailed guidelines are given in Clause 46A of Part-II of GCC-2022.
11.	Maintenance Period	The contractor shall give guarantee/warranty for whole work executed by them (including material/spares) for the period of 12 months from the date of Completion of work. No maintenance period is applicable for the works like Ballast supply, Hiring of vehicle.

Annexure-XIV

Reference Para 17(B) of GCC-2022

Registered Acknowledgement Due

PROFORMA FOR TIME EXTENSION

No. _____

Dated: _____

Sub: (i) _____ (name of work).

(ii) Acceptance letter no. _____

(iii) Understanding/Agreement no. _____

Ref: _____ (Quote specific application of Contractor for extension to the date received) _____

Dear Sir,

1. The stipulated date for completion of the work mentioned above is _____. From the progress made so far and the present rate of progress, it is unlikely that the work will be completed by the above date (or 'However, the work was not completed on this date').
2. Expecting that you may be able to complete the work if some more time is given, the competent authority, although not bound to do so, hereby extends the time for completion from _____ to _____.
3. Please note that an amount equal to the liquidated damages for delay in the completion of the work after the expiry of _____ (give here the stipulated date for completion with/without any penalty fixed earlier) will be recovered from you as mentioned in Clause 17B of the Standard General Conditions of Contract for the extended period, notwithstanding the grant of this extension. You may proceed with the work accordingly.
4. The above extension of the completion date will also be subject to the further condition that no increase in rates on any account will be payable to you.
5. Please intimate within a week of the receipt of this letter your acceptance of the extension of the conditions stated above.
6. Please note that in the event of your declining to accept the extension on the above said conditions or in the event of your failure after accepting or acting upto this extension to complete the work by _____ (here mention the extended date), further action will be taken in terms of Clause 62 of the Standard General Conditions of Contract.

Yours faithfully

For and on behalf of the President of India

Annexure–XV

Reference Para 60.(2) of GCC-2022

CERTIFICATE OF FITNESS

(a) Serial Number _____

(b) Date _____

(A) Name of person examined _____

(B) Father's Name: son/daughter of _____

(C) Residing at _____

(D) Sex _____

(E) Residence: _____

(F) Physical fitness

(G) Identification marks _____

(H) Date of birth, if available, and/or certified age _____

(I) I certify that I have personally examined (name) _____ who is desirous of being employed in a factory or on a work requiring manual labour and that his/her age as nearly as can be ascertained from my examination, is _____ years.

(J) I certify that he/she is fit for employment in a factory or on a work requiring manual labour as an adult/child.

(K) Reasons for :

(i) Refusal to grant certificate, or _____

(ii) Revoking the certificate _____

Signature or left hand

Thumb impression of the person examined.

Signature of Certifying Surgeon

Note: In case of physical disability, the exact details and cause of the physical disability should be clearly stated.

Annexure—XVI

Reference Clause 62.(1) of GCC-2022
Registered Acknowledgement Due

**PROFORMA OF 7 DAYS NOTICE FOR WORKS AS A WHOLE/ IN PARTS
(DETAILS OF PART OF WORK TO BE MENTIONED)**

_____ RAILWAY
(Without Prejudice)

To

M/s _____

Dear Sir,

Contract Agreement No. _____

In connection with _____

1. In spite of repeated instructions to you by the subordinate offices as well as by this office through various letters of even no. _____, dated _____; you have failed to start work/show adequate progress and/or submit detailed programme for completing the work/ part of work (details of part of work to be mentioned).
2. Your attention is invited to this office/Chief Engineer's office letter no. _____, dated _____ in reference to your representation, dated _____.
3. As you have failed to abide by the instructions issued to commence the work /to show adequate progress of work you are hereby given 7 days' notice in accordance with Clause 62 of Standard General Conditions of Contract to commence works / to make good the progress, failing which further action as provided in Clause 62 of the Standard General Conditions of Contract viz. to terminate your Contract and complete the balance work without your participation will be taken.

Kindly acknowledge receipt.

Yours faithfully

For and on behalf of the President of India

Annexure–XVII

Registered Acknowledgement Due

PROFORMA OF 48 HRS. NOTICE FOR WHOLE WORK

_____ RAILWAY
(Without Prejudice)

To

M/s _____

Dear Sir,

Contract Agreement No. _____

In connection with _____

1. Seven days' notice under Clause 62 of Standard General Conditions of Contract was given to you under this office letter of even no., dated _____; but you have taken no action to commence the work/show adequate progress of the work.

2. You are hereby given 48 hours' notice in terms of Clause 62 of Standard General Conditions of Contract to commence works / to make good the progress of works, failing which and on expiry of this period your above contract will be rescinded and the work under this contract will be carried out independently without your participation and your Security Deposit shall be forfeited and Performance Guarantee shall also be encashed and any other consequences which may please be noted.

Kindly acknowledge receipt.

Yours faithfully

For and on behalf of the President of India

Annexure—XVIII

Registered Acknowledgement Due

PROFORMA OF TERMINATION NOTICE

NORTHERN RAILWAY

(Without Prejudice)

No. _____ Dated _____

To

M/s _____

Dear Sir,

Contract Agreement No. _____

In connection with _____

Forty-eight hours (48 hrs.) notice was given to you under this office letter of even no., dated _____; but you have taken no action to commence the work/show adequate progress of the work.

Since the period of 48 hours' notice has already expired, the above contract stands rescinded in terms of Clause 62 of Standard General Conditions of Contract and the balance work under this contract will be carried out independently without your participation. Your participation as well as participation of every member/partner in any manner as an individual or a partnership firm/JV is hereby debarred from participation in the tender for executing the balance work and your Security Deposit shall be forfeited and Performance Guarantee shall also be encashed.

Kindly acknowledge receipt.

Yours faithfully

For and on behalf of the President of India

Annexure–XIX

Reference Para 62.(1) of GCC-2022
Registered Acknowledgement Due

PROFORMA OF 48 HRS.NOTICE FOR PART OF THE WORK.....

(DETAILS OF PART OF WORK TO BE MENTIONED)

NORTHERN RAILWAY

(Without Prejudice)

To

M/s _____

Dear Sir,

Contract Agreement No. _____

In connection with _____

1. Seven days' notice under Clause 62 of Standard General Conditions of Contract was given to you under this office letter of even no., dated _____; but you have taken no action to commence the work/show adequate progress of the part of work.....(details of part to be mentioned).

2. You are hereby given 48 hours' notice in terms of Clause 62 of Standard General Conditions of Contract to commence works / to make good the progress of works, failing which and on expiry of this period your above part of work..... (Details of part to be mentioned) in contract will be rescinded and the work will be carried out independently without your participation.

3. Your full Performance Guarantee for the contract shall be forfeited and you shall not be issued any completion certificate for the contract. However, no additional Performance Guarantee shall be required for balance of work being executed through the part terminated contract.

4. The contract value of part terminated contract shall stands reduced to

Kindly acknowledge receipt.

Yours faithfully

For and on behalf of the President of India

Annexure–XX

Reference Para 62.(1) of GCC-2022

Registered Acknowledgement Due

**PROFORMA OF TERMINATION NOTICE FOR PART OF THE WORK..... (DETAILS OF PART
OF WORK TO BE MENTIONED)**

NORTHERN RAILWAY

(Without Prejudice)

No. _____ Dated _____

To

M/s _____

Dear Sir,

Contract Agreement No. _____

In connection with _____

- (a) Forty eight hours (48 hrs.) notice was given to you under this office letter of even no., dated _____; but you have taken no action to commence the work/show adequate progress of the part of work.....(details of part to be mentioned).
- (b) Your above part of work in contract(details of part to be mentioned) stands rescinded in terms of Clause 62 of Standard General Conditions of Contract and the same will be carried out independently without your participation. Your participation as well as participation of every member/partner in any manner as an individual or a partnership firm/JV is hereby debarred from participation in the tender for executing the balance work
- (c) Your full Performance Guarantee for the contract shall be forfeited and you shall not be issued any completion certificate for the contract. However, no additional Performance Guarantee shall be required for balance of work being executed through the part terminated contract.
- (d) The contract value of part terminated contract stands reduced to
Kindly acknowledge receipt.

