

TENDER DOCUMENT
WESTERN RAILWAY
T E N D E R FORM (First Sheet)

Tender No.: EL-ADI-G-T-15-2026-27

Name of Work: Ahmedabad Division- Electrical work in connection with raising & extension of platform at Radhanpur & Adesar, provision of access control system in the newly constructed control office and DRM office including allied/ancillary works required for shifting of the control office at Ahmedabad, removal of pending deficiencies in divyangjan amenities at HG-3 category stations & at NSG-2 to NSG-6 category stations and provision of ballastless track on PF- 3 (Loop Line No. 4) & PF- 4 (Loop Line No. 5) at Bhildi.

To

The President of India,
Acting through the,
Divisional Railway Manager (Electrical)
Western Railway – Ahmedabad

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 **Divisional Railway Manager (Electrical) Western Railway, Ahmedabad**, at the rates quoted in the attached bill(s) of quantities and hereby bind myself/ourselves to complete the work in all respects within **Twelve 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 the 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 **Rs. 4,71,700/-** 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 Tenderer/s

T E N D E R FORM (Second Sheet)

1. **Instructions to Tenderers and Conditions of Tender:** The following documents form part of Tender / Contract:
 - I. NIT header
 - II. Schedule
 - III. Item break up
 - IV. Eligibility condition
 - V. Compliance
 - VI. Document attached
 - A. SGCC with latest AC's
 - B. Attached Tender Document
 - a. Tender Forms – First Sheet and Second Sheet
 - b. Special conditions/Technical specifications.
 - c. Declaration
 - d. Standard General Conditions of Contract and Standard Specifications (Works and Materials) of Indian Railways as amended/corrected upto latest correction slips, copies of which can be seen in the office of Sr. Divisional Electrical Engineer or obtained from the office of the Chief Electrical Engineer, Western Railway on payment of prescribed charges.
 - e. Standard Schedule of Rates as amended / corrected upto latest correction slips, copies of which can be seen in the office of Sr. Divisional Electrical Engineer or obtained from the office of the Chief Electrical Engineer, Western Railway on payment of prescribed charges.
 - f. All general and detailed drawings pertaining to this work which will be issued by the Engineer or his representatives (from time to time) with all changes and modifications.
2. **Drawings for the Work:** The Drawing for the work can be seen in the office of the Sr. Divisional Electrical Engineer, Western Railway, Ahmedabad and / or Chief Electrical Engineer, Western Railway at any time during the office hours. The drawings are only for the guidance of Tenderer(s). Detailed working drawings (if required) based generally on the drawing mentioned above, will be given by the Engineer or his representative from time to time.
3. The Tenderer(s) shall quote his / their rates as a percentage above or below the Standard Schedule of Rates (SSOR) of Western Railway as applicable to Ahmedabad Division except where he/they are required to quote item rates and must tender for all the items shown in the Schedule (Bills of quantities) of approximate quantities attached. The quantities shown in the attached Schedule (Bills of quantities) are given as a guide and are approximate only and are subject to variation according to the needs of the Railway. The Railway does not guarantee work under each item of the Schedule (Bills of quantities). The tenderer(s) shall quote rates / rebates only at specified place in Tender Form supplied by Railway. Any revision of rates / rebates submitted (quoted) through a separate letter whether enclosed with the bid (Tender Form) or submitted separately or mentioned elsewhere in the document other than specified place shall be summarily ignored and will not be considered.
4. Tenders containing erasures and / or alterations of tender documents are liable to be rejected. Any correction made by tender(s) in his/their entries must be attested by him / them.

5. The works are required to be completed within a period of **Twelve Months** from the date of issue of letter of acceptance of the tender.

6. Bid Security:

- a. Subject to exemptions provided under Para 5(1) (a) of Part-1 (ITT) of SGCC April 2022, the tender must be accompanied by a Bid Security as mentioned in tender documents, failing which the tender shall be summarily rejected.
- b. The Tenderer(s) shall keep the offer open for a minimum period of **60 days** (in case of two packet system of tendering 90 days) from the date of closing of the Tender. It is understood that the tender documents have been issued to the Tenderer(s) and the Tenderer(s), is / are permitted to tender in consideration of the stipulation on his / their part that after submitting his / their tender subject to the period being extended further, if required by mutual agreement from time to time, he will not resile from his offer or modify the terms and conditions thereof in a manner not acceptable to the of Divisional Railway Manager (Elect.) Western Railway Ahmedabad. Should the tenderer fail to observe or comply with the foregoing stipulation, the amount deposited as Bid Security (Earnest Money) for the due performance of the above stipulation, shall be forfeited to the Railway.
- c. If his tender is accepted,
 - (i) the Bid Security mentioned in sub Para(a) above deposited in cash through e-payment gateway 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;
 - (ii) the Bid Security mentioned in sub Para(a) above submitted as Bank guarantee bond will be encashed as part security for the due and faithful fulfillment of the contract in terms of Clause 16 of the Standard General Conditions of Contract.

The Bid Security of other Tenderers shall, save as herein before provided, be returned to them, but the Railway shall not be responsible for any loss or depreciation to the Bid Security that may happen thereto while in their possession, nor be liable to pay interest thereon.

- d. In case Contractor submits the Term Deposit Receipt/Bank Guarantee Bond towards either the Full Security Deposit or the Part Security Deposit equal to or more than Bid Security, the Railway shall return the Bid Security so retained as per sub Para (c) above, to the Contractor.

7. Rights of the Railway to deal with Tender: 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.

8. 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.

9. 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.

10. Eligibility criteria:

10.1 Technical eligibility criteria

- (a) Tenderer has to submit attested copy of valid electrical contractors license as per IE rule 45, which can be in his own name or in the name of his firm. Copy of same to be enclosed with tender document.
- (b) 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 the certificate to be submitted by the bidder is enclosed as **Annexure-V of GCC April-2022 with latest ACS**. In addition to Annexure-V, in case of other than Company/ proprietary firm, Annexure- V(A) shall also be submitted by the 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 are/is qualifying the Qualifying Criteria mentioned in the Tender Document.
- (c) The tenderer must have successfully completed or substantially completed any one of the following categories of work(s) during last 07 (seven) years, ending last day of month previous to the one in which tender is invited:
 - (i) Three similar works each costing not less than the amount equal to 30% of advertised value of the tender, **OR**
 - (ii) Two similar works each costing not less than the amount equal to 40% of advertised value of the tender, **OR**
 - (iii) One similar work costing not less than the amount equal to 60% of advertised value of the tender.
- (d) (1) In case of tenders for composite works (e.g. works involving more than one distinct component, such as Civil Engineering works, S&T works, Electrical works, OHE works etc. and in the case of major bridges – substructure, superstructure etc.), tenderer must have successfully completed any of the following during last 07 (seven) years, ending last day of month previous to the one in which tender is invited:
 - (i) Three similar works each costing not less than the amount equal to 30% of advertised value of each component of tender, **OR**
 - (ii) Two similar works each costing not less than the amount equal to 40% of advertised value of each component of tender, **OR**
 - (iii) One similar work each costing not less than the amount equal to 60% of advertised value of each component of tender.

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

(d) (2) 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.

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

However, if required in tender documents by way of Special Conditions, a formal agreement duly 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 fulfilment of technical eligibility. Such subcontractor must fulfill technical eligibility criteria as follows.

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

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 SGCC, with prior approval of Chief Engineer in writing.

Note for Item 10.1(c) & 10.1(d):

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

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

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

V= Advertised value of the tender in crores of Rupees.

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

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

The tenderers shall submit requisite information as per Annexure-VIB of Indian Railways Standard General Conditions of Contract, GCC - April 2022, along with copies of Audited Balance Sheets duly certified by the Chartered Accountant/ Certificate from Chartered Accountant duly supported by Audited Balance Sheet.

10.3 Bid Capacity: The tender/technical bid will be evaluated based on bid capacity formula detailed as Annexure-VI of Indian Railways Standard General Conditions of Contract, GCC - April 2022.

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

10.5 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 Para 10 of the Tender Form (Second Sheet) including Para 10.1 to 10.5 - Eligibility Criteria:

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

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

5. *If a bidder has successfully completed a work as subcontractor and the work experience certificate has been issued for such work to the subcontractor by a Govt. Organization or public listed company as defined in Note for Item 10.1 Para 10 of the*

Tender Form (Second Sheet), of **GCC April-2022** the same shall be considered for the purpose of fulfillment of credentials.

6. In case a work is considered similar in nature for fulfillment of technical credentials, the overall cost including the PVC amount (if paid) of that completed work or substantially completed work, shall be considered and no separate evaluation for each component of that work shall be made to decide eligibility.
7. In case of newly formed partnership firm, the credentials of individual partners from previous propriety firm(s) or dissolved previous partnership firm(s) or split previous partnership firm(s), shall be considered only to the extent of their share in previous entity on the date of dissolution / split and their share in newly formed partnership firm. For example, a partner A had 30% share in previous entity and his share in present partnership firm is 20%. In the present tender under consideration, the credentials of partner A will be considered to the extent of 0.3×0.2 * value of the work done in the previous entity. For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deed(s), dissolution deed(s) and proof of surrender of PAN No.(s) in case of dissolution of partnership firm(s) etc.
8. In case of existing partnership firm, if any one or more partners quit the partnership firm, the credentials of remaining partnership firm shall be re-worked out i.e., the quitting partner(s) shall take away his credentials to the extent of his share on the date of quitting the partnership firm(e.g. in a partnership firm of partners A, B & C having share 30%, 30% & 40% respectively and credentials of Rs 10 crore; in case partner C quits the firm, the credentials of this partnership firm shall remain as Rs 6 crore). For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deed(s), dissolution deed(s) and proof of surrender of PAN No.(s) in case of dissolution of partnership firm(s) etc.
9. In case of existing partnership firm if any new partner(s) joins the firm without any modification in the name and PAN/TAN no. of the firm, the credentials of partnership firm shall get enhanced to the extent of credentials of newly added partner(s) on the same principles as mentioned in item 6 above. For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deeds, dissolution/splitting deeds and proof of surrender of PAN No.(s) in case of dissolution of partnership firm etc.
10. Any partner in a partnership firm cannot use or claim his credentials in any other firm without leaving the partnership firm i.e., In a partnership firm of A&B partners, A or B partner cannot use credentials of partnership firm of A&B partners in any other partnership firm or propriety firm without leaving partnership firm of A&B partners.
11. In case a partner in a partnership firm is replaced due to succession as per succession law, the proportion of credentials of the previous partner will be passed on to the successor.
12. If the percentage share among partners of a partnership firm is changed, but the partners remain the same, the credentials of the firm before such modification in the share will continue to be considered for the firm as it is without any change in their value. Further, in case a partner of partnership firm retires without taking away any credentials from the firm, the credentials of partnership firm shall remain the same as it is without any change in their value.
13. In a partnership firm "AB" of A&B partners, in case A also works as propriety firm "P" or partner in some other partnership firm "AX", credentials of A in propriety firm "P" or

in other partnership firm "AX" earned after the date of becoming a partner of the firm AB shall not be added in partnership firm AB.

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

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

NOTE:

- i. Similar work shall mean by **"Electrification/Rewiring of Station/Building/Project/Yard etc."**
- ii. Tender committee would satisfy themselves about the authenticity of the certificates produced by the tenderer(s) to this effect which may be an attested certificate from the employer/ client, audited balance sheet duly certified by the chartered accountant etc.
- iii. Tenderer should submit documentary proof in support of fulfilling the eligibility conditions mentioned above along with his tender document. If any or all of the documents required are available in other tender of this office or even otherwise, the same shall not be taken in to consideration and such offer shall be treated as incomplete and summarily rejected. No correspondence in this regard shall be entertained from either side except for seeking additional information on already submitted documents, if any or for verifying the documents itself.

11. Tenderer Credentials:

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

Tenderer(s) who is / are not borne on the approved list of the Contractors of **Western 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) 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. Similarly list of Plant & Machinery available on hand and proposed to be inducted and hired for the tendered work.
- (iv) The Railway reserves the right to verify all statements, information and documents submitted by the bidder in his tender offer, and the bidder shall, when so required by the Railway, make available all such information, evidence and documents as may be necessary for such verification. Any such verification or lack of such verification, by the Railway shall not relieve the bidder of its obligations or liabilities hereunder nor will it affect any rights of the Railway there under.
- (v) (a) In case of any information submitted by tenderer is found to be false, forged or incorrect at any time during process for evaluation of tenders, it shall lead to forfeiture of the tender Bid Security besides banning of business for a period of upto two years.

(b) In case of any information submitted by tenderer is found to be false, forged or incorrect after the award of contract, the contract shall be terminated. Bid Security, Performance Guarantee and Security Deposit available with the railway shall be forfeited. In addition, other dues of the contractor, if any, under this contract shall be forfeited and agency shall be banned for doing business for a period of upto two years.

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

13. **Execution of Contract Documents:** The successful Tenderer(s) shall be required to execute an agreement with the President of India acting through the Senior Divisional Electrical Engineer, Ahmedabad, Western Railway for carrying out the work according to Standard General Conditions of Contract, Special Conditions / Specifications annexed to the tender and Standard Specifications (Works and Materials) of Railway as amended/corrected upto latest correction. slips, mentioned in tender form (First Sheet) of GCC April-2022.