Yours faithfully

For and on behalf of the President of India

Annexure-XXI

21. Check list to be filled up by tender issuing authority

SN	Description of item to be checked before Issuing Tender Document by Department	PI fill Yes / No
1.	Are all pages of the Tender Document numbered serially & signed by the Tender Issuing Authority?	Yes
2.	Is the cost of Tender Document mentioned in the Tender Notice?	Yes
3.	Is the Amount of Bid Security mentioned in the Tender Notice?	Yes
4.	Are the scope of work, location and sketches etc. given in Section 3 of PART-I of Tender document corresponding to TOP SHEET of Form 5?	Yes
5.	Is the work of Similar nature defined in Section 3 of PART-I of the Tender document?	Yes
6.	Are the date, Time & Place of opening mentioned in the Tender Notice?	Yes

Annexure–XXII

Reference Para 48.(3) of GCC-2022

FINAL SUPPLEMENTARY AGREEMENT

Articles of agreement made this day _____ in the year _____ between the President of India, acting through the _____ Railway Administration having his office at _____ herein after called the Railway of the one part and _____ of the second part.

Whereas the party hereto of the second part executed an agreement with the party hereto of the first part being agreement Number _____ dated _____ for the performance _____ herein after called the 'Principal Agreement'.

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 payment to the party hereto of the second part diverse sums from time to time aggregating to ₹ _____ including the Final Bill bearing voucher No. _____ dated _____ of value _____ duly adjusted as per price variation clause, if applicable (the receipt of which is hereby acknowledged by the party hereto of the second part in full and final settlement of all his /its claims under the principal agreement.

And whereas the party hereto of the second part have received sum of ₹ _____ through the Final Bill bearing voucher No. _____ dated _____ duly adjusted as per price variation clause (PVC), if applicable (the receipt of which is hereby acknowledged by the party thereto of the second part) from the party hereto of the first part in full and final settlement of all his/its disputed claims under principal agreement.

Now, it is hereby agreed by and between the parties in the consideration of sums already paid by the party hereto of the first part to the party hereto of the second part against all outstanding dues and claims for all works done under the aforesaid principal agreement excluding the Security Deposit, the party hereto of the second part have no further dues of claims against the party hereto of the first part under the said Principal Agreement. It is further agreed by and between the parties that the party hereto of the second part has accepted the said sums mentioned above in full and final satisfaction of all its dues and claims under the said Principal Agreement.

(Applicable in case Final Supplementary Agreement is signed after release of Final Payment)

Or

And whereas the party hereto of the first part already made payment to the party hereto of the second part diverse sums from time to time aggregating to ₹ _____ through various On Account Bills (the receipt of which is hereby acknowledged by the party hereto of the second part).

And whereas the party hereto of the second part have received sum of ₹ _____ through various On Account Bills (the receipt of which is hereby acknowledged by the party thereto of the second part) from the party hereto of the first part and party hereto of the second part have accepted final measurements recorded on Page No..... to Page No.... of Measurement Book No.....and corresponding Final Bill duly adjusted as per price variation clause (PVC), if applicable, for full and final settlement of all his/its disputed claims under principal agreement.

Now, it is hereby agreed by and between the parties in the consideration of sums already paid through various On Account Bills and sums to be paid through Final Bill duly adjusted as per price variation clause (PVC), if applicable, based on accepted final measurements including the Security Deposit by the party hereto of the first part to the party hereto of the second part against all outstanding dues and claims for

all works done under the aforesaid principal agreement, the party hereto of the second part have no further dues of claims against the party hereto of the first part under the said Principal Agreement.

(Applicable in case Final Supplementary Agreement is signed before release of Final Payment)

It is further agreed and understood by and between the parties that the arbitration clause contained in the said principal agreement shall cease to have any effect and/or shall be deemed to be non-existent for all purposes.

Signature of the Contractor/s for and on behalf of the President of India

Witnesses

ADDRESS: _____

Annexure-XXIII

Reference Para 64.3 & 64.6 of GCC-2022

Agreement towards Waiver under Section 12(5) and Section 31A (5) of Arbitration and Conciliation (Amendment) Act

I/we..... (Name of agency/Contractor) with reference to agreement no..... raise disputes as to the construction and operation of this contract, or the respective rights and liabilities, withholding of certificate and demand arbitration in respect of following claims :

Brief of claim:

- (i) Claim 1- Detailed at Annexure-
- (ii) Claim 2 –
- (iii) Claim 3 –

I/we..... (post of Engineer) with reference to agreement no..... hereby raise disputes as to the construction and operation of this contract, or the respective rights and liabilities, withholding of certificate and demand arbitration in respect of following claims

I/we.....do/do not agree to waive off applicability of section 12(5) of Arbitration and Conciliation (Amendment) Act.

Signature of Claimant_____ Signature of Respondent _____

Agreement under Section 31(5)

I/we..... (Name of claimant) with reference to agreement no..... hereby waive off the applicability of sub section 31-A (2) to 31-A (4) of the Arbitration and Conciliation (Amendment) Act. We further agree that the cost of arbitration will be shared by the parties as per Clause 64(6) of the Standard General Conditions of Contract.

Signature of Claimant_____ Signature of Respondent _____

*Strike out whichever not applicable.

Annexure-XXIV

Reference Para 64. (3) of GCC-2022

**Certification by Arbitrators appointed under Clause 63 & 64 of Indian Railways
General Conditions of Contract**

1. Name:
2. Contact Details:
3. Prior experience (Including Experience with Arbitrations):
4. **I do not have more than ten on-going Arbitration cases with me.**
5. I hereby certify that I have retired from Railways w.e.f. _____ and empaneled as Railway Arbitrator as per 'The Arbitration and Conciliation Act- 1996'.
6. I have no any past or present relationship in relation to the subject matter in dispute, whether financial, business, professional or other kind.
Or
7. I have past or present relationship in relation to the subject matter in dispute, whether financial, business, professional or other kind. The list of such interests is as under:
8. I have no any past or present relationship with or interest in any of the parties whether financial, business, professional or other kind, which is likely to give rise to justifiable doubts as to my independence or impartiality in terms of The Arbitration and Conciliation Act-1996.
Or
9. I have past or present relationship with or interest in any of the parties whether financial, business, professional or other kind, which is likely to give rise to justifiable doubts as to my independence or impartiality in terms of The Arbitration and Conciliation Act-1996. The details of such relationship or interests are as under:
10. There are no concurrent Circumstances which are likely to affect my ability to devote sufficient time to the arbitration and in particular to finish the entire arbitration within twelve months.

Or

There are Circumstances which are likely to affect my ability to devote sufficient time to the arbitration and in particular to finish the entire arbitration within twelve months. The list of such circumstances is as under:

Annexure–XXV

Name of the Bank -----

President of India

Acting through Sr. DFM/N.Rly,

Bank Guarantee Bond No.: Date: -----

PERFORMANCE GUARANTEE BOND

In consideration of the President of India acting through ----- (Designation & address of Contract signing Authority). Northern Railway, ----- (hereinafter called "The Government") having agreed under the terms and conditions of agreement/Contract Acceptance letter No. ----- dated ----- made between----- (Designation & address of contract signing Authority) and ----- (here in after called "the said contractor(s)" for the work----- (here in after called "the said agreement") having agreed for submission of a irrevocable Bank Guarantee Bond for Rs.----- - (Rs. only) as a performance security Guarantee Bond from the contractor (s) for compliance of his obligations in accordance of his obligations in accordance with the terms & conditions in the said agreement.

1. We..... (indicate the name of the Bank) hereinafter referred to as the Bank, undertake to pay the Government an amount not exceeding Rs..... (Rs. only) on demand by the Government.
2. We..... (indicate the name of the bank, further agree that (and promise) to pay the amounts due and payable under this guarantee without any demur merely on a demand from the Government through the Sr. DFM/N.Rly (-----), stating that the amount claimed is due by way o loss or damage caused to or would be caused or suffered by the Government by reason of any breach by the said contractor of any of the terms of conditions contained in the said agreement or by reason of the contractor failure to perform the said agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs..... (Rupees..... Only).
3. (a) We..... (indicate the name of Bank) further undertake to pay to the Government any money so demanded notwithstanding any dispute or dispute raised by the contractor(s) in any suite or proceeding pending before any court or Tribunal relating to liability under this present being absolute and unequivocal.
(b) The payment so made by us under this bond shall be valid discharge of our liability for payment there under and the contractor(s), shall have no claim against us for making such payment.
4. We..... (indicate the name of bank) to further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged by (Designation & Address of contract signing authority) on behalf of the Government. Certify that the terms and conditions of the said agreement have been fully and property carried out by the said contractor(s) and accordingly discharges this guarantee.
5. (a) Not withstanding anything to the contrary contained herein the liability of the bank under this guarantee will remain in force and effect until such time as this guarantee is discharged in writing by the Government or until (date of validity/ extended validity) whichever is earlier and no claim shall be valid under this guarantee unless notice in writing thereof is given by the Government within validity/extended period of validity of guarantee for the date aforesaid.

- (b) Provided always that we.....(indicate the name of the bank) unconditionally undertakes to renew this guarantee on to extend the period of guarantee form year to year before the expiry of the period or the extended period of the guarantee, as the case may be on being called upon to do so by the Government. If the guarantee is not renewed or the period extended on demand, we.....(indicate the name of the bank) shall pay the Government the full amount of guarantee on demand and without demur.
6. We,(indicate the name of Bank) further agree with the Government that the Government shall have the fullest liberty without our consent and without effecting in any manner out of obligations hereunder to vary any of the terms and conditions of the said contract from time to time or to postpone for any time or from time to time any to the powers exercisable by the Government against the said contract (s) and to forbear or enforce any of the terms and conditions of the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said contractor(s) or for any bearance act or omission on the part of the Government or any indulgence by the Government to the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties for the said reservation would relive us from the liability.
7. This guarantee will not be discharged by any change in the constitution of the Bank or the Contractor(s).
8. We, (indicate the name of the Bank) lastly undertake not to revoke this guarantee except with the previous consent of the Government in writing.
9. This guarantee shall be valid upto..... (date of Completion plus 60 days). Unless extended on demand by Government. Notwithstanding anything to the contrary contained hereinbefore, our liability under this guarantee is restricted to Rs..... (Rs.....only) unless a demand under this guarantee is made on us in writing on or before..... we shall be discharged from our liabilities under this guarantee thereafter.

Dated: the day of for

(Indicate the name of bank)

Signature of Banks Authorised official

(Name)

Designation with Code No.....

Full Address.....

Witness 1:

Signature.....

Name.....

(In Capital)

Address.....

.....

.....

Witness 2:

Signature.....

Name.....

(In Capital)

Address.....

.....

.....

Annexure–XXVI

FOR RETIRED RAILWAY EMPLOYEE

DECLARATION/UNDERTAKING

I/We, _____ (name and Designation) on behalf of _____ (Name of the tendering firm) do hereby declare/undertake that I/We have not employed any retired Engineer or retired gazetted officer, nor made any Partner/Director etc. in our firm who retires from Railway Service in last one year as on the date of opening of tender in terms of Clause 16 of TENDER FORM (Second Sheet) of Part-I of GCC 2022.

(Authorized signatory)

Name of the tendering firm

Place:-

Dated:

Annexure—XXVII

Insurance Surety Bond for Performance Security

Name of the issuer of Surety bond:

President of India,
Acting through
..... Railway

Date:

Surety Bond No.:

Issue Date:

Amount of Bond:

Expiry Date:

WHEREAS, In consideration of the President of India acting through (*Designation & address of contract signing authority*), Railway,, (hereinafter called "The Railway") having accepted the bid of M/s XXXXXXXXX hereinafter called the contractor, for the work of XXXXX" under invitation for bids No. XXXXXX, vide Letter of Acceptance No.

AND

WHEREAS, the contractor is required to furnish Performance Security for the sum of ₹ XXXXXX (**Rupees XXXX Only**), in the form of Surety Bond, being a condition precedent to the signing of the contract agreement.

WHEREAS, we, (*Name of insurance company*) hereinafter called the Surety, acting through [*Designation(s) of the authorised person of the Surety*], have, at the request of the M/s XXXXXXXXX contractor, agreed to give Bond for performance security/ additional performance security as hereinafter contained:

1. KNOW ALL MEN by these present that I/We, the undersigned [*Insert name(s) of authorised representatives of the Surety*], being fully authorised to sign and incur obligations for and behalf of the Surety, confirm that the Surety, hereby, unconditionally and irrevocably Bond to pay the Railway the full amount in the sum of ₹ XXXXXX (**Rupees XXXX Only**) as above stated.
2. The Surety undertakes to immediately pay on presentation of demand by the Railway any amount up to and including aforementioned full amount without any demur, reservation or recourse. Any such demand made by the Railway on the Surety shall be final, conclusive and binding, absolute and unequivocal notwithstanding any disputes raised/pending before any Court tribunal, arbitration or any authority or any threatened litigation by the Bidder or Bank.
3. On payment of any amount less than aforementioned full amount, as per demand of the Railway, the Bond shall remain valid for the balance amount i.e. the aforementioned full amount less than the payment made to the Railway.
4. The Surety shall pay the amount as demanded immediately on presentation of the demand by Railway without any reference to the contractor and without the Railway being required to show grounds or give reasons for its demand or the amount demanded.
5. The Surety Bond shall be unconditional and irrevocable.
6. The Bond hereinbefore shall not be affected by any change in the constitution of the Surety or in the constitution of the Contractor.
7. The Surety agrees that no change, addition, modifications to the terms of the Contract Agreement or to any documents, which have been or may be made between the Railway and the Contractor, will

- in any way release us from the liability under this Bond; and the Surety, hereby, waives any requirement for notice of any such change, addition or modification to the Surety.
8. This Bond is valid and effective from the date of its issue, which is *[insert date of issue]*. The Bond and our obligations under it will expire on **XXXXXX** (*Expiry Date*). All demands for payment under the Bond must be received by us on or before that date.
 9. The Surety agrees that the Railways right to demand payment of aforementioned full amount in one instance or demand payments in parts totaling up to the aforementioned full amount in several instances will be valid until either the aforementioned full amount is paid to the Railway or the Bond is released by Railway before the Expiry date.
 10. The Surety agrees that its obligation to pay any amount demanded by the Railway before the expiry of this Bond will continue until the amount demanded has been paid in full.
 11. The expressions Surety and Railway hereinbefore used shall include their respective successors, administrators and assigns.
 12. The Surety hereby undertakes not to revoke the Bond during its currency, except with the previous consent in writing of the Railway. This Bond is subject to the Uniform Rules for Demand Bonds, ICC Publication No. 758.
 13. We, the Surety Insurer, further agree that the Authority shall be the sole judge to decide as to whether the Bidder is in default of due and faithful fulfilment and compliance with the terms and conditions contained in the Bidding Documents including, inter alia, the failure of the Bidder to keep its Bid open during the Bid validity period set forth in the said Documents, and the decision of the Authority that the Bidder is in default as aforesaid shall be final and binding on us, notwithstanding any differences between the Authority and the Bidder or any dispute pending before any Court, tribunal, arbitrator or any other authority.
 14. The Bond shall be in addition to and without prejudice to any other security Bond (s) of the contractor in favour of the Railway available with the Railway. The Surety, under this Bond, shall be deemed as Principal Debtor of the Railway.
- Notwithstanding anything to the contrary contained in these presents,**
- a. Our liability under this Surety Bond shall not exceed ₹ **XXXXXX** (**Rupees XXXX Only**).
 - b. This Surety Bond shall be valid up to **XXXXXX** (*being the date of expiry*).
 - c. Unless the bank is served a written claim or demand on or before **XXXXXX** (*Date of Expiry*) all rights under this Bond shall be forfeited and the Surety shall be relieved and discharged from all liabilities under this Bond irrespective of whether or not the original Surety bond is returned to the Surety.

Dated (*date*) the day of (*month & year*)

15. The Insurance Surety Bond shall be verified by sending mail to [official email of Surety].

Place

Surety's Seal and authorised signature(s)

[Name in Block letters].....

[Designation with Code No.].....

[P/Attorney No.].....

Witness

1.

2.

* * * * *

[Note: All italicized texts are for guidance on how to prepare this Insurance Surety Bond and shall be deleted from the final document]

Annexure–XXVIII

LIST OF STANDARD DRAWINGS AND SPECIFICATIONS

This Annexure contains reference to drawing numbers, charts, Schedules, Specifications and other data referred to in various paragraphs of this Tender Document.

All references to drawings, charts, schedules, specifications, IS etc. given in this Annexure or elsewhere in the tender document shall be taken to be the latest versions including all amendments. All other items not covered under the Drawing/Specification shall be referred to as per relevant IS and Railway practice in force.

The Drawing and RDSO specification can be purchased from the office of TI Directorate of RDSO, Lucknow or from IREPS/RDSO/CORE website on payment basis.