14. 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:

(i) Sole Proprietorship Firm:

(i) All documents in terms of Para 10 (Eligibility criteria) of the Tender Form (Second Sheet) of Indian Railways Standard General Conditions of Contract, **GCC - April 2022.**

(ii) HUF:

- i. A copy of notarized affidavit on Stamp Paper declaring that he who is submitting the tender on behalf of HUF is in the position of 'Karta' of Hindu Undivided Family (HUF) and he has the authority, power and consent given by other members to act on behalf of HUF.
- ii. All other documents in terms of Para 10 (Eligibility criteria) of the Tender Form (Second Sheet) of Indian Railways Standard General Conditions of Contract, **GCC - April 2022.**

(iii) Partnership Firm:

- i. All documents as mentioned in Para 18 of the Tender Form (Second Sheet) of Indian Railways Standard General Conditions of Contract, **GCC - April 2022.**

(iv) Joint Venture (JV): All documents as mentioned in Para 17 of the Tender Form (Second Sheet) of Indian Railways Standard General Conditions of Contract, **GCC - April 2022 with latest amendment.**

(v) 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) All other documents in terms of Para 10 (Eligibility criteria) of the Tender Form (Second Sheet) of Indian Railways Standard General Conditions of Contract, **GCC - April 2022.**

(vi) LLP (Limited Liability Partnership) Firm:

- (i) A copy of LLP Agreement
- (ii) A copy of Certificate of Incorporation
- (iii) A copy of Power of Attorney/Authorisation issued by the LLP in favour of the individual to sign the tender on behalf of the LLP and create liability against the LLP.
- (iv) An undertaking by all partners of the LLP that they are not blacklisted or debarred by Railways or any other Ministry / Department of the Govt. of India from participation in tenders / contracts as on the date of submission of bids, either in their individual capacity or in any firm/LLP or JV in which they were / are partners/members. Concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the Standard General Conditions of Contract.
- (v) All other documents in terms of Para 10 (Eligibility criteria) of the Tender Form (Second Sheet) of Indian Railways Standard General Conditions of Contract, **GCC - April 2022.**

(vii) Registered Society & Registered Trust:

- (i) A copy of Certificate of Registration
- (ii) A copy of Memorandum of Association of Society/Trust Deed
- (iii) A copy of Power of Attorney in favour of the individual to sign the tender documents and create liability against the Society/Trust.
- (iv) A copy of Rules & Regulations of the Society
- (v) All other documents in terms of Para 10 (Eligibility criteria) of the Tender Form (Second Sheet) of Indian Railways Standard General Conditions of Contract, **GCC - April 2022.**

(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 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.

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

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

Note: A Power of Attorney executed and issued overseas, the document will also have to be legalized by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney is being issued. However, the Power of Attorney provided by Bidders from countries that have signed the Hague Legislation Convention 1961 are not required to be legalized by the Indian Embassy if it carries a conforming Apostille certificate.

16. Employment/Partnership etc. of Retired Railway Employees:

(a) Should a tenderer

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

AND

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

THEN

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

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

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

- 17. Participation of Joint Venture (JV) in Works Tender** as mentioned in Clause 17 of the Tender Form (Second Sheet) of Indian Railways Standard General Conditions of Contract, **GCC - April 2022 with latest ACS.**
- 18. Participation of Partnership Firms in works tenders** as mentioned in Clause 18 of the Tender Form (Second Sheet) of Indian Railways Standard General Conditions of Contract, **GCC - April 2022 with latest ACS.**
- 19.** It is responsibility of the tenderer to check any correction or any modifications published subsequently in website and the same shall be taken into account while submitting the tender on website.
- 20.** Each of the page of tender documents and corrigendum (if any) is required to be signed by person/ persons submitting the tender in token of their having acquainted themselves with latest GCC, standard specification as laid down at the time of contract agreement.
- 21.** Tenderer/s are free to download tender document at their own risk and cost, for the purpose of perusal as well as for using the same as tender document for submitting the offer. Master copy of the tender document is available in the office of The Sr.

Divisional Electrical Engineer, Western Railway, Ahmedabad-45. After award of work an agreement will be prepared based on the master copy of tender available in the above-mentioned office. In case, any discrepancy between the tender documents downloaded from the Internet and master copy later shall prevail and will be binding on the tenderer/s no claim on this account will be entertained.

22. If any change/addition/deletion is made by the Tenderer/Contractor and the same is detected at any stage even after the award of the tender, full Bid Security (earnest money deposit) will be forfeited and the contract will be terminated at his/their risk and cost. The tenderer is also liable to be banned from doing business with Railways and/or prosecuted.

23. **Error/omission and discrepancies-** The tenderer shall not take advantage of any error due to typing or otherwise, if there is any doubt, that shall be brought to notice of Sr.DEE/G/ADI without delay and same shall be dealt as per Railway's requirement only and to Railway's advantage only.

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 endeavour 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.

24. Tenderers are requested to submit his offer well within the closing time of tender and Railway will not be responsible for any last minute technical snag whatsoever in submission of bid.

25. Bid Security (Earnest Money):

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

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

Note:

- i. The Bid Security shall be rounded off to the nearest ₹100. This Bid Security shall be applicable for all modes of tendering.
 - ii. Any firm recognized by Department of Industrial Policy and Promotion (DIPP) as 'Startups' shall be exempted from payment of Bid Security detailed above.
 - iii. Labour Cooperative Societies shall submit only 50% of above Bid Security detailed above.
- (b) It shall be understood that the tender documents have been issued to the tenderer and the tenderer is permitted to tender in consideration of stipulation on his part, that after submitting his tender he will not resale from his offer or modify the terms and conditions thereof in a manner not acceptable to the Engineer. Should the tenderer fail to observe or comply with the said stipulation, the aforesaid amount shall be liable to be forfeited to the Railway.
- (c) If his tender is accepted, this Bid Security mentioned in sub Para (a) above will be retained as part security for the due and faithful fulfillment of the contract in terms of

Clause 16 of the Standard General Conditions of Contract. The Bid Security of other Tenderers shall, save as herein before provided, be returned to them, but the Railway shall not be responsible for any loss or depreciation that may happen thereto while in their possession, nor be liable to pay interest thereon.

- (2) The Bid Security shall be deposited either in cash through e-payment gateway or submitted as Bank Guarantee bond from a scheduled commercial bank of India or as mentioned in tender documents. The Bank Guarantee bond shall be as per **Annexure-VIA of GCC April-2022** and shall be valid for a period of **90 days** beyond the bid validity period.

(3) In case, submission of Bid Security in the form of Bank Guarantee, following shall be ensured:

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

- 26.** The bid security (earnest money) for the due performance of the stipulation to keep the offer open till the date specified in the tender will be refunded to the unsuccessful tenderer/ tenderers within a reasonable time, after deducting postal registration charges and other if any Amount. The full earnest money deposited by the successful

tenderer/tenderers, will be retained towards the security deposit for due and faithful fulfillment of the contract, but shall be forfeited if the contractor fails/contractors fail to execute the Agreement bond or to start the work within the time as specified in the letter of offer after notification of the acceptance of his/their tender. The Railway shall not be responsible for any loss or depreciation that may happen to the earnest money while in their possession and not be liable to pay interests there on.

27. Tenderer shall submit documentary proof in support of satisfying eligibility criteria, failing which their offer shall be treated as invalid & summarily rejected.
28. In case whether the power of attorney/partnership deed has not been executed in English the true and authenticate copies of translation of the same by advocate authorized translator of court and licensed petition writers should be supplied by the contractor while tendering for the work.
29. A) If the tenderer/s has/have already submitted the partnership deed, power of attorney or any other documents relating to their firm they will attach a declaration signed by all the partners of firm to the following effect. The partnership deed, power of attorney is already submitted to the Railway Administration vide letter No. _____ dated _____ hold good for this contract also.
- B) The Railway will not be bound by any power of attorney granted by the tenderer or by change in the composition of the firm made subsequent to the execution of the contract. It may however, recognized such powers of attorney and change after obtaining proper legal advice the cost of which will be chargeable to the contractor. This charges payable by the tenderer at the time of submitting the power of attorney for scrutiny legal advise. If the power of attorney is not accepted otherwise than for legal effect the charges will be refunded, if the power of attorney is returned on account of legal defect for correction separate charges as applicable for security of corrected power of attorney will be payable by the tenderer while resubmitting the power of attorney. The same charges will be recoverable for scrutiny of all documents as in file of **EL-ADI-G-T-15-2026-27**. The charges mentioned above are liable to vary and contractor shall be bound to make payment as per latest norms. Power of attorney, partnership deed, joint ventures or any other legal documents shall be subjected for legal vetting in head quarter office unless these are already vetted and no change have been incorporated in them till date of opening of tender. No payment shall be made unless legal vetting is obtained on such documents.
30. **Right of Railway to Deal with Tenders:** The Railway reserves the right of not to invite tenders for any of Railway work or works or to invite open or limited tenders and when tenders are called to accept a tender in whole or in part or reject any tender or all tenders without assigning reasons for any such action. In case if tender is accepted in part by Railway administration, Letter of Acceptance shall be issued as counter offer to the Tenderer, which shall be subject to acceptance by the Tenderer.
31. The successful tenderer/tenderers shall be required to execute an agreement with the president of India acting through Divisional Railway Manager (Elect.) Western Railway Ahmedabad to carry out the work according to the latest Standard General Conditions

of Contract and as per terms & conditions of the tender and technical specifications of the work.

32. **Railway Passes:** No free railway passes shall be issued by the Railway to the Contractor or any of his employee/worker.
33. **Carriage of Materials:** No forwarding orders shall be issued by the Railway for the conveyance of Contractor's materials, tools and plant by train which may be required for use in the works and the Contractor shall pay full freight charges at public tariff rates therefor.
34. The successful tenderer will however have no right or claim in the execution of the work, which is in opinion of the Sr. Divisional (Electrical) Engineer that work should be carried out departmentally or otherwise. The Sr. Divisional (Electrical) Engineer reserves to himself the right at any time after the acceptance of the tender to keep back from the contract and carry work in other ways or by other agency all work or any portion of work he may think fit without assigning any reasons.
35. All loading/ unloading and transportation that may be required shall be done by the contractor at his own cost. No counter offer/ deviation from tender conditions shall be given in the tender. The rates should be inclusive of supervision and all incidental charges. No extra payment on any account would be admissible.
36. Cess and drinking water charges will be recovered from the contractors as per rules in force from time to time.
37. Royalty on materials to be supplied by the contractor for construction work if any (Except those to be supplied by the Railway) will be borne by the contractor.
38. Arrangements for permits or license for materials will not made by the Railway, but assistance will be given whenever possible.
39. All taxes, duties and other Govt. levies etc. shall be liable to be deducted as per rates and rules in force at the time of preparation of bill and contractor shall have no objection in this regard. The rates quoted by tenderer shall be inclusive of all taxes, duties and other Govt. levies etc.
40. The successful tenderer should give no claim certificate at the time of signing the final bill. The payment of the final bill as well as refund of security deposit will not be arranged till such certificate is given.
41. Non compliance with any of the conditions set forth there in above is liable to result in the tender may be rejected.
42. The tender form is not transferable.
43. The tenderer(s) shall inspect the proposed site of work and acquaint himself/themselves with the site conditions, working hours, layout of, land trees and shrubs that he/they will have to cut, type of strata likely to be met within the burrow pits, stacking space for materials, approach roads, path ways available, etc. and all relevant items connected with the execution of the work. No claim shall be entertained for the contractor (s) making his/their own arrangement for approaches/approach road from outside Railway land and contractor (s) will bear entire expenses such as road

taxes, payment for right of way, etc. outsiders and for construction of approaches/approach roads etc.

44. The contractor shall inspect the site fully before quoting of tender. The work shall be done as per site requirements and tender schedule. The contractor shall quote rates after fully satisfying himself about site requirements.
45. All drawings copies of which may be furnished to the contractors by the Railway Administration shall be treated as secret documents and should not be handed over or shown to the persons other than who are directly concerned with the work. The drawings shall be returned to the Engineer-in-charge on completion of the works or termination of the contract.
46. The contractor shall take all steps necessary to ensure that all persons employed to any work in connection with this contract have noticed that the Indian officials secret act 1923 (XIV) of 1923 is applied to them and will continue to apply even after the execution of such work under the contract.
47. Tenderer shall have not tamper/ modify the tender forms in any manner. In case, if the same is found to be tampered/ modified, tender will be summarily rejected and full earnest money will be forfeited and tenderer are liable to the banned from doing business with Railways and/or prosecuted.
48. The tenderer should keep the offer open **for 60 days** (in case of two packet system of tendering 90 days) from the date of closing of the tender.
49. Rates **tendered should be inclusive of all taxes & levies etc. If there is any variation** between the rates quoted in figures and in words the rates quoted in "WORDS" shall be taken as correct. However, If more than one or improper rates are quoted, then such ambiguous offers shall be summarily rejected. Similarly, if a tenderer fails to strike out "below/above/at par" then in such condition the offer shall be treated as below.
50. The completion period of the work will be **Twelve Months**.
51. The tenderer shall submit an analysis of rates if called upon to do so.
52. Railway shall not be responsible for any personal injury or loss to the representative of the firm or any other loss to the firm while they are on the job at Railway premises. The contractor's representative shall observe all the disciplinary and safety codes as applicable to Railway employees at the premises of Railways.
53. The successful contractor should have experience and expertise in undertaking such jobs and he will get the work done by experienced and skilled manpower.
54. The rates are firm & consolidated and inclusive of all taxes, duties, levies including ED, ST on works contract, incidental transport etc.
55. Price variation clause (PVC) shall be applicable only in tender having advertised value above Rs. 2 Crores as per GCC 2022 with latest amendments.
56. The Schedule of Rates & Quantities shall be read together with the GCC in vogue and the terms & conditions incorporated in the tender paper.
57. The unit rate in the rate schedule includes supply, installation, testing, & commissioning including all contingent material like hard ware, bushes, PVC flexible pipe, down rods, chain, clamps, connecting wires etc. if not specified in the rates schedule.
58. All released material, if any, shall have to be handed over to concerned Railway supervisor in-charge of the jurisdiction with deploying manpower as well as own transport of contractor.
59. Any correction is made by the tenderer/tenderers his/their entries must be attested by him/them.
60. During execution of contractual work, the consignee should not issue departmental material (which is contractor supply items) to the contractor keeping Railways interest at top priority.