LIST OF STANDARD DRAWINGS FOR “OHE”

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	C
2.	Standard setting of structures in the vicinity of signals (broad gauge)	-do-	00112	D
3.	Typical design of side bearing foundation.	-do-	00131	-
4.	Typical design of cantilever mast.	RE/33/G	00141 Sh.3	-
5.	Standard drilling schedule of OHE masts 9.5 m long RSJ and BFB	ETI/OHE/G	00144 Sh.3	C
6.	Span and stagger chart for (conventional OHE, Cad. Cu catenary & Cu cont. wire) wind pressure 75, 112.5 & 150 kgf/m ² .	ETI/OHE/G	00202	-
7.	Employment schedule for Cantilever mast Regulated OHE without return conductor and without Earth wire (WP- 112.5 kgf/m ² (Cd- 65/Cu, Cont. 107/Cu)	ETI/OHE/G	00153 Sh.1	F
8.	Employment schedule for Cantilever mast Regulated OHE without return conductor and with Earth wire (WP- 112.5 kgf/m ² (Cd- 65/Cu, Cont. 107/Cu)	ETI/OHE/G	00153 Sh.2	F
9.	Employment schedule for Cantilever masts Regulated OHE with return conductor and without Earth wire (WP- 112.5 kgf/m ² (Cd- 65/Cu Cont. 107/Cu)	-do-	00153 Sh.3	F
10.	Employment schedule for Cantilever masts Regulated OHE with return conductor and with Earth wire (WP- 112.5 kgf/m ² (Cd- 65/Cu, Cont. 107/Cu)	-do-	00153 Sh.4	E
11.	Employment schedule for Cantilever masts unregulated OHE without return conductor and without Earth wire (WP- 112.5 kgf/m ² at 35°C and 28 kgf/m ² at 4°C (Cat- 65/Cu, Cont. 107/Cu)	-do-	00154	D
12.	Employment schedule of bracket tubes Conventional OHE (Cad Cu Caty & Cu contact wire 1000 kgf tension each) WP-75 Kg/ m ²	ETI/OHE/G	00158 sh.1 of 3	-
13.	Employment schedule of bracket tubes Regulated Conventional OHE (Cad. Cu Cat & Cu contact wire 1000 kgf tension in each) WP-112.5 Kg/ m ²	ETI/OHE/G	00158 sh.2 of 3	-
14.	Employment schedule of bracket tubes Regulated Conventional OHE (Cad Cu Caty & Cu contact wire 1000 kgf tension in each) WP- 150 Kg/ m ²	ETI/OHE/G	00158 sh.3 of 3	-
15.	Dropper schedule for uninsulated Overlap spans	-do	00169	A

16.	Dropper schedule for insulated Overlap spans	-do	00170	A
17.	Dropper schedule for conventional regulated OHE. With Zero presag (1400/1400)	-do	00177	A
18.	Adjustment chart of Regulating equipment 3 Pulley Type (3:1 ratio)	-do	00195	A
19.	Schematic arrangement of regulated OHE	-do	02101	A
20.	Schematic arrangement of uninsulated overlap (3 & 4 span overlaps)	-do	02121 Sh.4	A
21.	Schematic arrangement of insulated overlap	ETI/OHE/G	02131 Sh.3	A
22.	Standard termination of tramway type OHE (Regulated) with Pulley type regulating equipment (3:1 ratio).	ETI/OHE/G	04212	B
23.	General distribution of droppers	ETI/OHE/G	00161	-
24.	Outline of Pantograph (Broad gauge and metre gauge).	RE/33/G	00181	A
25.	General formation of single track in Embankments and cutting (Broad gauge.)	RE/33/G	01101 Sh.1	A
26.	General formation of double track in embankments and cutting (Broad gauge).	-do-	01102 Sh.1	A
27.	General formation of multiple tracks (1676 mm gauge).	-do-	01103 Sh.1	A
28.	Standard anchor arrangement	-do-	01401	E
29.	Anchor arrangement with dwarf mast.	ETI/OHE/G	01402	B
30.	Schedule of anchor block for B.G. track.	-do-	01403 Sh.1	E
31.	Schedule of anchor block for B.G. track.	-do-	01403 Sh.2	D
32.	Schedule of anchor block for B.G. track (Black cotton soil)	-do-	01403 Sh.3	D
33.	Standard guide tube arrangement on a mast and structures.	ETI/OHE/G	01505	-
34.	Trapezoidal counter weight arrangement on OHE structures.	ETI/OHE/G	01502	-
35.	Arrangement of 3KV & 25 KV Pedestal Insulator supports on OHE masts and portals.	-do-	01601	-
36.	Standard arrangements for mounting of number plate on OHE Structures.	ETI/OHE/G	01701	A
37.	Schematic arrangement of regulated overhead equipment.	-do-	02101	A
38.	Typical arrangements of OHE on cantilever masts for double track section.	-do-	02102	-
39.	Typical arrangement for fixing of bracket assembly on 9.5 m mast and Structure to suit raising of tracks (in future)	-do	02102 Sh.3	-
40.	Mast on platforms (Metre Gauge)	RE/33/G	02104 Sh.2	A
41.	Details of bracket arrangement on tangent and curved tracks	ETI/OHE/G	02106 Sh.1	A
42.	Details of bracket arrangement for OHE	-do-	02106 Sh.3	C
43.	Single bracket assembly on Structures and dropped arms.	RE/33/G	02107	D
44.	Box type cantilever Arrangement.	ETI/OHE/G	02108	A
45.	Arrangement at anticreep.	TI/DRG/OHE/ GENL/RDSO/	00001/12/0	0
46.	Standard cantilever arrangement for boom anchor anticreep location.	ETI/OHE/G	02113	-
47.	Schematic arrangement of uninsulated over Lap (type-I) (3 & 4 Span overlaps)	RE/33/G	02121 Sh.1	F
48.	Schematic arrangement of insulated overlap.	ETI/OHE/G	02131 Sh.1	

49.	General arrangement of regulated OHE at turn-outs (overlap & crossed type).	ETI/OHE/G	02141	C
50.	General arrangement of regulated OHE at cross over(overlap & crossed type).	-do	02151	-
51.	Arrangement of neutral section	-do-	02161 Sh.1	C
52.	Arrangement of neutral section assembly (PTFE Type) at SWS.	-do	02162	-
53.	Arrangement of short neutral section.	-do	02161 Sh.2	-
54.	Schematic arrangement of unregulated overhead equipment.	-do	03101	-
55	Standard termination of OHE (Regulated & un-regulated).	ETI/OHE/G	03121 Pt 1 of 3	E
56	-do-	-do	03121 Pt 2 of 3	E
57	-do-	-do	03121 Pt 3 of 3	E
58.	General arrangement of Unregulated OHE at turnouts (crossed & overlap type).	-do	03151	-
59.	General arrangement of unregulated OHE at crossovers and diamond crossings (overlap and crossed type).	-do	03152 Sh.1	-
60.	General arrangement of unregulated OHE at diamond crossing.	-do	03152 Sh.2	-
61.	General arrangement of pull off	-do-	03301	A
62.	General arrangement of Head span	-do	03201	-
63.	In span jumper connection between catenary & contact wire.	-do-	05101	-
64.	Continuity jumper connection at un-insulated overlap turnouts and cross overs	-do	05102	C
65.	Anti- theft jumper	-do	05107	A
66.	Connections at turnouts	-do	05103	B
67.	Potential equalizer connection at insulated overlap and neutral section	-do-	05104	-
68.	Connections at diamond crossing.	-do-	05106	A
69.	General arrangement of connections to OHE by copper cross feeder (150).	-do	05121 Sh.1	C
70.	General arrangement of connections at switching station on double track section by copper cross feeder	ETI/OHE/G	05122 Sh.1	C
71.	General arrangement of connections at switching station on multiple track section by copper cross feeder	-do-	05123 Sh.1	C
72.	Suspension of 25kV feeder(Spider)on 25KV OHE masts	ETI/OHE/G	05143	B
73.	Termination of feeder, return conductor & return feeder(copper & aluminum).	ETI/OHE/G	05145-1	A
74.	Arrangement of suspension of double spider 25 KV feeder and return feeder between sub-station and feeding station	RE/33/G	05152	C
75.	Assembly of section insulators	RE/33/G	05181	C
76.	General arrangement of earth wire on OHE mast	ETI/OHE/G	05201	A
77.	General arrangement of earth wire on OHE mast	ETI/OHE/G	05201-1	-
78.	Arrangement of transverse bonds	ETI/OHE/G	05251	A
79.	Connection of return conductor to track	-do-	05306	F
80.	Suspension arrangement of aluminum return conductor (spider) on traction Structures	-do-	05307	B

81.	Suspension of return conductor (spider) from boom of Structures (with clevis type disc insulators)	-do-	05312	A
82.	Connections between OHE and aluminum return conductor at booster stations	ETI/OHE/G	05413	B
83.	Mounting of 25kv Isolators on OHE Structures (General arrangement)	ETI/OHE/G	05513 Sh.1	A
84.	Details of small part steel work for supporting 25kv Isolator on new T.T.C. boom	-do-	05513 Sh.2	A
85	Connection from Isolator to OHE	-do-	05516	A
86	Characteristics of conductors/ bus-bar for 25kv AC traction	-do-	05600	A
87	Mounting arrangement of Auxiliary Transformer on OHE masts	ETI/OHE/G	05522	-
88	Employment Schedule for Cantilever Mast regulated OHE without return conductor & without earthwire (WP- 75 kgf/ m ² .) (Cat. 65/Cu & Cont. 107/Cu)	ETI/C	0702 (Sh.1)	B
89	Employment Schedule for Cantilever Mast regulated OHE with earth wire but without return conductor (WP- 75 kgf/ m ²) (Caty. 65/Cu & Cont. 107/Cu)	-do-	0702 (Sh.2)	B
90	Employment Schedule for Cantilever Mast regulated OHE with return conductor but without earth wire (WP- 75 kgf/ m ²) (Caty. 65/Cu & Cont. 107/Cu)	-do-	0702 (Sh.3)	B
91	Employment Schedule for Cantilever Mast regulated OHE with return conductor with earth wire (WP- 75 kgf/ m ²) (Caty. 65/Cu & Cont. 107/Cu)	-do-	0702 (Sh.4)	B
92	Employment Schedule for Tramway type regulated OHE RC & EW (WP- 75 kgf/m ²)	-do-	0704	B
93	Employment Schedule for 8"x 8"x35 lbs BFB (9.5 M. long)(WP-112.5 kgf/m ² Caty. 65/Cu & Cont. 07/Cu.	-do-	0708	B
94	Employment Schedule for OHE mast (9.5m) overlap central location with 3.0 m implantation WP-75 kgf/m ² Caty. 65/Cu & Cont. 107/Cu.	-do-	0709	A
95	Employment schedule for OHE mast (9.5M) overlap central with 3.0 M implantation WP- 112.5 kgf/m ² (Caty 65/cu and Cont.107/Cu)	ETI/C	0710	A
96	Employment Schedule for OHE mast (9.5m) overlap inter with 3.0 m implantation. WP-75 kgf/ m ² Caty. 65/Cu & Cont. 107/Cu.	-do-	0711	A
97	Employment schedule for OHE mast (9.5M) overlap inter with 3.0 M implantations. WP- 112.5kgf/m ² Caty.65/Cu and cont.107/Cu	-do-	0712	A
98	Employment Schedule for 9.5 m 200x200x49.9 kg mast WP-75 kgf/m ² (Caty. 65/Cu & Cont. 107/Cu.)	-do-	0713	B
99.	Employment schedule for 9.5 m long 200x200x49.9 kg mast WP-112.5 Kg/ m ² (Caty. 65/Cu and Cont.107/Cu)	-do-	0714	B
100	Employment Schedule for OHE mast (9.5m) WP-75 kgf/ m ² overlap Anchor location with 3.0 m implantation (Copper OHE)	-do-	0715	A
101	Employment schedule for OHE mast (9.5M) WP 112.5 kgf/ m ² overlap anchor location with 3.0 M implantations. (Copper OHE)	-do-	0716	A
102	Employment Schedule for pre-stressed span concrete mast (PC 42) - 9.5 M long conventional OHE, normal location (WP-150),112.5 & 75kgf/m ²)	ETI/C	0725	A

103	STD portals (N,O,P,R,G & Double BFB types)	-do-	0064	-
104	Volume chart and equivalent chart of foundations (Side bearing, Side gravity and W.B.C.)	TI/DRG/CIV/ FND/RDSO	00001/04/0 SH-1	B
105	Volume chart and equivalent chart of foundations (Side bearing, Side gravity and W.B.C.)	TI/CIV/FND/ RDSO	00001/12/0 SH-1	A
106	Volume chart and equivalent chart of foundations (NG type)	TI/DRG/CIV/ FND/RDSO/	00001/04/0 SH-2	B
107	Volume chart and equivalent chart of foundations (NG type)	TI/CIV/FND/ RDSO	00001/12/0 SH-2	A
108	Volume and equivalent chart of foundations for Dry black cotton soil (NBC type) (For 16500 & 11000kgf/ m ²)	TI/DRG/CIV/ FND/RDSO/	00001/04/0 SH-3	B
109	Volume and equivalent chart of foundations for Dry black cotton soil (NBC type) (For 16500 & 11000kgf/ m ²)	TI/CIV/FND/ RDSO	00001/12/0 SH-3	A
110	Volume chart and equivalent chart of New pure gravity foundations (500 mm exposed)	TI/DRG/CIV/ FND/RDSO/	00001/04/0 SH-4	B
111	Volume chart and equivalent chart of New pure gravity foundations (500 mm exposed)	TI/CIV/FND/ RDSO	00001/12/0 SH-4	A
112	Volume and equivalent chart of New foundations for Dry black cotton soil only (8000 kg/m ²)(NBC type) 2.5 M depth	TI/DRG/CIV/ FND/RDSO/	00001/04/0 SH-5	B
113	Volume and equivalent chart of foundations for Dry black cotton soil only (8000 kg/m ²) NBC type 2.5 m depth	TI/CIV/FND/ RDSO	00001/12/0 SH-5	A
114	Volume and equivalent chart of foundations (For 8000 kg/m ² Direct load)	ETI/C	0058 Sh.6	B
115	Special BFB portal for 5 tracks (General arrangement)	-do-	0026 Sh.1	C
116	Protective screen of foot-over bridge and road over-bridge.	-do-	0068	H
117	Chart for portal foundation	-do-	0005/68	
118	Muff for OHE structures	-do-	0007/68	E
119	Structures muff for sand cored foundations	-do-	0012/69	E
120	9.5 m Standard traction mast (fabricated 'K' series)	-do-	0018-2	D
121	Remote Control Cubicle at Stn, Foundation, RCC slab, Building plant & Steel door	-do-	0067	B
122	9.5 m long standard traction mast (fabricated with bottom plates 'B' series)	ETI/C	0071	E
123	Details of OHE foundation in soft rock (Bearing capacity 45,000 Kgf/m ²).	ETI/C	0059	C
123	Details of OHE foundation in Hard rock (Bearing capacity 90,000 Kgf/m ²).	ETI/C	0060	D
124	Details of foundation for fencing upright	-do-	0032	B
125	Employment schedule for switching and booster station main masts	ETI/C	0185	B
126	Drilling schedule for S-1 mast	ETI/C	0030	F
127	Drilling schedule for S-2 mast	-do-	0031	D
128	Drilling schedule for S-3 mast (length 11. 4 m)	-do-	0180	C
129	Drilling schedule for 8" x 6" x 35 lbs. RSJ mast 8.0 m long for booster transformer station Type S-4	-do-	0036	E
130	Drilling schedule for S-5 mast (11.4m long)	-do-	0042	E
131	Drilling schedule for S-6 mast (length 12.4m)	-do-	0181	C
132	Drilling schedule for S-7 mast (length 12.4m)	-do-	0182	C
133	Drilling schedule for S-8 mast (length 12.4m)	-do-	0183	C
134	Drilling schedule for S-9 mast (length 12.4m)	-do-	0184	C