61. Contract shall be governed by GST act and rules as applicable from time to time.

62. Care in submission of tender.

- (a) (i) Before submitting a tender, the tenderer will be deemed to have satisfied himself by actual inspection of the site and locality of the works, that all conditions liable to be encountered during the execution of the works are taken into account and that the rates he enters in the tender forms are adequate and all inclusive to accord with the provisions in Clause-37 of the Standard General Conditions of Contract for the completion of works to the entire satisfaction of the Engineer.
- (a)(ii) Tenderers will examine the various provisions of The Central Goods and Services Tax Act, 2017(CGST)/ Integrated Goods and Services Tax Act, 2017(IGST)/ Union Territory Goods and Services Tax Act, 2017(UTGST)/ respective state's State Goods and Services Tax Act (SGST) also, as notified by Central/State Govt. & as amended from time to time and applicable taxes before bidding. Tenderers will ensure that full benefit of Input Tax Credit (ITC) likely to be availed by them is duly considered while quoting rates.
- (a)(iii) The successful tenderer who is liable to be registered under CGST/IGST/UTGST/SGST Act shall submit GSTIN along with other details required under CGST/IGST/UTGST/SGST Act to railway immediately after the award of contract, without which no payment shall be released to the Contractor. The Contractor shall be responsible for deposition of applicable GST to the concerned authority.
- (a)(iv) In case the successful tenderer is not liable to be registered under CGST/IGST/UTGST/ SGST Act, the railway shall deduct the applicable GST from his/their bills under reverse charge mechanism (RCM) and deposit the same to the concerned authority.
- (b) When work is tendered for by a firm or company, the tender shall be signed by the individual legally authorized to enter into commitments on their behalf.
- (c) The Railway will not be bound by any power of attorney granted by the tenderer or by changes in the composition of the firm made subsequent to the execution of the contract. It may, however, recognize such power of attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the Contractor.

63. Contractor shall follow the guidelines regarding application of policies/Laws related to "contract labour".

1. Social security covers under ESI Act, PF Act are to be followed.
2. Issue of ID cards.
3. Labour Law Related to
 - I. Minimum Wages Act.
 - II. Payments of Wages Act.
 - III. Apprentice Act.
 - IV. Provisions of contract labour (Regulation and abolition) Act.
 - V. Reporting of accident to labour commissioner.
 - VI. Provision of workmen compensations Act.
 - VII. Railway not to provide quarters to contractors.

- VIII. Compliance of rules for employment of labour.
- IX. Non employment of female labour in cantonment areas.
- X. Non employment of labour below the age of 15.
- XI. Medical fitness of labour is to be followed.

64. Order of Precedence of Documents: In a contract agreement, in case of any difference, contradiction, discrepancy, with regard to conditions of tender/contract, specifications, drawings, Bill(s) of Quantities etc., forming part of the tender/contract, the following shall be the order of precedence:

- (i) Letter of Award/Acceptance(LOA)
- (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) 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.
- (viii) 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.
- (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.

SPECIAL CONDITIONS OF TENDER

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

- a) The Contractor shall comply with the provision of the contract labour (Regulation and Abolition) Act, 1970 and the Contract labour (Regulation and Abolition) Central Rules 1971 as modified from time to time, wherever applicable and shall also indemnify the Railway from and against any claims under the aforesaid Act and the Rules.
- b) The Contractor shall obtain a valid license under the aforesaid Act as modified from time to time before the commencement of the work and continue to have a valid license until the completion of the work. Any failure to fulfill the requirement shall attract the penal provision of the Act.
- c) The Contractor shall pay to the labour employed by him directly or through subcontractors the wages as per provision of the aforesaid Act and the Rules wherever applicable. The Contractor shall not withstanding the provisions of the contract to the contrary, cause to be paid the wages to labour, indirectly engaged on the works including any engaged by subcontractors in connection with the said work, as if the labour had been immediately employed by him.
- d) In respect of all labour directly or indirectly employed in the work for performance of the Contractor's part of the contract, the Contractor shall comply with or cause to be complied with the provisions of the aforesaid Act and Rules wherever applicable.
- e) In every case in which, by virtue of the provisions of the aforesaid Act or the rules, the Railway is obliged to pay any amount of wages to a workman employed by the Contractor or his sub-contractor in execution of the work or to incur any expenditure on account of the contingent, liability of the Railway due to the Contractor's failure to fulfill his statutory obligations under the aforesaid Act or the rules, the Railway will recover from the Contractor, the amount of wages so paid or the amount of expenditure so incurred and without prejudice to the rights of the Railway under the Section 20, Sub-Section (2) and Section 2, Sub-Section (4) of the aforesaid Act, the Railway shall be at liberty to recover such amount or part thereof from Contractor's bills/Security Deposit or any other dues of Contractor with the Government of India. The Railway shall not be bound to contest any claim made against it under Sub-Section (1) of Section 20 and Sub-Section (4) of Section 21 of the aforesaid Act except on the written request of the Contractor and upon his giving to the Railway full security for all costs for which the Railway might become liable in contesting such claim. The decision of the Chief Engineer regarding the amount actually recoverable from the Contractor as stated above shall be final and binding on the Contractor.

2. Inspection:

The Railway's representative/ officers for checking the progress and quality of work could inspect the work site at any time. Any defects as may be noticed by the inspecting officials will have to be rectified by the contractor at his (Contractor's) cost. In case the inspecting officer finds the progress unsatisfactory or the quality of work inferior, he may immediately order the contractor to suspend the work. The defects noticed should be got attended immediately, failing which the defects could be got rectified and the balance work got completed through any other agency at risk and cost of the defaulting contractor.

3. Tools and plants:

The contractor will have to make his own arrangements for tools and plants required for execution of the works.

4. Works completion report:

Work completion report will have to be given by the contractor after the work has been completed in all respects with information as specified in clause and before submitting his final bill.

5. Modification to Contract to be in Writing: In the event of any of the provisions of the contract required to be modified after the contract documents have been signed, the modifications shall be made in writing and signed by the Railway and the Contractor and no work shall proceed under such modifications until this has been done. Any verbal or written arrangement abandoning, modifying, extending, reducing or supplementing the contract or any of the terms thereof shall be deemed conditional and shall not be binding on the Railway unless and until the same is incorporated in a formal instrument and signed by the Railway and the Contractor, and till then the Railway shall have the right to repudiate such arrangements.

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

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

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

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

- a. Quantities operated in excess of 125% but upto 140% of the agreement quantity of the concerned item, shall be paid at 98% of the rate awarded for that item in that particular tender;
- b. Quantities operated in excess of 140% but upto 150% of the agreement quantity of the concerned item shall be paid at 96% of the rate awarded for that item in that particular tender;
- c. Variation in quantities of individual items beyond 150% will be avoided and would be permitted only in exceptional unavoidable circumstances and shall be paid at 96% of the rate awarded for that item in that particular tender.

d. Variation to quantities of Minor Value Item:

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

d.(i) Quantities operated upto and including 100% of the agreement quantity of the concerned minor value item, shall be paid at the rate awarded for that item in that particular tender;

d.(ii) Quantities operated in excess of 100% but upto 200% of the agreement quantity of the concerned minor value item, shall be paid at 98% of the rate awarded for that item in that particular tender;

d.(iii) Variation in quantities of individual minor value item beyond 200% will be avoided and would be permitted only in exceptional unavoidable circumstances and shall be paid at 96% of the rate awarded for that item in that particular tender.

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

(V) As far as Standard Schedule of Rates (SSOR) items are concerned, the variation limit of 25% would apply to the value of SSOR schedule(s) as a whole and not on individual SSOR items. However, in case of Non Standard Schedule of Rates (SSOR) items, the limit of 25% would apply on the individual items irrespective of the manner of quoting the rate (single percentage rate or individual item rate).

(3) Valuation of Variations: The enlargements, extensions, diminution, reduction, alterations or additions referred to in Sub-Clause (2) of this Clause shall in no degree affect the validity of the contract; but shall be performed by the Contractor as provided therein and be subject to the same conditions, stipulations and obligations as if they had been originally and expressively included and provided for in the Specifications and Drawings and the amounts to be paid therefor shall be calculated in accordance with the accepted Bill(s) of Quantities. Any extra item(s)/quantities of work falling outside the purview of the provisions of Sub-Clause (2) above shall be paid for at the rates determined under Clause-39 of **GCC - April 2022**.

7. Guarantee:

a) The contractor shall furnish guarantee for all the material supplied and replaced for 12 months (Except BLDC fan, UPS and LED light fitting) from the date of commissioning and testing for their satisfactory performance and Security Deposit shall be released accordingly.

b) Warranty for BLDC fan is for a period of 24 months from the date of supply for their satisfactory performance and Security Deposit shall be released accordingly.

c) Guarantee for UPS is for a period of 60 months from the date of supply for their satisfactory performance and Security Deposit shall be released accordingly.

d) **Guarantee for LED light:**

➤ **If LED light fitting is not commissioned on account of Railway.**

Guarantee for LED light fitting (including driver etc.) is for a period of 60 months from the date of commissioning or 72 months from the date of supply whichever is earlier for their satisfactory performance and Security Deposit shall be released accordingly.

- **If LED light fitting is not commissioned within 12 months on account of contractor.**

Guarantee for LED light fitting (including driver etc.) is for a period of 60 months from the date of commissioning and Security Deposit shall be released accordingly.

Contractor should give Guarantee period in writing.

The successful tenderer will have to attend the failed equipment/part of work, as soon as they are informed by the Railway's representative, without waiting for availability of stores or labours and without any reservations and disputes. The decision of the Senior Divisional Electrical Engineer Ahmedabad with respect to liability for such rectification and replacement shall be final and binding on the tenderer.

8. General Conditions of Contract:

Contractor shall abide by the Latest Standard General Conditions of Contract with amendment of Railways.

9. Jurisdiction of court:

If any dispute arises between the parties with respect to this agreement, any application or suit shall be instituted only in the court with the local limits of whose jurisdiction, the Western Railway's Divisional Headquarters Office is situated and both the parties shall be bound by this clause.

10. Terms of payment:

- **For items of all Schedule which rates are bifurcated in Supply and Erection.**
- 80% of supply rates will be paid against supply, inspection and acceptance of materials.
 - Remaining 20% of supply rates will be paid after successful installation (erection), testing, commissioning of materials.
 - 100% of installation (erection) charges will be paid after successful installation (erection), testing, commissioning of materials.

Note: If erection of material is not carried out on Railway account, remaining 20% of supply rate will also be paid after completion of work of respective schedule.

- **For items of all Schedule which rates are not bifurcated in Supply and Erection.**
- 80% of rates will be paid against supply, inspection and acceptance of materials.
 - 20% of rates will be paid after successful installation (erection), testing, commissioning of materials.

NOTE:-

- As per the FA & CAO's letter no. HQ/Bks/CPC/Misc.Corresp/Vol II, dated 02/07/2010, Reserve Bank of India will stop the practice of honouring cheques issued by Railways on their outstation accounts with RBI from 31.08.2010.
- All the payments to the contractors, suppliers, etc. are to be made only in Electronic modes (NEFT/RTGS).
- The Contractors who do not have an Account in NEFT/RTGS enabled bank branches may shift their account to NEFT/RTGS enabled bank branches.

(List of such bank branches is available at RBI's website www.rbi.org.in/scripts/neft.aspx).

- Tenderers should provide the details of bank name, branch name and address, Account type, Bank account no. and bank and branch code as appearing in the MICR cheque issued by the bank. The Tenderer should also attach certificate from their bank certifying the correctness of all the above mentioned information.
 - The tenderer for carrying out any construction work in Gujarat must get themselves registered from the Registering Officer under Section – 7 of the Building and Other Construction Workers Act, 1996 and rules made thereto by the Gujarat Govt and submit certificate of Registration issued from The Registering Officer of the Gujarat govt. Labour Deptt. For enactment of this ACT, the tenderer shall required to pay cess@1 % of cost of construction work to be deducted from each bill. Cost of material shall be outside the purview of cess, when supplied under a separate schedule item.
- **Special conditions for 'Letter of Credit' (LC) as Mode of Payment in Works Tenders or Service tenders:**
- i. For all the tenders having advertised cost of Rs 10 lakh or above, the contractor shall have the option to take payment from Railways through a letter of credit (LC) arrangement.
 - ii. This option of taking payment through LC arrangement has to be exercised in IREPS (Indian Railway Electronic Procurement System - the e-application on which tenders are called by Railways) by the tenderer at the time of bidding itself, and the tenderer shall affirm having read over and agreed to the terms and conditions of the LC option.
 - iii. The option so exercised, shall be an integral part of the bidder's offer.
 - iv. The above option of taking payment through LC arrangement, once exercised by tenderer at the time of bidding, shall be final and no change shall be permitted, thereafter, during execution of contract.
 - v. In case tenderer opts for payment through LC, following shall be the procedure to deal release of payment through LC:
 - a) The LC shall be a sight LC.
 - b) The contractor shall select his Advising/Negotiating bank for LC. The incidental cost towards issue of LC and its operation thereof shall be borne by the contractor.
 - c) SBI, New Delhi, Main Branch will be the nodal branch for issue of LCs based on online requests received from Railway Accounts Units. 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 as per latest guidelines, 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 Authorisation (format as Annexure 2) after passing the bill for completed work, to enable contractor to claim the authorized amount from their bank.
- g) The acceptable, agreed upon document for payments to be released under the LC shall be the Document of Authorisation.
- h) The Document of Authorisation shall be issued by Railway Accounts Office against each bill passed by Railways.
- i) On issuance of Document of Authorisation, a copy of Document of Authorisation shall be posted on IREPS for download by the contractor. A digitally signed copy of Document of Authorisation shall also be sent by Railway Accounts Office to Railway's bank (Local SBI Branch).
- j) The contractor shall take print out of the Document of Authorisation available on IREPS and present his claim to his bank (advising Bank) for necessary payments as per LC terms and conditions. The claim shall comprise of copy of Document of Authorisation, Bill of Exchange and Bill.
- k) The payment against LC shall be subject to verification from Railway's Bank (Local SBI Branch).
- l) The contractor's bank (advising bank) shall submit the documents to the Railway's Bank (Local SBI Branch).
- m) The railway's bank (issuing bank) shall, after verifying the claim so received w.r.t. the digitally signed Document of Authorisation received from Railway Accounts Office, release the payment to contractor's bank (advising bank) for crediting the same to contractor's account.
- n) Any number of bills can be dealt within one L.C, 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.

11. Performance Guarantee [PG]:

The procedure for obtaining Performance Guarantee is outlined below:

- (a) The successful bidder shall have to submit a Performance Guarantee (PG) within 21 (Twenty one) days from the date of issue of Letter of Acceptance (LOA). Extension of time for submission of PG beyond 21 (Twenty one) days and upto 60 days from the date of issue of LOA may be given by the Authority who is competent to sign the contract agreement. However, a penal interest of 12% per annum shall be charged for the delay beyond 21 (Twenty one) days, i.e. from 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 to the contractor against that particular contract, subject to maximum of PG amount. In case a tenderer has not submitted Bid Security on the strength of their

registration as a Startup recognized by Department of Industrial Policy and Promotion (DIPP) under Ministry of Commerce and Industry, DIPP shall be informed to this effect.

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

(b) The successful bidder shall submit the Performance Guarantee (PG) amounting to 5% of the original contract value and Additional Performance Guarantee as per New Para 16(4) (h) of Para-II of GCC in any of the following forms

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

Note:

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

- (iv) Government Securities including State Loan Bonds at 5% below the market value;
 - (v) Pay Orders and Demand Drafts tendered by any Scheduled Commercial Bank of India;
 - (vi) Guarantee Bonds executed or Deposits Receipts tendered by any Scheduled Commercial Bank of India;
 - (vii) Deposit in the Post Office Saving Bank;
 - (viii) Deposit in the National Savings Certificates;
 - (ix) Twelve years National Defence Certificates;
 - (x) Ten years Defence Deposits;
 - (xi) National Defence Bonds and
 - (xii) Unit Trust Certificates at 5% below market value or at the face value whichever is less. Also, FDR in favour of **Senior Divisional Finance Manager Western Railway Ahmedabad** (free from any encumbrance) may be accepted.
- (c) The Performance Guarantee shall be submitted by the successful bidder after the Letter of Acceptance (LOA) has been issued, but before signing of the contract agreement. This P.G. shall be initially valid upto the stipulated date of completion plus 60 days beyond that. In case, the time for completion of work gets extended, the Contractor shall get the validity of P.G. extended to cover such extended time for completion of work plus 60 days.
- (d) The value of PG to be submitted by the Contractor is based on original contract value and shall not change due to subsequent variation(s) in the original contract value.
- (e) Performance Guarantee (PG) shall be released after physical completion of the work based on 'Completion Certificate' issued by the competent authority stating that the Contractor has completed the work in all respects satisfactorily.
- (f) Whenever the contract is rescinded, the Performance Guarantee already submitted for the contract shall be encashed.

- (g) The Engineer shall not make a claim under the Performance Guarantee except for amounts to which the President of India is entitled under the contract (not withstanding and/or without prejudice to any other provisions in the contract agreement) in the event of:
- (i) Failure by the Contractor to extend the validity of the Performance Guarantee as described herein above, in which event the Engineer may claim the full amount of the Performance Guarantee.
 - (ii) Failure by the Contractor to pay President of India any amount due, either as agreed by the Contractor or determined under any of the Clauses/Conditions of the Agreement, within 30 days of the service of notice to this effect by Engineer.
 - (iii) The Contract being determined or rescinded under clause 62 of these conditions.
- (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 – 5% (inclusive)	Nil
Below 5%	5%

ANNEXURE-XVII

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 XXXXX hereinafter called the contractor, for the work of XXX" under invitation for bids No XXXX Dated XXXXX, Vide Letter of Acceptance No.....

AND

WHEREAS, the contractor is required to furnish Performance Security for the sum of Rs XXXX. (Rupees XXXX Only), in the form of Surety Bond, being a condition precedent to the signing of the contract agreement.

SB No:

Date:

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. XXXX contactor, 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 authorized representatives of the Surety*], being fully authorized to sign and incur obligations for and on behalf of the Surety, confirm that the Surety, hereby, unconditionally and irrevocably Bond to pay the Railway the full amount in the sum of XXXX (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 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 Contactor.
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 XXXX (*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 totalling 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 XXXX (Rupees XXXX Only).
- b. This Surety Bond shall be valid up to XXXX (*being the date of expiry*);
- c. Unless the bank is served a written claim or demand on or before XXXX [*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.... the day of 20.....

15. The Insurance Surety Bond shall be verified by sending mail to [customer.care@sbigeneral.in].

Place

Bank's Seal and authorized 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.]

12. Security Deposit [SD]:

- 1) 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 fulfilment of the contract by the Contractor. Provided further that, if Contractor submits the Cash or Term Deposit Receipt issued from a

K. R. Ram

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.

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

(a) Final Payment of the Contract as per clause 51.(1) of **GCC April- 2022** and

(b) Execution of Final Supplementary Agreement or Certification by Engineer that Railway has No Claim on Contractor **and**

(c) Maintenance Certificate issued, on expiry of the maintenance period as per clause 50.(1) of **GCC April- 2022**, in case applicable.

2) **(ii) Forfeiture of Security Deposit:** Whenever the contract is rescinded as a whole under clause 62 (1) of **GCC April- 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 April- 2022**, the Security Deposit shall not be forfeited.

3) No interest shall be payable upon the Bid Security and Security Deposit or amounts payable to the Contractor under the Contract, but Government Securities deposited in terms of Sub-Clause 16.(4)(b) of **GCC April- 2022** will be payable with interest accrued thereon.

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

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

- (ii) The Contractor shall at once remove from the works any agents, permitted sub-contractor, supervisor, workman or labourer who shall be objected to by the Engineer and if and whenever required by the Engineer, he shall submit a correct return showing the names of all staff and workmen employed by him.
- (iii) In the event of the Engineer being of the opinion that the Contractor is not employing on the works a sufficient number of staff and workmen as is necessary for proper completion of the works within the time prescribed, the Contractor shall forthwith on receiving intimation to this effect deploy the additional number of staff and labour as specified by the Engineer within seven days of being so required and failure on the part of the Contractor to comply with such instructions will entitle the Railway to rescind the contract under Clause 62 of Standard General condition of Contract.

14. Deployment of Qualified Engineers at Work Sites by the Contractor:

- (a) The Contractor shall also employ qualified Graduate Engineer(s) or equivalent, or qualified Diploma Engineer(s), as prescribed in the tender documents
- (b) In case the Contractor fails to employ the Engineer, as aforesaid in Para (a), he shall be liable to pay liquidated damages at the rates, as prescribed in the tender documents.

15. Employment of Diploma and Degree Holder:

The contractor shall employ the following technical staff during the execution of this work:

- [i] One qualified graduate engineer when the cost of the work to be executed is Rs. 200 lakhs and above, and.
- [ii] One qualified diploma holder when cost of work to be executed is more than Rs.25 lakhs but less than Rs. 200 lakhs. Technical staff should be available at site whenever required by the Engineer in charge to take instruction.
- [iii] In case the contractor fails to employ the qualified engineer, as said above, he, in terms of provisions of GCC clause, shall be liable to pay an amount of Rs. 40,000/- (Rs. Forty - thousand only) and Rs. 25,000/- (Rs. Twenty Five thousand - only) for each month or part thereof for the default period for the provisions, as contained in para [i] and [ii] above respectively.

16. Furnishing Wrong Information:

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.

17. Railway Administration Reserve The Rights:

The Railway Administration reserves the right to change or amend the drawings as and when necessary at any stage of the work. No claim of any kind what so ever will be entertained by the Railway. In case the execution of any item of the work is held up for want of approved design or late supply of such material as are to be arranged by the Railway, then such failure or delay shall in no way effect or vitiate the contractor or alter the character thereof or entitle the contractor for damages or compensation thereof but in any such case, the Railway may grant such extension of the completion date as may be considered reasonable.

18. Railways Not Bound To Accept Any Tender:

- i. The Railways shall not be bound to accept the lowest or any tender or to assign any reason for non-acceptance or rejection of a tender.
- ii. The Railways reserve the right to accept any tender in respect of the whole or any portion of the work specified in the tender papers or to sub-divide the work among different tenderer or to accept any tender for less than the tendered quantities without assigning any reason whatsoever.
- iii. The Railway Administration reserve the right to modify the quantity from time to time whether it is an increase or decrease in the scope and quantity of work. The tenderer shall not be entitled to any compensation but will be paid for as per contract for the actual work done.

19. If, in the opinion of Railway, tenderer has quoted abnormally low bid then written clarification from the bidder would be required clearly including detailed price analyses of its bid price in relation to scope, schedule, allocation of risks and responsibilities and any other requirements of the bids document as demanded by Railways. If, after evaluating the price analysis and other document submitted by the bidder. Railway determines that the bidder has substantially failed to demonstrate its capability to deliver the contract at the offered price may result into rejection of bid.

20. Approval of materials:

The firm has to submit complete technical data **and sample of material to the concerned site supervisor** in prescribed format for material approval. Material directly submitted to Divisional office will not be entertained.

Contractor should have to take approval of material as per following guidelines:

- a. The contractor has to submit list of material and their sample to Railway site supervisor in writing in proper format. The contractor shall arrange demo of sample if Railway calls for.
- b. Material should be as per tender make and specifications. Material which is deviated from tender specification will not be accepted.
- c. The consignee has to give approval after scrutinizing the report of material and **checking of sample of material** submitted by the contractor.
- d. **The contractor should not start work without approval of material in any case.**

21. TRANSPORTATION OF MATERIAL

Transportation of the material up to site has to be arranged by the contractor. Transportation, loading, unloading of the released material from site to the concerned depot are to be arranged by the contractor. "the vehicles and equipments of the contractors can be drafted by the Railway administration in case of accidents/ natural calamity involving human lives"

- a) All the procured material is to be inspected by the concerned depot in charge before placing on existing location and he will put identification mark on material.
- b) In addition to special condition mention in tender documents, all other clauses as per latest GCC shall be applicable for this tender.

22. Mandatory Updation of Labour data on Railway's shramikkalyan portal by Contractor:

- A. Contractor is to abide by the provisions of various labour laws in terms of above clause 54, 55, 55-A and 55-B of the Standard General Conditions of Contract. In

order to ensure the same, an application has been developed and hosted on website 'www.shramikkalyan.indianrailways.gov.in'. Contractor shall register his firm/company etc. and upload requisite details of labour and their payment in this portal. These details shall be available in public domain. The registration/ updation in Portal shall be done as under:

- a) Contractor shall apply for onetime registration of his company/firm etc. in the shramikkalyan portal with requisite details subsequent to issue of letter of Acceptance. Engineer shall approve the contractor's registration on the portal within 7 days of receipts of such request.
- b) Contractor once approved by any engineer, can create password with login ID (PAN No.) for subsequent use of portal for all Letter of Acceptances (LOAs) issued in his favour.
- c) The Contractor once registered on the portal, shall provide details of his letter of Acceptances (LOA/contract Agreements on shramikkalyan portal within 15 days of issue of any LOA for approval of concerned engineer. Engineer shall update (if required and approve the details of LOA filled by contractor within 7 days of receipts of such request.
- d) After approval of LOA by engineer, contractor shall fill the salient details of contract labours engaged in the contract and ensure updating of each wage payment to them on shramikkalyan portal on monthly basis.
- e) It shall be mandatory upon the contractor to ensure correct and prompt uploading of all salient details of engaged contractual labour & payments made thereof after each wage period.