135	General arrangement & details of fencing panels & gate for switching station	-do-	0186 Sh.1	E
136	Details of fencing uprights and anti-climbing device for switching station	-do-	0186 Sh.2	E
137	S-100 fabricated mast for mounting LT supply transformer and drop out fuse switch at switching station	-do-	0043	B
138	S-101 details of mast for supporting Isolator inside switching station	ETI/C	0044	A
139	Details of anchor beam or SP, SSP, & FP	-do-	0033	D
140	Details of small part steel for switching station	ETI/C	0034 Sh.1	K
141	Details of bracing for switching & B.T. masts	ETI/C	0034 Sh.2	B
142	Details of small parts steel of out rigger for switching stations and booster transformer stations	ETI/C	0037	C
143	Details of small parts steel for booster transformer stations	ETI/C	0040	E
144	Details of pre-cast cable trench for switching station	-do-	0038	E
145	Standard 'R' type portal rod laced general arrangement	-do-	0011/69 Sh.1	C
146	'G' type portal special upright and end piece	-do-	0056	C
147	Short bored pile foundation for traction mast (permissible BM & volume)	-do-	0062	B
148	Chart for portal foundations in dry black cotton soil safe bearing capacity 16500 Kg/ M ²	-do-	0063	B
149	Dwarf mast foundation on wet & dry black cotton soil	CORE/ALD/O HE/SK/C	02	-
150	Typical design of new pure gravity foundation.	ETI/SK/C	131	A
151	Typical design of side gravity foundation (Soil pressure=8,000 Kg/ M ²)	-do-	142	A
152	Rock Anchor for B.G. Track. –	ETI/SK/C	208	-
153	Bracket fitting for PSC Mast (cap 4200 Kgm) general arrangement and SPS details	ETI/SK/C	214 Sh.1 of 2	E
154	SPS details for Earth wire clamp on PSC mast	ETI/SK/C	214 Sh. 2 of 2	A
155	Special arrangement of OHE under over line structure	ETI/OHE/SK	529	--
156	Earthing and bonding of PSC mast.	ETI/OHE/SK	537 Sh.1 of 2	D
157	Typical Earthing arrangement in SPUN PSC Mast with 18mm dia rod.	-do-	537 Sh.2 of 2	B
158	Arrangement of overlap	ETI/OHE/SK	566	-
159	Catenary dropper assembly	ETI/OHE/P	1190	B
160	Parallel clamp (20/20)	ETI/OHE/P	1550	E
161	Standard guide tube assembly.	ETI/OHE/P	5060-2	C
161 A	Counter weight assembly for Regulating Equipment (3:1 Ratio)	ETI/OHE/P	5090-5	E
161 B	Trapezoidal weight assembly for Regulating Equipment (3:1 Ratio)	TI/DRG/OHE/ ATD/RDSO/	00004/00/2	-
161 C	Trapezoidal weight assembly	ETI/OHE/P/	5090-1	G
161 D	Counter weight assembly	ETI/OHE/P/	5090	F
162	Standard anti-wind clamp	-do-	2550-1/2	L
163	Multiple cantilever cross arm assembly.	RE/33/P	3120	H
164	Anchor fitting assembly on rolled sections	ETI/OHE/P	3230	C

165	Anchor fitting assembly on 'K' series, TCC masts and 'P' type portal upright.	-do-	3240	D
166	Anchor assembly on 'N' and 'O' type portal upright	-do-	3250	D
167	Structure bonds	-do-	7000	F
168	Earthing station	-do-	7020	B
169	Longitudinal rail bond	-do-	7030	F
170	Short super mast assembly	ETI/C/P	8010	G
171	Long super mast assembly	-do-	8020	C
172	Bracket attachment assembly on portal upright (N,O,R,P,G & BFB Type)	-do-	8030	B
173	Super mast assembly on portals	-do-	8050	C
174	Medium super mast assembly	ETI/OHE/P	8060	C
175	Compensating plate	-do-	5191-1/2	D
176	Suspension clamp	RE/33/P	1160	J
177	Double suspension clamp	-do-	1170	K
178	Double suspension lock plate.	-do-	1172	C
179	Catenary splice (65)	ETI/OHE/P	1090	-
180	Typical location & schematic connection diagram for a three interrupter switching station	ETI/PSI	003	C
181	Typical general arrangement of a three interrupter switching station	-do-	004	F
182	Typical location plan & general arrangement for sectioning & paralleling station	-do-	005	F
183	Typical location plan and general arrangement for a feeding station	-do-	006	E
184	Typical general arrangement at a Booster transformer station (with 4 cross feeder) Type III	-do-	013	B
185	General arrangement of 280 KVA Booster Transformer station Type III (with 4 cross feeder)	-do-	018	A
186	Typical general arrangement at a booster transformer station (without cross feeder) Type-I	ETI/PSI	011	C
187	Typical number plate for Auxiliary Transformer	ETI/PSI/P	7525	-
188	Typical fencing and anti-climbing arrangement at switching stations	ETI/PSI	104	E
189	Typical earthing layout of sub-sectioning and paralleling station	-do-	201	B
190	Typical earthing layout of a sectioning and paralleling station	-do-	202	B
191	Typical earthing layout of a feeding station	-do-	203	B
192	Earthing details for interrupter L.T. supply transformer 25 KV Lightning Arrestors P.T. Type-I (S-100 masts, S-101 mast, fencing upright and main mast)	-do-	204	C
193	Typical earthing layout at a booster transformer stations	-do-	211-1	A
194	Typical cable run layout of a sub-sectioning & paralleling station	-do-	301	C
195	Typical cable run layout of a sectioning and paralleling station	-do-	302	C
196	Typical cable run layout of a feeding station	-do-	303	B
197	Typical earthing layout at a booster transformer station (with 4 cross feeder for Type III,IV and V	ETI/PSI	212	B
198	Typical drawing for a terminal board	-do-	501	C

199	36 mm Aluminum Bus terminal for 25kv Isolator (Rigid type)	ETI/PSI/P	6480	C
200	36 mm Aluminum Bus splices	-do-	6490	B
201	36 mm Aluminum Bus Tee connector	-do-	6500	C
202	36 mm Aluminum Bus Tee terminal	-do-	6510	D
203	36/15 mm Top connector	-do-	6520	B
204	36mm Aluminum flexible bus splice	-do-	6550	B
205	36 mm Aluminum bus splice cum tee connector	-do-	6560	B
206	Typical number plate for interrupter and double pole isolator	-do-	7520	B
207	Typical number plate for potential transformer Type	-do-	7521	B
208	Typical number plate for booster transformer	-do-	7522	B
209	Caution plate 25 KV AC	ETI/OHE/P	7531	C
210	General Caution notice at entrance to railway Station (Hindi & English)	RE/33/P	7551	C
211	Typical details of pressed steel door, window and ventilator	RE/Civil/S	129/ 2001	R2
212	Bolted base connection for portals located in drains	ETI/C	0010	C
213	Details of base plate for mast on drains in station yards	-do-	0002/68	A
214	Height gauge for level crossings (for clear span upto 7.3 mtr) details of structure and foundation	TI/DRG/CIV/ HGAUGE/RD SO	00001/05/0	--
215	Height gauge for level crossings (for clear span above 7.3 mtr up to 12.2 mtr) details of structure and foundation	TI/DRG/CIV/ HGAUGE/RD SO	00002/05/0	--
216	Standard plan details of Height gauge for span 7.3 M to 10.0 M with rail Type	RE/CIVIL/S	146/2008	R3
217	Arrangement for false catenary under over line structure	ETI/OHE/SK	446	--
218	Typical arrangement of OHE with insulated copper catenary under over line structure	ETI/OHE/SK	570	--
218A	Anti-Climbing Arrangement	TI/SK/OHE/AN TIMON/RDSO	00001/08/0	--
218B	Anti-Climbing Arrangement	TI/SK/OHE/AN TIMON/RDSO	00001/09/0	--
218C	GSSW Assembly	TI/DRG/OHE/G SSW	0002/09/0	--
218D	18 mm Lug (Forged) (Compression type)	TI/DRG/OHE/G TBLUG/RDSO	00001/04/0	--

LIST OF STANDARD DRAWINGS FOR TRAMWAY TYPE OHE (REGULATED)

219	Span and stagger chart for Tramway type OHE (Regulated)	ETI/OHE/G	04201	-
220	Drilling schedule of OHE mast 8.5m & 9m ling RSJ and BFB for Tramway OHE (Regulated) respectively.	ETI/OHE/G	04202 Sh.1 Sh.2	C C
221	Schematic arrangement of tramway type OHE (regulated).	-do-	04203	C
222	Arrangement of bracket assembly for Tramway Type OHE (regulated)	-do-	04204	B
223	Arrangement of anti-creep for Tramway Type OHE (Regulated)	ETI/OHE/G	04205	B
224	Arrangement of anticreep (alternative arrangement) for Tramway OHE (Regulated)	-do-	04206	B
225	Arrangement of section Insulator for Tramway Type OHE (Regulated)	-do-	04207 Sh.1	B
226	Small parts steel for supporting section insulator assembly for (regulated Tramway Type OHE)	-do-	04207 Sh.2	B
227	General arrangement of turnouts for Tramway type OHE (Regulated)	ETI/OHE/G	04208	-
228	Adjustment chart for Tramway type OHE (Regulated)	ETI/OHE/G	04209	-
229	Bridle wire clamp (6 mm) with two bolts	ETI/OHE/P	1070-1	B
230	Large suspension clamp 20mm (with Armour rod)	ETI/OHE/P	1580 Sh-2	-
231	Hook Bracket	ETI/OHE/P	2380	C
232	BFB Steady arm assembly for Tramway OHE (Regulated)	ETI/OHE/P	2540-1	-
233	Anti wind clamp for tramway OHE (Regulated)	-do-	2550-3	E
234	Counter weight assembly (light)	ETI/OHE/P	5090-3	I
235	Counter weight assembly	-do-	5090-6	D
236	Employment schedule for tramway type regulated OHE without R.C. and E.W. (W.P.112.5 kgf/sq.m)	ETI/C	0705	B
237	Protective screen at FOB/ROBs	ETI/C	0068	H