While processing payment of any 'on account bill' or 'Final bill' or release of 'Advances' or 'Performance Guarantee/ Security deposit', contractor shall submit a certificate to the engineer or Engineer's representatives that "I have uploaded the correct details of contract labours engaged in connection with this contract and payments made to them during the wage period in Railway's shramikkalyan portal at 'www.shramikkalyan.indianrailways.gov.in' till _____Month _____year".

TECHNICAL SPECIFICATION

NAME OF WORK: Ahmedabad Division- Electrical work in connection with raising & extension of platform at Radhanpur & Adesar, provision of access control system in the newly constructed control office and DRM office including allied/ancillary works required for shifting of the control office at Ahmedabad, removal of pending deficiencies in divyangjan amenities at HG-3 category stations & at NSG-2 to NSG-6 category stations and provision of ballastless track on PF- 3 (Loop Line No. 4) & PF- 4 (Loop Line No. 5) at Bhildi.

SCOPE OF WORK:

The scope of work includes supply, installation, testing and commissioning of LED light fitting, 3 pin ceiling rose, junction boxes, cable tray with cover, BLDC ceiling fan, 150 liter capacity storage type S.S. body water cooler, emergency light, UPS, HDPE pipe, half round RCC pipe, cable route marker, 25 KVAR APFC panel, octagonal poles, 20 mtr. high mast, 25 X 3 mm GI strip, new welding /pre cooling box, battery charging terminal (EFT 110 volt DC), battery charger rectifier set, Supply of 400 mm sweep wall mounted fan, 300 mm sweep heavy duty exhaust fan, 160A feeder pillar, 8 lockers almirah, steel almirah, office chair, steel table, MCB DP, Digging of cable trench and laying of cable in it and refilling the trench, Dismantling of electrical Rail/tubular poles, wiring of light/fan/plug point, main/sub main, earthing etc.

FLOW CHART OF ACTIVITIES TO BE UNDERTAKEN:

1. As soon as LOA is issued to successful tenderer, he shall submit Performance Guarantee bond as explained in tender and sign the contract agreement.
2. As soon as LOA is issued to successful tenderer, He shall get the samples approved from Sr.DEE/G/ADI or SSE/incharge within one week and for approved samples, he shall immediately place purchase orders on concerned firms.
3. **Within 15 days of issuance of LOA contractor shall submit a Bar chart/planning of activities, mobilisation of material and manpower to be done in order to complete the work in stipulated time.**
4. Contractor shall then execute the work under supervision of railways authorised personnel's within the period of completion.
5. **All T&P item must be supplied by contractor immediately after issue of LOA and payment for the same shall be proposed only in 1st running bill.**

Terms & Conditions [Specific to work]:

- a. The contractor shall carry out the electrical work as per IE Rules & Regulation and specification. Relevant IS specifications wherever applicable shall be followed.
- b. In case of any ambiguity in technical specifications of the work, the matter shall be referred to Sr. DEE/G/ADI and his decision shall be binding on contractor.

- c. The contractor has to supply & provide ancillary materials such as nut, bolt, clamps, brackets etc. required for the work even if they are not mentioned in the tender schedule.
- d. The materials used in the work shall be of the standard make and shall be got approved from Sr.DEE/G/ADI or SSE/incharge before its installation.
- e. The unit rate in the rate schedule includes supply, installation, testing, & commissioning including all contingent material like hard ware, bushes, PVC flexible pipe, down rods, chain, clamps, connecting wires etc. if not specified in the rates schedule.
- f. Electrical works shall be carried out by the contractor in supervision of the railway Engineers and contractor shall inform the railway representative before starting the work. All the hidden work i.e. laying of cables etc. shall be carried out in the presence of railway supervisor / representative.
- g. The released material to be collected and deposited in Rlys supervisor stores by contractor by deploying his own manpower and transport. The released material should be accounted for by Rly's supervisor and contractor with joint note.
- h. Any damage to plaster or any other item of Railway during the course of execution of work shall be made good by the contractor & restoring it to match general décor of the wall/Ceiling etc.
- i. Earth excavation should be carried out very cautiously so that Electrical/Telecommunication/Signaling cable passing through underground enroute the rail periphery do not get damage. If any damaged caused to OFC/Quad cable or Electrical cable during execution of the work, necessary debit shall be raised.

(A) **Technical specification for item No. 01, 24, 32, 34, 37 & 39 of SCHEDULE 'A', item No. 02 & 12 of SCHEDULE 'C', item No. 02 & 12 of SCHEDULE 'D' and item No. 14 & 16 of SCHEDULE 'E' of rates and quantities: [LED Light fittings]**

- **Item No. 01 of SCHEDULE 'A': SITC of 40 Watt weather proof LED Light fittings**
The contractor shall have to do supply, installation, testing and commissioning of 40 watt weather proof LED light fitting IP 65 complete with all accessories as per **WR specification No. WR/CCG/SPECIFICATION/P/001(Rev.01)-2018**. Make and model of fitting should be got approved by Sr.DEE/G/ADI or SSE/incharge before supply.
- **Item No. 24 of SCHEDULE 'A': Supply of 2 feet X 2 feet 36 watt LED panel light fitting**
The contractor shall supply of 2 feet X 2 feet 36 watt LED panel light fitting IP 20 complete with accessories as per **WR specification No. WR/CCG/SPECIFICATION/P/001(Rev.01)-2018**. Make and model of fitting should be got approved by Sr.DEE/G/ADI or SSE/incharge before supply.
- **Item No. 32 of SCHEDULE 'A', Item No. 02 of SCHEDULE 'C', Item No. 02 of SCHEDULE 'D' & Item No. 14 of SCHEDULE 'E': SITC of 20 Watt LED tube light fitting**
The contractor shall have to do supply, installation, testing and commissioning of 20W LED tube light fitting IP 20 complete with tube and all accessories as per **WR specification No. WR/CCG/SPECIFICATION/P/001(Rev.01)-2018**. Make and model of fitting should be got approved by Sr.DEE/G/ADI or SSE/incharge before supply.
- **Item No. 34 of SCHEDULE 'A', item No. 12 of SCHEDULE 'C', item No. 12 of SCHEDULE 'D' and item No. 16 of SCHEDULE 'E' : SITC of 45 Watt LED street light fitting**
The contractor shall have to do supply, installation, testing and commissioning of 45 watt LED street light fitting IP 66 complete with all accessories as per **WR specification No. WR/CCG/SPECIFICATION/P/001(Rev.01)-2018**. Make and model of fitting should be got approved by Sr.DEE/G/ADI or SSE/incharge before supply.
- **Item No. 37 of SCHEDULE 'A': SITC of 240 Watt LED flood light**
The contractor shall have to do supply, installation, testing and commissioning of 240 watt LED flood light IP 66 complete with all associate accessories as per **WR specification No. WR/CCG/SPECIFICATION/P/001(Rev.01)-2018**. Make and model of fitting should be got approved by Sr.DEE/G/ADI or SSE/incharge before supply.
- **Item No. 39 of SCHEDULE 'A': Supply of 70 W LED street light fitting**
The contractor shall supply of 70 W LED street light IP 66 fitting compete with all accessories as per **WR specification No. WR/CCG/SPECIFICATION/P/001(Rev.01)-2018**. Make and model of fitting should be got approved by Sr.DEE/G/ADI or SSE/incharge before supply.

For installation, testing and commissioning of above LED light fittings.

The contractor shall provide the mounting arrangement to fittings as per requirement of Railway with necessary hardware and connection to the fittings shall be made with the 3 core 1.5 Sq. mm FRLS PVC insulated flexible copper wire. The contractor should be got approval from Sr. DEE/G/ADI or SSE/Incharge for fittings and its mounting arrangement also before supply.

1. Scope:

The scope includes design, development, manufacturing, testing and supply of energy efficient luminaire complete with all accessories. LED lamp with suitable current control driver circuit including mounting arrangement for street light, platform light, recessed type and ceiling mounting arrangements etc. The luminaire shall be suitable for rugged service under the operational and environmental conditions.

Each type of luminaire shall be supplied with associated driver circuit and required optics. The applications of Energy Efficient LED based luminaire are as under:

- i) For outdoor: street light, High mast, and platform open area.
- ii) Platform lighting.
- iii) For indoor: offices, service buildings etc.

2. Construction:

- a. All the luminaire shall be finalized based on the performance requirement. The detailed calculation for lux level as per clause 5.8 with uniform distribution including the lux distribution curve /graph/spatial distribution shall be submitted in support of the dimensions selected and variation thereof. Housing shall be made of 1.6mm or more thick sheet steel conforming to IS:513 (Grade O) or aluminum die cast having high conductivity preferably to Grade 5000 or similar to high conductivity heat sink material for outdoor fittings and 1 mm or more thick sheet steel conforming to IS:513 (Grade O) for indoor fittings. Effort shall be made to keep the overall outer dimensions as minimum as possible.

All outdoor light fitting shall be provided with toughened glass of sufficient strength under the LED chamber to protect the LED and LED luminaries.

- b. Suitable number of LED lamps shall be used in the luminaries. LED lamps of NICHIA/CREE/OSRAM/SEOUL/PHILIPS LUMILEDS/LEDNIUM/AVAGO make shall be used for the purpose. The manufacture shall submit the proof of procurement of LEDs from above OEMs at the time of testing.
- c. Suitable reflector/lenses may also be provided to increase the illumination angle.
- d. Supplier will be solely responsible for testing and performance of the luminaries after installation and shall also ensure the specified and uniform illumination and comfort level on the street /platform for outdoor and work desk/floor for indoor lighting.
- e. Design of the thermal management shall be done in such a way that it shall not affect the properties of the diffuser.

2.1 High power and high lumen efficient LEDs suitable for following feature shall be used:

- a. The efficiency of the LED lamps at 110 °C junction temperature shall be more than 80%.
- b. The working life of the lamp at junction temperature of 110 °C for 350 mA current shall be more than 50,000 hours of accumulative operation and shall be suitable for

continuous operation of 24 hours per day. These features shall be supported with datasheet.

- c. Adequate heat sink with proper thermal management shall be provided.
- d. Colour temperature of the proposed white colour LED shall be between 5500K-7000K.
- e. Minimum view angle of the LED shall not be less than 120 degree.
- f. The output of LED shall be more than 100 Lumens per watt at minimum operating current and shall ensure guaranteed operation life of 50,000 burning hours with controlled junction temperature of 110 °C.
- g. Efficiency of driver electronics shall be more than 85%.
- h. Power factor of complete fitting shall be more than 0.95.
- i. The Driver card shall withstand 440V & 1.5 KV \pm 3% surge protection and shall resume normal working when nominal voltage is applied again.
- j. Thermal management shall be in such a way that LED junction temperature shall not go beyond 80 degree centigrade.
- k. Lumen maintenance report as per LM 80 standards for the LEDs used and LM 79 standards for efficacy of fixture shall be submitted along with offer or at the time of prototype test.
- l. The LED luminaire shall be free of glare.
- m. Colour Rendering Index CRI \geq 75.

2.2 Specification for LED Driver:

- a. Input voltage range within 180Vrms to 270Vrms.
- b. Operating input voltage 240Vrms.
- c. No load power consumption \leq 500mW
- d. Maximum output voltage 105V DC \pm 3%.
- e. Output voltage ripple should be within 3%.
- f. Output over voltage protection 125VDC.
- g. Power factor 0.95.
- h. Full load efficiency \geq 85%.
- i. THD \leq 10%.
- j. Hot swapping.
- k. Current waveform should meet EN 61000-3-2
- l. LED driver shall withstand voltage of 440V for 2 hours and restore normal working when normal voltage is applied.
- m. Maximum temperature rise \leq 10 °C @ 55 °C T_{amb} with safety margin of 10 °C.
- n. The driver should comply to CISPR 15 for limits and methods of measurement of radio disturbance characteristics.
- o. The equipment should comply to IEC 61547 for EMC immunity requirements.
- p. The control gear should be complaint to IEC 61347-2-13, IEC 62031 and IEC 62384 as per the requirements.

2.3 The equipment should be complaint to IEC 60598-1, IEC 62031 and IEC/PAS 62612 depending on the type of luminaire.

3. Referred standards:

3.1 For indoor lighting:

IS: 513	Cold -rolled low carbon steel sheets and strips.
IEC 60529	Classification of degree of protections provided by enclosures.
EN 55015, CISPR15	Limits and methods of measurement of radio disturbance characteristic of electrical lighting and similar equipments.
IEC 62031	LED modules for general lighting -safety requirements.
EN 61547	Equipment for general lighting purpose - EMC immunity requirement.
EN 60929	Performance, AC supplied electronics ballast for tubular fluorescent lamps performance.
IEC 60598-2-1	Fixed general purpose luminaries.
IEC 60598-1	Luminaries-General requirement and tests.
IEC 61000-3-2	Electromagnetic compatibility (EMC)-Limits for harmonic currents emission - equipment Input current ≤ 16 Amps per phase.
IEC 60068-2-38	Environmental testing - Test Z –AD: Composite temperature / humidity cyclic test.
IEC 61347-2-13	Lamp control gear: Particular requirements for DC or AC supplied electronic control gear for LED modules.
IS 10322	Specification for the luminaries.
IS 4905	Method for random sampling
LM 79	LED Luminaire photometry measurement.
LM 80	Lumen maintenance
IEC 62384	DC or AC supplied electronic control gear for LED modules performance requirements.
IEC/PAS 62612	Self ballasted LED lamps for general lighting services-performance requirements.

3.2 For outdoor lighting:

IS: 513	Cold -rolled low carbon steel sheets.
IEC 60529	Classification of degree of protections provided by enclosures.
EN 55015	RFI < 30 MHz
EN 55022	RFI > 30 MHz
EN 61000-3-2	Harmonics.
EN 61547	Immunity.
EN 60929	Performance
IEC 60598-2-1	Fixed general purpose luminaries.
IEC 60598-1	General requirement and tests.
IEC 61000-3-2	Limits for harmonic currents emission -THD < 10%.
IEC 60068-2-38	Specification for permitted humidity test
IS 10322	Specification for the luminaries.
IS 4905	Method for random sampling

4. Service condition:

Street light/ indoor light on pipe /recess mounting type light unit complete with luminaries and mounting accessories shall be suitable for street, office complex , railway platforms (covered and open) and residential colonies of Indian railways under the following environmental conditions:

4.1 Environmental conditions:

Maximum ambient air temperature: 55 °C (For outdoor application) &
45 °C (For indoor application)

Minimum ambient air temperature: -5 °C

Maximum relative humidity: 100%

Atmosphere: Extremely dusty and desert weather and desert terrain in certain areas.

The dust contents in air may reach as high value as 1.6 mg/m³

Costal area: The equipment shall be designed to work in coastal area in humid, salt laden and corrosive atmosphere.

4.2 The maximum value of the environmental condition in the costal area will be as follows:

Max. pH value: 8.5

Sulphate: 7 mg/litre

Max. concentration of chlorine: 6 mg/litre.

Max. conductivity: 130 micro sec./cm.

Annual rainfall: Ranging between 1750 to 6250 mm with thunder storm.

Altitudes: Not exceeding 1200m above sea level.

4.3 The supplier shall provide "In the field service support" during guarantee period.

5. Technical requirements:

5.1 The luminaire casing/housing shall be made of 1.6 mm or more thick sheet steel conforming to IS: 513 (Grade O) or aluminium die cast having high conductivity preferably to Grade 5000 or similar to high conductivity heat sink material for outdoor fittings and 1 mm or more thick sheet steel conforming to IS: 513 (Grade O) for indoor fittings.

5.2 The electronic components used shall be as follows:

- a) IC (Integrated Circuit) shall be of industrial grade or above.
- b) Metallic film /Paper/polyester capacitor shall be rated for a maximum temperature of 105°C
- c) The registers shall be preferably made of metal film of adequate rating. The actual loading versus rating shall be 3.
- d) The junction temperature of the switching device such as transistors and MOSFETs etc. shall not exceed 125°C (Allowing thermal margin of 25°C)
- e) The conformal coating used on PCBs should be clear and transparent and should not affect colour code of electronic components or the product code of the company.
- f) The heavy components shall be properly fixed. The solder connection should be with good finish.
- g) The electronic components covered for this equipment shall pass all the tests called for in the specification. The tenderer shall indicate the deviation or compliance otherwise the offer may not be considered for evaluation.
- h) The infrastructure for quality Assurance facilities as called for in the specification shall be available for the manufacturing of this product.

5.3 The connecting wire used inside the luminaire shall be low smoke halogen free, Fire retardant e-beam/PTFE cable and fuse protection shall be provided in input side.

- 5.4**Care shall be taken in the design that there is no water stagnation anywhere. The entire housing shall be dust and water proof having IP 65 protection for outdoor application and IP 20 protection for indoor application as per IEC 60529.
- 5.5**The control gear shall be designed in such a way so that temperature rise of heat sink shall not be more than 10°C with respect to the ambient temperature.
- 5.6**For platform lighting, Luminaire shall be such that the glare from individual LED is restricted and shall not cause inconvenience to the public.
- 5.7**All the material used in the luminaire shall be halogen free and fire retardant conforming to UL94.
- 5.8 Illumination Level:** The fitting shall be so designed that the illumination level shall be evenly distributed and shall be free from glare. Illumination level of different types of luminarie shall be as below:

Sr. No	Type of Luminaries	Vertical distance of fittings from the floor level (Mtrs)	Minimum Illumination level (Lux) at centre	Colour of Illumination street light
Street light				
1	50W	5	25	Daylight white
2	100W	7	25	Daylight white
3	170W	7	25	Daylight white
4	260W	7	25	Daylight white
5	190W	7	25	Daylight white
6	30W	5	25	Daylight white
7	60W	7	25	Daylight white
Platform Light				
8	30W	4	50	Daylight white
9	60W	4	50	Daylight white

Sr. No	Place to be Illuminated	Vertical distance of fittings from the floor level (Mtrs)	Average Illumination level (Lux)	Colour Temp. in °K
Indoor light				
1.	Work areas like cabins and work stations	2.743	250 at 1Mtr above ground level.	5500 to 7000
2	Corridors	2.743	125 on the floor	5500 to 7000

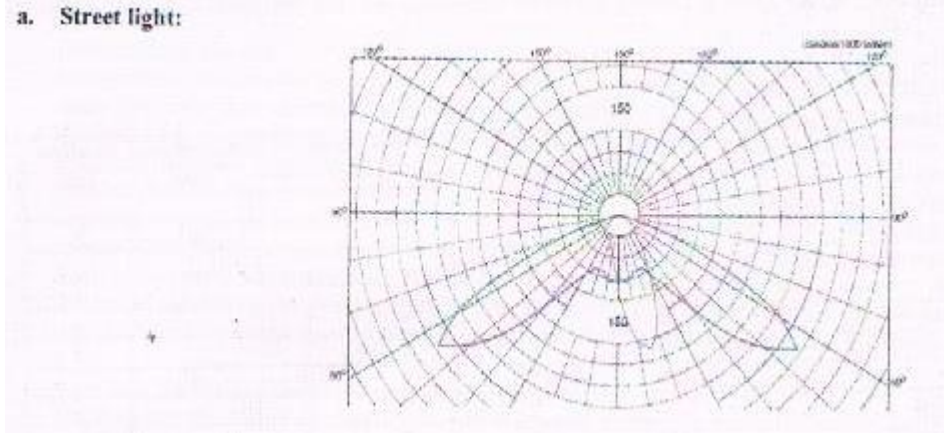
Note:

1. Variation in illumination shall be $\pm 2\%$ is allowed in input voltage range from 180VAC to 250VAC.
- 2.The illumination shall not have infra-red and ultra-violet emission. The test certificate from the NABI approved laboratory shall be submitted.
- 3.Electronic efficiency shall be more than 85%.

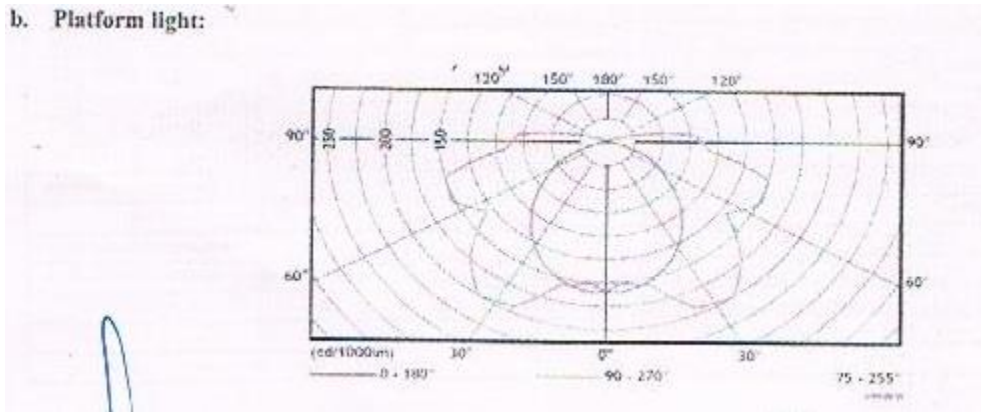
5.8.1 Polar Curves:

The typical distribution of illumination of these luminaries shall be as given below

a. Street light:



b. Platform light:



6. Tests for indoor and outdoor lighting:

Tests are classified as:

- Type test
- Acceptance test
- Routine test

6.1 Type Test:

All the tests mentioned in the specifications should be carried out by NABL accredited lab by the manufacturer and be submitted to the inspecting agency. The inspecting agency should inspect the material based upon the same. However, no test certificate should be more than 3 years old.

6.2 Acceptance Tests:

These tests are carried out by an inspecting authority at the supplier's premises on sample taken from a lot for the purpose of acceptance of a lot. Acceptance tests shall not be carried out from particular size from the lot on which type tests have already been conducted. Recommended sampling plan is given below.

6.2.1 Sample size and criteria for conformity:

The luminaries shall be selected from the lot at random. In order to ensure randomness of selection, Procedures given in IS 4905-1968 (Reaffirmed 2001) may be followed.

6.3 Routine Tests:

These tests shall be performed by the manufacturer on each complete unit of the same type and the results shall be submitted to the inspecting agency. Prior to offering the lot for acceptance test. The firm shall maintain the records with traceability.

6.4 Test Scheme:

Sr. No.	Description of test.	Clause No.	Prototype Test (Only for outdoor)	Type test		Acceptance Test	Routine Test
				Outdoor	Indoor		
1	Visual and dimensional check	7.1	Y	Y	Y	Y	Y
2	Checking of documents of purchase of LED	7.2	Y	Y	Y	Y	Y
3	Resistance to humidity	7.3	Y	Y	Y	---	---
4	Insulation resistance test	7.4	Y	Y	Y	Y	Y
5	HV Test	7.5	Y	Y	Y	Y	Y
6	Over voltage protection	7.6	Y	Y	Y	---	---
7	Surge protection	7.7	Y	Y	Y	---	---
8	Reverse polarity	7.8	Y	Y	Y	Y	Y
9	Temperature. rise test	7.9	Y	Y	Y	---	---
10	Ra (colour Rendering Index) Measurement test	7.10	Y	Y	Y	---	---
11	Lux measurement	7.11	Y	Y	Y	Y	Y
12	Fire retardant test	7.12	Y	Y	Y	---	---
13	Test for IP 20 & IP 65 protection	7.13	Y	Y	Y	---	---
14	Environmental test	7.14	Y	Y	---	---	---
15	Reliability test	7.15	Y	Y	---	---	---
16	Life test	7.16	Y	Y	Y	---	---
17	Endurance test	7.17	Y	Y	---	---	---
18	EMI/EMC (Only for indoor lighting)	---	---	---	Y	---	---

7. Method of testing

7.1 Visual and dimensional check:

The unit shall be checked visually for all dimensions as per approved design and drawing. General workmanship should be good. All the components properly secured and sharp edges shall be rounded off. Check the marking and quality of

K. R. Ram

the workmanship visually. Check the rating and make of electronic/electrical items.

7.2 Checking of documents of purchase of LED:

Check documents of purchase of LED lamps of approved sources Viz. NICHIA/OSRAM/ CREE / SEOUL/ PHILIPS LUMILEDS/ LEDNIUM/ AVAGO.

7.3 Resistance to humidity test:

This is carried out by suspending the painted panels in corrosion chamber maintained at 100% RH and temperature cycle of 42 to 48 deg. C for 7 days and examining it for any sign of deterioration and corrosion of metal surface.

7.4 Insulation resistance test:

The insulation resistance of the unit between earth and current carrying parts shorted together shall not be less than 2 M ohms when measured with 500V megger.

7.5 HV test:

Immediately after insulation resistance test, an AC voltage of 1.72 KV rms (1500+2 x rated voltage) of sine wave form of 50 Hz shall be applied for one minute between the live parts and frame. There shall not be any kind of break down, flash over or tripping of supply.

7.6 Over voltage protection:

The outdoor luminaire shall withstand at 415 V AC for two minutes.

7.7 Surge protection:

It shall withstand a surge of 1.5kV \pm 3% for 50 microsecond's \pm 20% at the input terminals for all types and shall resume normal working when nominal voltage is applied again. (Tests shall comply with Clause 5.4 of latest IEC 60571-1).

7.8 Reverse polarity:

The luminaire shall withstand polarity reversal. It shall be operated with reverse voltage for 5 minutes at maximum value of voltage range. At the end of this period, the supply shall be made correct polarity and luminaire shall operate in a normal way.