STANDARD TYPICAL AND PARTICULAR DRAWINGS FOR TSS AND SHUNT CAPACITOR BANKS

-DELETED-

STANDARD TYPICAL AND PARTICULAR DRAWINGS FOR SCADA WORKS -DELETED-

LIST OF STANDARD DRAWING FOR HIGH RISE OHE -DELETED-

LIST OF STANDARD DRAWING AS PER NEW WIND ZONES -DELETED-

LIST OF STANDARD RDSO's SPECIFICATIONS FOR OHE, TSS AND SCADA

SI.NO.	TITLE OF SPECIFICATION	SPECIFICATION NO
1.	Annealed stranded copper conductor for jumper wire.	ETI/OHE/3(2/94) with A&C slip No.1of (4/95)
2.	Copper busbar	RE/30/OHE/5 (11/60)

3.	Structural Steel tubes.	ETI/OHE/11 (5/89)
4.	Hot dip zinc galvanisation of steel masts (Rolled and Fabricated) tube and fittings used on 25 KV AC OHE.	ETI/OHE/13(4/84) with A&C slip No. 1of (5/86),2 of (4/90) & 3 of (4/90)
5.	Stainless steel wire ropes	TI/SPC/OHE/WR/1060 with A&C slip No 1 of (11/06) & 2 of (05/07)
6.	Solid core porcelain insulators for 25 KV50 Hz single phase overhead lines	TI/SPC/OHE/INS/0070 (04/2007)
7.	25 KV single and double pole isolators.	ETI/OHE/16(1/94) with A&C slip No.1 of (06/2000) & 2 of (3/2004)
8.	Steel fasteners & Stainless-Steel fasteners	TI/SPC/OHE/Fasteners/0120
9.	Aluminum alloy section and tubes	ETI/OHE/21(9/74)
10.	Standard for drawings for Traction Overhead equipment	ETI/OHE/25(3/66)
11.	Light Weight Section Insulators assembly. OR Section Insulator assembly without sectioning insulator.	TI/SPC/OHE/LWTSI/0060 (8/2006) OR ETI/OHE/27(8/84) with A&C slip No.1 of (10/92)
12.	Enameled steel plates	ETI/OHE/33(8/85)
	Retro-reflective Structure Number Plates & Caution/Warning Boards	ETI/OHE/33A(12/97) Rev-8 (11/12)
13.	Galvanised steel wire	ETI/OHE/36(12/73) with A&C Slip No.1 of (5/98)
14.	3 pulley Type Regulating Equipment	TI/SPC/OHE/ATD/0060 (8/2006) with A&C Slip No1 of (10/2006), 2 of (5/2007) & 3 of (01/13)
15.	Fitting for 25 kv 50 Hz AC Overhead equipment.	TI/SPC/OHE/Fitting/0130(10/13) {Old ETI/OHE/49 (9/95) with A&C}
16.	Cadmium copper conductor for overhead Railway Traction	ETI/OHE/50 (6/97) with A&C slip No.1 to 3 (04/09).
17.	Principles of OHE layout plans and sectioning diagrams for 25 KV AC traction.	ETI/OHE/53(6/88) with A&C slip no.1 of (12/88), 2 of (8/89), 3 of (6/90), 4 of (8/92) &5 of (11/2006)
18.	19/2.79mm All Aluminum alloy stranded catenary wire.	ETI/OHE/54(2/85) with A&C slip No. 1 of (11/89) &2 of (10/92)
19.	Bimetallic (Al-cu) strip	ETI/OHE/55(4/90)
20.	Short Neutral Section Assembly (Phase Break)	TI/SPC/OHE/SNS/0000 of (2/2000) with A&C slip No. 1
21.	Code for bonding and earthing for 25 KV, AC single phase, 50 Hz traction system.	ETI/OHE/71(11/90) with A&C slip no. 1 of (8/91) & 2 of (3/93)
22.	Insulated Cadmium copper catenary 19/2.10 mm dia for provision under overline structures in the 25 KV AC Electric Traction.	TI/SPC/OHE/INSCAT/0000 of (4/2000)
23.	Battery charger for 110 V battery, 40 AH.	ETI/PSI/1(6/81)
24.	Lightning arrestor- 7.5 KV	ETI/PSI/3(8/75) with A&C slip No.1of (2/91)
25.	220 KV or 132 KV or 110 KV or 66 KV or 25 kv Potential transformers	TI/SPC/PSI/PTs/0990 with A&C slip No.1 to 5 (01/09)
26.	25 KV Dropout fuse switch & operating pole for use with 10 KVA and 100 kVA 25 kv/ 230 V L.T. Supply transformer.	ETI/PSI/14(1/86) with A&C slip no 1 of (4/87)
27.	25 kv/240 V, 5 kVA,10 kVA, 25 kVA & 50 kVA, 50 Hz single phase oil filled Auxiliary	ETI/PSI/15(8/03)

	Transformers.	
28.	Low maintenance Lead Acid 40AH & 200 AH cells.	RDSO/PE/SPEC/TL/0040-2003(Rev-0) with A&C slip no 1 of (9/2005)
29.	150 KVA, 25 KV, single phase, 50 Hz. Dry type Cast resin Booster Transformers	ETI/PSI/97(6/87) with A&C slip No.1 of (9/88)
30.	100 KVA & 150 KVA, 25 KV, single phase, 50 Hz, oil filled Booster Transformers	ETI/PSI/98(8/92) with A&C slip No.1 of (9/92), 2 of (1/94) & 3 of (6/94)
31(a)	25 KV AC Single Pole, Double Pole mounted, Out Door Vacuum Circuit Breaker (VCB) and Vacuum Interrupter (BM).	TI/SPC/PSI/LVCBIN/0120 (December'2013) Revision-0)
31(b)	220 kV/132 kV/110 kV/100 kV/66 kV Double Pole, Triple Pole, Out Door SF6 Circuit Breakers.	TI/SPC/PSI/HVCB/0120 (June'2014) with A&C slip No.1(March-16)
32	Hard drawn grooved copper Contact wire	ETI/OHE/76(6/97) with A&C slip No.1 of (4/01), 3 of (03/05) , 4 of (12/06), 5 of (7/09), 6 of (5/12) & 7 of (12/13)
33	Metal Oxide Gapless type Lightning Arrestor for use on 25kV side of Rly. traction sub stations & switching stations	TI/SPC/PSI/MOGLA/0100(07/10)
34	Technical Specification for Silicon Composite Insulators for 25 kV A.C. 50 Hz single phase over head traction lines.	TI/SPC/OHE/INSCOM/1070 (01/07) OR TI/SPC/OHE/INSCOM/1071 (04/13)
35	Specification for solid core porcelain cylindrical post insulator for systems with nominal voltage of 66kV, 110kV, 132kV & 220kV.	TI/SPC/OHE/POST/0100(01/2010)
36	25kv/240V L.T. supply Transformer, 100 KVA	ETI/PSI/15 A (7/82) with A&C Slip No.1(9/89)
37	Battery charger for 110V Battery, 200 AH	ETI/PSI/24(6/81)
38	Low tension Distribution panels for Rly. A.C traction sub-stations	ETI/PSI/29 (12/79)With A&C Slip No.1 (2/93)
39	Standard for drawings for power supply Installations.	ETI/PSI/31 (5/76)
40	Low tension distribution panels.	ETI/PSI/63(7/82)
41	Technical specification for control and relay panel for 25kV ac TSS including specification for numerical type protection relays for traction transformer, 25kV shunt capacitor bank and transmission line for 25kV ac TSS on Indian Railways.	TI/SPC/PSI/PROTCT/6071
42	Technical specification for shunt capacitor & series reactor equipment for traction sub-station	TI/SPC/PSI/FC&SR/0100(01/10)
43	Technical specification for 25kV ac, 50 Hz, single phase, oil filled, current transformer with CT ratio of I-1000-500/5A (for general purpose), II-1500-750/5A (for heavy haul	ETI/PSI/90 (6/95) with A&C Slip No.1, 2,3,4,5,6,7 (08/2007) & 8 (April 2009).