7.9 Temperature rise test:

Temperature rise test shall be conducted at 180VAC for outdoor lighting and 100VAC for indoor lighting with full load. The temperature rise shall be recorded by temperature detectors mounted at the specified reference points on the body of semiconductors, capacitors and other components as agreed between purchaser and manufacturer. The maximum recorded temperature under worst conditions shall be corrected to 55°C and compared with maximum permissible temperature (for power devices at junction). Under loading condition as specified above, the corrected temperature of the power devices shall have a safety margin of minimum 10°C. Temperature at junction shall not exceed 100°C when corrected to 55°C. The luminaire shall also be subjected for short time rating after continuous loading to ensure the temperature rise within the permissible limit. The maximum temperature rise of the electronics device on the PCBs shall be in limit for industrial grade components suitable for 85°C environment. In case of

exceeding limit, use of MIL grade components shall be considered keeping RDSO informed.

7.10 Ra(Colour rendering Index) Mesurment test:

The Lumen is the unit of luminous flux, which is equal to the flux emitted in a solid angle of one steradian by a uniform point source of one candela.

The initial reading of the chromaticity co-ordinates x & y shall be within 5 SDCM (Standards Deviation for Colour matching) from the standardized rated value as per Annex. D of IEC 60081-1997.

The initial reading of the general colour rendering index (Ra) shall not be less than the rated value decreased by 3.

The lumen maintenance of the lamp shall not be less than 80% of the initial lumen after 20000 burning hours and 70% of the initial lumen after 50000 hours. The initial lumen will be taken after 100 hours aging.

Photometric test shall be conducted as per Annexure B of IEC 60081-97. The lumen maintenance test shall be done as per Annexure C of IEC 60081-97.

7.11 Lux Measurement:

Lux measurement with the help of lux meter shall be done at a distance at shown in Para 5.8 above. Value obtained shall not be less than the lux specified in the table therein. Considering 10% lumen is absorbed by the reflector.

7.12 Fire retardant test:

Fire retardant test shall be conducted as per IEC 332-I (for outdoor lighting) and IEC 60332-I (for indoor lighting) of the wire used in the fittings.

7.13 Test for IP 65 protection (for outdoor lighting) and **test for IP 20 protection** (for indoor lighting): This test shall be conducted as per IEC 60529.

7.14 Environmental tests:

The luminaire shall meet the following tests as prescribed in IEC 60571.

- a) Dry heat test
- b) Damp heat test
- c) Test in corrosive atmosphere.
- d) Combined dust, humidity and heat test.

7.15 Reliability test:

The reliability can only be determined in actual service. However, the following tests shall be carried out on the prototype to simulate as close as possible, the service conditions. There shall be no failure during this test.

- a) The light unit shall be mounted in an oven maintained at 75°C for outdoor lighting and 45°C for indoor lighting.
- b) The light will be operated at the specified maximum voltage and at 75°C for outdoor lighting and 45°C for indoor lighting for a period of 100 hours.

7.16 Life tests:

For outdoor lighting: The lumen maintenance and life test shall be done as per Annexure C of IEC 60081-97.

For indoor lighting: The lumen maintenance and life test shall be done as per Annexure C of LM80 report of LEDs.

7.17 Endurance test:

The luminaire shall be kept "ON" with input voltage of 250VAC for 200 hours. After this the luminaire is subjected to 20,000 cycles of "ON" & "OFF", each cycle consisting of 3 seconds "ON" and 10 seconds "OFF" period. Luminaire should survive this test. Test is to be continued for one lakh cycles, followed by performance test.

7.18 Safety:

The luminaire shall comply with the safety requirements as per IEC 61195.

7.19 Vibration Test:

The complete unit cubicles together with its mounting arrangements (including shock absorbing device, if provided) shall be subjected to the vibration and shock testing (For category I class A/B) as per latest IEC 61373.

8. Marking: The following information shall be distinctly and indelibly marked on the housing:

- a) Year of manufacture/ Batch number/ Serial number
- b) Name of manufacturer.
- c) Rated watt and voltage.
- d) Input frequency.

9. Manufacturer's certificates:

Manufacturer should submit the certificate of having purchased LED from one of the approved source (LM80 certificate should be submitted).

Manufacturer's test certificate to be submitted for (i) mechanical strength, (ii) Endurance test and Thermal test, (iii) resistance to dust and moisture (iv) Insulation resistance and electrical strength (v) resistance to heat, fire and tracking and (vi) Photometric test as per the IS: 10322 Part-5, Sec. 2.

10. Guarantee:

➤ If LED light fitting is not commissioned on account of Railway.

Guarantee for LED light fitting (including driver etc.) is for a period of 60 months from the date of commissioning or 72 months from the date of supply whichever is earlier for their satisfactory performance and Security Deposit shall be released accordingly.

➤ If LED light fitting is not commissioned within 12 months on account of contractor.

Guarantee for LED light fitting (including driver etc.) is for a period of 60 months from the date of commissioning and Security Deposit shall be released accordingly.

Contractor should give Guarantee period of LED fittings in writing.

(B) Technical specification for item No. 02 of SCHEDULE 'A' of rates and quantities: [SITC of 3 pin ceiling rose]:

The contractor shall have to do supply, installation, testing and commissioning of 3 pin ceiling rose. 3 pin ceiling rose shall be 149A of Leader make or its equivalent of make as per list of approved make given below.

The contractor should submit the copy of challan or bill for the above material supplied from the manufacturer/authorized dealer issued on the name of contractor.

(C) Technical specification for item No. 03 of SCHEDULE 'A' of rates and quantities: [Cable junction box for 4 – 6 Sq. mm cable entry]

The contractor shall supply, installation, testing and commissioning of cable Junction Box with integrated Elastic Membranes/ metric knockouts which can be removed for the 4-6 Sq. mm. cable entry and to fix cable glands.

The junction box shall have wall mounting/pole mounting provision. The terminals used inside the junction boxes shall be mounted on high position to ensure sufficient space for wiring. Every pole shall be suitable for various conductor cross sections and conductor types. Terminals should be able to prevent damage to conductors and should also be able to take flexible conductors without ferrules.

Rated insulation voltage	690 V a.c./d.c
Rated current	40 A
Material	Polypropylene
Width	180 mm.
Height	130 mm.
Depth	77 mm.
Ingress Protection	IP 66

Cable junction box shall be of Sintex, National, Hensel, Schneider, Siemens Make and should be got approved from Sr. DEE/G/ADI or SSE/Incharge before supply.

(D) Technical specification for item No. 04, 05, 06, 25, 27, 28, 29, 30 & 31 of SCHEDULE 'A', item No. 01, 04 & 05 of SCHEDULE 'B', Item No. 01 & 05 of SCHEDULE 'C' and Item No. 01 & 05 of SCHEDULE 'D' of rates and quantities: [Internal wiring]

[i] GENERAL SPECIFICATIONS OF WIRING:

1. The conduit pipe and accessories should be "ISI marked" medium class of white/cream in colour and conforming to IS:9537 Part –III of 1983.
2. The PVC casing capping and accessories should be "ISI marked" medium class of white/cream in colour and conforming to IS:14927 2001.
3. PVC numbering sleeves to be provided to all the wires both ends for identification purpose.
4. There shall be no joints in wires in between mains, point wiring. If joint is required, it shall be permitted only in switchboard, distribution board, junction board and ceiling rose only.
5. The copper wires, which will be used in wiring should be of FRLS PVC insulated, multi-strand, single core 1.1 KV grade and conforming to IS: 694". Specifications and construction details of copper wires are as under:

Area of conductor sq. Mm	Nos. & Dia. Of wire in mm	Nominal Thickness of insulation in mm
1.5 sq. Mm	22/0.30	0.7
2.5 sq. Mm	36/0.30	0.8
4 sq. Mm	56/0.30	0.8
6 sq. Mm	84/0.30	0.8
10 sq. Mm	80/0.40	1.0

All wiring material such as 6 Amp. Piano type designer switch, flush mounted cover plate, 3 points ceiling rose, angular base lamp holder, electronic fan regulator, 6 & 16 Amp. Plug sockets, adopter etc. All the above item should be of single one make from mentioned makes

[ii] LIGHT, FAN AND BELL POINTS:

The contractor shall have to supply the material and carry out the wiring of light and fan points from switch board to load/ ceiling rose point in Casing Capping (minimum size 25 mm. x 12 mm.)/conduit pipe (minimum size 20 mm.) or more size wherever required by using three number copper wires of 1.5 sq. Mm. Multi-strand, single core, FRLS PVC insulated, 1.1 KV grade for phase, neutral and earth continuity in the same conduit/casing capping. The earth wire is used as internal earthing of points for light, fan and 6 A sockets etc.

The point wiring shall included supply, erection, testing & commissioning of PVC switchboard with switches (for light, fan, bell push batten or 2 way for staircase light), angular lamp holders, 3-pin ceiling rose, PVC Jn. Boxes, adopter etc. There shall be sufficient space on switchboard to provide fan regulator and 6 Amp. Sockets.

No. All wiring material such as 6 Amp. Modular switch, flush mounted cover plate, 3 points ceiling rose, angular base lamp holder, electronic fan regulator, 6 & 16 Amp. Plug sockets, adopter etc.. All the above item should be of single one make from mentioned makes. Cat. Nos. of these materials given as under is illustrated example. Make of these material are as per List of Approved Make given below

S N	ITEM	CAT. NO. OF ANCHOR (Penta)
1	6AX 1 way Switch 1M	65001 [(ANCHOR (Penta))]
2	6AX 2 way Switch 1M	65002 [(ANCHOR (Penta))]
3	16AX 1 way Switch 1M	65007[(ANCHOR (Penta))]
4	16AX 2 way Switch 1M	65008 [(ANCHOR (Penta))]
5	16A 2 way Switch 2M	65010 [(ANCHOR (Penta))]
7	6 A 2 in 1 socket with shutter 2M	65222 [(ANCHOR (Penta))]
8.	16A 3 pin socket 2M	65204 [(ANCHOR (Penta))]
9.	6/16A twin socket 2M	65205 [(ANCHOR (Penta))]
10	Dura fan Regulator 2M	65322 [(ANCHOR (Penta))]
11	3-Pin Ceiling Rose	149A of leader
12	Angular Holder	39673 [(ANCHOR (Penta))]
13	6 Amp. Bell push, 1M switch	65003 [(ANCHOR (Penta))]
14	Resettable fuse unit 6A 240V	65508 [(ANCHOR (Penta))]
15	Resettable fuse unit 16A 240V	65509 [(ANCHOR (Penta))]

MAIN / SUB MAIN WITH PVC CONDUIT/Casing Capping:

The wiring for the mains & sub- mains circuit From MDB/SDB to switch board shall be carried out with 2.5/4/6 sq mm., multi-strand, FRLS PVC insulated 1.1 KV grade single core copper wire for phase and neutral and 1.5/2.5/4 sq mm., copper wire for earth accordingly in medium class PVC casing capping (minimum size 25 mm. x 12 mm.)/conduit pipe (minimum size 20 mm.) or more size wherever required.

The rates are covered for supply of materials (copper wires and PVC conduit pipes/Casing Capping) and drawing of mains/ submains by three number copper wires as mentioned in schedule of rates with PVC conduit pipe/Casing Capping and required hardware.

For further clarification regarding wiring, please refer detail specification of wiring.

NOTE:

- [1] One switch board shall be provided in each room however it may increase considering the construction of quarter and each board of above 214mmx 205mmx60mm size should be provided. The modular board (18 module), surface mounted board shall be **code No. 34569 of Anchor** make or equivalent of Anchor/ Roma, Penta, Cona, Leader, Crabtree, Legrand. Dummy switch shall be provided for unused module.
- [2] Distribution board should be properly connected with earth wire.

[III] DETAILED SPECIFICATION FOR WIRING WORKS

- [a] All the materials used should be of good quality, of specified makes and samples of each items should be got approved from Sr. DEE/ADI or SSE/Incharge before starting the work. The completed installation, shall be tested in accordance with the provision of I.E. Rules and code of practice.
- [b] All the cables [main/submain, circuit wires] are to be terminated on 30/5 Amp bakelite/PVC connector or required ways as per site condition.

Mains/ Sub Main: The connection from one main/sub main board to another main/sub main board.

Point wiring: All wiring in a building except that covered by the terms "Mains"/"Sub mains" and also part of the wiring required for the light, fan or plug circuit as case may be will be considered as "point wiring".

Wiring for separate board having. 6 Amps multi pin socket with modular switch: Carry out the wiring up to 3 meter with 2.5 mm Sq. size multistrand FRLS PVC insulated ISI marked copper wire for phase, neutral & one number 1.5 Sq. mm copper wire for earth continuity with PVC pipe from MDB/SDB to this separate board. If as per site condition wiring more than 3 meters is required then the additional length shall be counted as 2.5 Sq. mm mains with pipe.

Wiring for separate board having 2 Nos. 6 Amps multi pin socket with modular switch for each socket: Carry out the wiring up to 3 meter with 2.5 mm Sq. size multistrand FRLS PVC insulated ISI marked copper wire for phase, neutral & one number 1.5 Sq. mm copper wire for earth continuity with PVC pipe from MDB/SDB to this separate board. If as per site condition wiring more than 3 meters is required then the additional length shall be counted as 2.5 Sq. mm mains with pipe.