	duties) for Railway ac traction sub station.	
44	Technical specification for two zone static relay for distance protection for 25kV ac single phase 50 Hz traction overhead equipment.	ETI/PSI/101 (8/87) with A&C Slip No.1 (09/87)
45	Technical specification for current transformers. I. 220kV. 200-100/5A, II. 132kV. 400-200/5A, III. 110kV. 400-200/5A, IV. 66kV. 800-400/5A for Railway A.C traction substations.	ETI/PSI/117 (7/88) with A&C Slip No.1 (11/88), 2 (3/89), 3 (12/89), 4 (4/90), 5 (6/90), 6 (9/92), 7 (8/05), 8 (08/2007) & 9 (July 2008).
46	Specification for 21.6 MVA single phase, 50 Hz. i) 220/27kV ii) 132/27kV iii) 110/27kV, iv), 66/27kV traction power transformer for Railway A.C traction sub-station.	ETI/PSI/118 (10/93) with A&C Slip No.1 to 9 & A&C slip No.10 (08/12) or latest
47	Code of practice for earthing of power supply installations for 25kV A.C., 50 Hz, single phase traction system.	ETI/PSI/120 (2/91) with A&C Slip No1 (10/93)
48	Technical specification for i) 245 kV, (ii) 145 kV, (iii) 123 kV, (iv) 72.5 kV double pole & triple pole Isolator for Railway traction sub stations.	ETI/PSI/122 (3/89) with A&C Slip No.1(4/90)
49	Specification for Metal Oxide gapless type lightning arrestors (combined) for use on 220/132/110/66 kV side of Railway A.C. traction substation.	ETI/PSI/137 (8/89) with A&C Slip No.1,2,3 (Embodying) A&C slip No. 4(8/94) 5(04/01), 6 (9/05) & 7(07/2007)
50	Technical specification for 220 kV or 132 kV or 110 kV or 66kV or 25 kV potential transformer.	TI/SPC/PSI/PTS/0990with A&C Slip No.1,2,3,4,& 5 (April 09)
51	Delta I type High resistive fault selective Relay for 25 kV AC Single phase 50 Hz traction system.	TI/SPC/PSI/PROTCT/1982(12/2003) with A&C slip No.1(10/13)
52	Panto flashover protection relay for 25 kV A.C. single phase 50 Hz traction system.	TI/SPC/PSI/PROTCT/2983 (09/2001)
53	Technical Specification of SCADA system for 25kV, AC Single phase Traction supply on Indian Railway.	TI/SPC/RCC/SCADA/0130(04/2014)
54	Technical Specification for Galvanised Steel Stranded Wire for Traction Masts	TI/SPC/OHE/GSSW/0090 (10/2009)
55	Technical specification for galvanized steel stranded wire for traction bonds	TI/SPC/OHE/GALSTB/0040(09/04) Rev. 1 (08/05)
56	Setting up Earthing Station at switching posts (SSP & SP) with conventional Earthing.	Special Maintenance Instruction No. TI/SMI/0032 Rev-1
57	Design handout for Overhead equipment for running double stack containers under electrified routes (High Rise OHE) with speed potential of 140 Kmph based on revised wind zone.	TI/DESIGN/OHE/2013/00001 (July'13)

58	OHE span in view of changes in wind zones in country	TI/OHE/GA/2013 DATED 25/30.04.2013
59	Technical guidelines and Standard Instruction for Railway Electrification Works including OHE,TSS, Transmission Line, SCADA , Electrical General Works, signaling Works, Telecom works & Civil Engineering Works.	CORE/RE TENDER/EPC/2014/STANDARD INSTRUCTIONS AND GUIDELINES

LIST OF IS SPECIFICATION

S No.	IS Code No.	Descriptions
1	IS:210-1993	Grey iron castings
2	IS:269-1989	Specification for 33 grade ordinary Portland cement (4 th Rev)
3	IS:282-1982	Dropper Wire
4	IS:306-1983	Tin bronze castings
5	IS:335-1993	New Insulating oil (4 th Rev) Reaffirmed 2000
6	IS:371-1999	Ceiling rose spec.(3 rd Rev)
7	IS: 383-1970	Specification for coarse & fine aggregates from natural sources for concrete
8	IS:398(Pt.I)-1996	All Aluminum conductor
9	IS:398 Pt.II-1996	Al. conductor for overhead transmission purposes
10	IS:398(Part-III) 1976.	Aluminum conductors galvanized steel reinforced
11	IS: 432 Pt.1-1982	Specification for mild steel & medium tensile steel bars and hard drawn steel wires for concrete reinforcement
12	IS: 456-2000	Plain & Reinforced concrete Code of practice (3 rd Rev)
13	IS: 516-1959	Method of tests for strength of concrete
14	IS:617-1994	Aluminum castings
15	IS:694:1990	Al. Jumper wire
16	IS:702-1988	Specification for industrial bitumen (2 nd Rev) reaffirmed 1999
17	IS:731-1971	Porcelain Insulator for overhead power lines with a nominal voltage greater than 1000V
18	IS:732-1989	Code of practice for electrical wiring installation (3 rd Rev)
19	IS:800-1984	Code of practice for general construction in steel (2 nd Rev)
20	IS:808-1989	Dimensions for hot rolled steel beam, column, channel & angle sections
21	IS:816-1969	Welding
22	IS:875 (Part-3) 1987 (Reaffirmed)	Code of practice for design loads (other than earthquakes) for building and structures – Part 3: Wind loads second revision.
23	IS:1293-2005	Plugs & socket outlets of rated voltage upto and including 250V and rated current up to 16 Amp(3 rd Rev)
24	IS:1387-1993	General requirements for the supply of metals and metal products
25	IS: 1489 Pt. I 1991	Specification for Portland-Pozzalana cement Pt .I Fly ash based (3 rd Rev)
26	IS:1554(Part-I) 1988	PVC insulated cables
27	IS:1608-1995	Mechanical testing of metal- tensile testing
28	IS:1731-1971	Dimensions for steel flats for structural & general engineering purpose
29	IS:1777-1978	Industrial Luminaries with metal reflectors (1 st Rev)

30	IS:1786-1985	Specification for high strength deformed steel bars and wires for concrete reinforcement
31	IS:1897-1983	Copper strip for formed fittings
32	IS:2004-1991	Carbon steel forgings for general engineering purpose
33	IS:2062-2011	Steel for general structural purpose
34	IS: 2074-1992	Ready mix Paint, air drying, Red oxide, Zinc chrome
35	IS:2121-1981	Aluminum and steel cored Aluminum conductors for (Part I & II) overhead power lines.
36	IS:2141-2000	Galvanised stay strand
37	IS:2312-1967	Propeller type AC ventilating fans (1 st Rev)
38	IS: 2386 Pt.III-1963	Method of tests for aggregates for concrete Pt. III Specific gravity, density voids, absorption & buckling
39	IS:2673-2002	Dimensions for Aluminum Tubular Busbar.
40	IS:2675-1983	Enclosed distribution fuse boards ad cut-outs for voltage not exceeding 1000V AC & 1200V DC (2 nd Rev)
41	IS:3043-1987	Code of practice for earthing (1 st Rev)
42	IS:3091-1999	Aluminum bronze castings
43	IS:3188-1980	Characteristics of string insulator units
44	IS:3837-1976	Accessories for Rigid steel conduit for electrical wiring
45	IS:3854-1997	Switches for domestic & similar purposes (2nd Rev)
46	IS:4826-1979	Specification for hot dipped for galvanised coatings on round steel wires (1st Rev)
47	IS:5082-1998	Material for Aluminum tubular busbar.
48	IS: 6403-1981	Code of practice for determination bearing capacity of shallow foundations (1st Rev)
49	IS:7098 (Part I) 1988	LT XLPE cables
50	IS:7098 (Part II) 1985	HT XLPE cables
51	IS: 8130-1984	Conductor for Insulated electric cables & flexible cords (1st Rev)
52	IS:9537 Pt-I-1980	Conduits for electrical installations
53	IS:9968(Pt.2)-2002	Annealed Copper Jumper Wire
54	IS:13947 Pt. III 1993	Specification for low voltage switchgear & control gear Pt.-3, disconnectors & fuse combination unit
55	IS:14329-1995	Malleable iron castings