Wiring for separate board having 4 Nos. 6 Amps multi pin socket with modular switch for each socket: Carry out the wiring up to 3 meter with 2.5 mm Sq. size multistrand FRLS PVC insulated ISI marked copper wire for phase, neutral & one number 1.5 Sq. mm copper wire for earth continuity with PVC pipe from MDB/SDB to this separate board. If as per site condition wiring more than 3 meters is required then the additional length shall be counted as 2.5 Sq. mm mains with pipe.

Wiring for separate board having 16 Amp multi pin Modular socket and switch: Carry out the wiring up to 3 meter with 4 mm Sq. size multistrand FRLS PVC insulated ISI marked copper wire for phase, neutral & one number 2.5 Sq. mm copper wire for earth continuity with PVC pipe from MDB/SDB to this separate board. If as per site condition wiring more than 3 meters is required then the additional length shall be counted as 4 Sq. mm mains with pipe.

The internal wiring of above said separate board is to be done by 4 Sq. mm. PVC flexible wire.

1.0 System of internal wiring:

The wiring shall be done in accordance with the Indian Electricity act 1910 and Rules 1956 as amended up to date and Rules made there under and IS 732 (Pt.-I) and 732 (Pt.-II) (looping back system of wiring design and constructions).

The wiring should be carried out by single core multi stranded FRLS PVC insulated copper wires of size 1.5 Sq. mm, 2.5 sq mm, 4 sq. mm. and 6 sq. mm. as mentioned in schedule of rates which shall be laid in ISI marked PVC Conduit pipe/Casing Capping clipped suitably on rawl plug at a minimum distance of 18" apart on the wall/Ceiling. The PVC Conduit pipe/Casing Capping shall be fixed to walls by using Rawl plugs not more than 450mm (18") apart. Suitable clamps shall be provided where Conduit pipe/Casing Capping runs on rail/angle/pipe structure.

- 1.1 Switches for domestic and similar purpose should be of 6/16 Amps. Capacity suitable for 230 V .A.C. supply.
- 1.2 FRLS PVC insulated wires for voltage up to 1100 volts. A.C. with copper multi stranded conductors to be used.
- 1.3 The contractor shall have to maintain the standard colour code for circuit such as phase- red, neutral-Black, earth- green.
- 1.4 Connection to tube light fitting & ceiling fans shall be done with 3- core flexible copper cable of proper size.
- 1.5 All boards should be fixed with drill, insertion of rawl plug, then board shall be fixed with MS screw 75mm (approx.) long.
- 1.6 Off sizes PVC boards should be got approved from Sr. DEE/G/ADI or SSE/incharge.
- 1.7 The work of providing light points / fan points/ plug points includes the provision of PVC board, switches, angular holder/ batten holder, ceiling

rose, socket etc. as per the requirement. Space should be kept on the board for fixing electronic type fan regulator.

- 1.8. All the PVC boards should be of adequate depth to accommodate extra wires and earthing wires. All the wires inside the board should be tied with link clips and terminated in trip connector of adequate capacity and ways.
- 1.9 The dimension of the PVC boards for various accessories should be as follows:-
- 1.10 Passing through floors and walls: Conductors passing through the walls are to be carried in PVC pipe of the suitable size for wiring. Care should be taken that the cables pass through in straight line without twist or cross in wires, on either end of such holes in the walls.
- 1.11 There shall be no joint in wires in boards. However if required same should be through connectors of suitable capacity.
2. **Switches:** All the switches shall be placed in the live or phase conductors of the circuit. All the switch shall be single pole switch of modular type with cover plate and shall be "ON" when the knob is down and of type quick make and break. Marking for lights, fans may be done on switches.
3. **Cables:** All cables of not less than 1100 volts grade shall be used for wiring. All conductor shall be of stranded copper and no conductor (except where flexible is used) shall have a cross section area of less than 1.5 mm Sq. all stranded conductor should be provided with cable socket and lug for connections, joints and termination.
- 4 Earth continuity shall be provided with FRLS PVC insulated, multi strand, copper wire of 1.5 sq. mm. for wiring of light/fan points and 2.5 sq. mm. for main/ sub-main or as per mentioned in item wise specifications, and it shall run along with wiring in PVC Conduit pipe/Casing Capping and no tapping in between or twisting will be permitted. All metallic parts shall be suitably earthed. All plug sockets, regulators and fans should be connected with earth continuity wire such that the resistance at the remotest point do not exceed 1 ohm. The earth resistance value of all earthings will be displayed along with the date on which earth resistance tested. Earth resistance should be measured and tested jointly.
- 5.0 **Wattages:** Unless otherwise specified in the schedule, the following wattages for calculating the load may be taken:-
 - (i) For each light point (incandescent) : 60 watts.
 - (ii) For each fan point : 100 watts.
 - (iii) For each plug point : 100 watts.
- 5.1 The circuit loading shall conform to the following:
 - (i) Maximum number of points on any circuit: 7 Nos.
 - (ii) Maximum load of any sub circuit : 750 watts.

6. Mounting height from floor level shall be generally:-
- | | | |
|-------|---------------------------|------------|
| (i) | Light fittings | : 2740 mm |
| (ii) | Switches and plug sockets | : 1525 mm. |
| (iii) | Fans | : 2900 mm. |
7. **General:**
Before starting the work Samples of each materials, fittings, appliances etc. shall be got approved by the Sr. DEE or SSE/incharge. Also installation carried out shall conform to IS: 732 (Pt. II) 1983 as amended latest COP for electrical wiring and fittings in building. Special care shall be taken to give superlative look/get up and the quality of work by adopting standard wiring practice, layout etc., installations shall be carried out in conformity with the requirement of I.E. Act 1910, I.E. Rules 1956, as amended up to date.
- 7.1. All wiring shall be as near the ceiling as possible and due consideration shall be given for neatness and good appearance.
- 7.2 No bare or twisted joint shall be made at intermediate points in the through run of cables unless the length of a final sub-circuit, sub-main is more than the length of the standard coil as given by manufacturer of the cable. If any jointing becomes unavoidable, such joints shall be made through proper junction boxes open to easy inspection. No joints of wires inside Board shall be allowed, if necessary, wires should be connected through connectors.
- 7.3 Looping in system of wiring shall be adopted.
- 7.4 The wiring though out the circuit should be such that there is no break in the neutral wire in the form of switch. The neutral should be distinctly marked.
- 7.5 In every case when switches and fuses are fitted on the same poles these fuse should be so arranged that fuses are not alive when their respective switches are in the off position.
- 7.6 The wiring of all fans should terminate into three point ceiling rose.
- 7.7 Switches controlling the sockets should be on the live side of the line. All sockets outlet should be of 3 pin type with third terminal/pin connected to earth and following E.L.N. in clock wise as per ISS.
- 7.8 The wiring shall be carried out strictly as per code of practice for electrical wiring installations for system voltage of 650 V, (Revised) as per IS 732 (Pt. II) 1983 as amend latest.
- 7.9 Contractor should employ only qualified staff to supervise and carry out the wiring installation. The supervisor should have first class Electrical Supervisor's certificate and wireman, II class wireman certificate issued by the State Government Names of supervisor's employed should be furnished to the Sr. Divisional Electrical Engineer Ahmedabad. Any changes in the staff should also be similarly advised.
8. Measurements: Where wiring between two points is payable in terms of lengths involved, the length will be measured from center of the switch, meter, socket or other equipments at one end to the center of the switch, meter socket or other equipment at the other end and payment will be made treating this length as the length of wiring. The measurement will be made along the run of the wiring and rounded to nearest meter.

In case of point in which a single controlling switch (for example Bell Switch) is mounted separately from a main or sub-main board the wiring between the feeding board and the controlling switch also should be included while determining the category of the point.

9. Testing: All tests such as Earth resistance test, earth continuity test, insulation resistance test will be carried out as per IS 732 (Pt. III) 1983 as amended latest and I.E. Act and Rules in presence of Railway's representative. Certificate be signed jointly. Test results of the wiring done to be submitted quarter wise and service building wise to Sr. DEE/G/ADI.
10. Special Clause :
 - i. Wiring shall include "Main" and "sub-main" to be drawn from the respective main, sub distribution boards and switch board located at convenient centres duly approved.
 - ii. All phase and neutral wires shall be looped back only at switches and ceiling roses, where ever necessary and the looping shall be limited to only two wires at each terminal. If more than two wires are required to be looped the same shall be done by suitable mechanical connectors. Size of looping wire shall be equal or lower than main wire.
 - iii. Any masonry work involved will be done by the contractor and all surface properly done after the work and given white washing.
 - iv. The work of wiring should be completed within the time limit specified in the tender schedule. Any deviation from above condition contractor should not be allowed to carry out work, unless taken prior approval from administration.

Supply and laying P.V.C. conduit pipe in wall & ceiling in open manner

The contractor shall supply and provide medium class rigid P.V.C. conduit pipe of white colour in open manner of various sizes as per mentioned in schedule of rates. The pipe should be laid on the wall and ceiling of building. The P.V.C. conduit pipe should be of ISI marked of makes as per List of Approved Make given below with all accessories such as various sizes Tee joints, bends, elbow and coupler etc. for open wiring. The P.V.C. conduit pipe should be conforming to IS-9537 part-III (as amended latest).

The rates are inclusive of providing pipes, fixing with 2 mm thick saddles of suitable size to be fixed on wall with roul plug through 25 mm long 8 SWG screw. Distance between the saddles should not the more than 40 cm. Saddle to be fixed in both the end, where junction box/tee joint/elbow are provided.

Contractor shall have to supply materials as per List of Approved Make given below.

**(E) Technical specification for item no. 07 of SCHEDULE 'A' of rates and quantities:
[GI cable tray 100 mm x150 mm]**

The contractor shall supply, installation, testing and commissioning of 14 SWG 150 mm width, 100 mm depth GI hot dip perforated cable tray with cover, required accessories & hardware for fixing, installation and mounting of tray. The contractor should be got approved by Sr. DEE/G/ADI or SSE/incharge for cable tray and its mounting arrangement also before supply.

Make and model of cable tray is to be got approved before supply.

**(F) Technical specification for item No. 08 of SCHEDULE 'A' of rates and quantities:
[Distribution Board]**

1. Distribution Board (DB) shall be pre-wired in sheet steel enclosure, with DIN channel, neutral bus-bar. The box and cover shall be properly pretreated, phosphatized with powder coated finish and surface mounted type.
2. Detachable plate with Knock out holes shall be provided at the top/bottom of board. Complete board shall be factory fabricated and pre-wired in factory ready for installation at site.
3. The DB shall be cubicle type, wall mounted dust and vermin proof suitable for 3 phase, 4-wire, 415V, 50Hz AC supply system.
4. The sheet steel enclosure / angle / channel used in the fabrication of distribution board shall be provided with double coating of red oxide and final coating of light grey powder coated paint.
5. Minimum two earth terminals shall be provided in the DB. All sheet steel section shall be electrically connected with earth.
6. DB shall be mounted on wall/ pillar.
7. The breaking capacity of MCBs should not be less than 10KA & 'C' curve.

The DB/panel shall be comprised with following switchgears:

Incoming circuit:

- 1 No. 63 Amp. MCB FP, 'C' curve.

Outgoing circuit:

- **4 Nos. 16 Amp. 30 mA. sensitivity RCBO DP.** RCBO shall be of LK (FORMERLY L&T) cat. No. **AUF3C201603** or legrand cat. No. **4113 24** or its equivalent of make as per List of Approved Make given below.

Note: Technical specification of above MCBs is given in Annexure II given below.

Contractor shall have to supply materials as per List of Approved Make given below & got approved by Sr. DEE/G/ADI or SSE/incharge before supply.

(G) Technical specification for item no. 09 & 10 of SCHEDULE 'A', item no. 03 & 04 of SCHEDULE 'C', item no. 03 & 04 of SCHEDULE 'D' and item no. 17 & 18 of SCHEDULE 'E' of rates and quantities: [Supply of 1200 mm BLDC fan with FTC of fan and SFTC of regulator]

- **For item no. 09 of SCHEDULE 'A', item no. 03 of SCHEDULE 'C', item no. 03 of SCHEDULE 'D' and item no. 17 of SCHEDULE 'E': Supply of BLDC fan**

Contractor shall have to do supply of Brushless DC (BLDC) Motor ceiling fan, ISI marked, sweep size: 1200 mm., BEE rating: 5 star or above rated power: Up to 30W, Minimum Air delivery: 210 Cubic Meter/Min, Total harmonic distortion: 10% (Max), Rated Voltage: 230V, 50 Hz, Single Phase AC, Copper winding, Power Factor: Not less than 0.9, Nos. of blades: 03 Nos, Blade material: Aluminium, Bearing: Double ball bearings, Shank and shackle kit, canopy: 2 Nos., Colour standard: White, Service Value: 7, Class of insulation: B, Insulation resistance: > 2 Mega ohms, Temperature rise: 75 degree C, Warranty: Minimum 2 Years from the date of supply & all remaining accessories including Safety pin, Nut, Bolts, washers, earthing etc.

BLDC fan conforming to:

- 1) IS 374/2019.
- 2) The firm has to submit type test report from Government accredited test labs like NABL/CPRI etc.
- 3) Routine test certificate has to be submitted along with supply.

➤ **For item no. 10 of SCHEDULE 'A', item no. 04 of SCHEDULE 'C', item no. 04 of SCHEDULE 'D' and item no. 18 of SCHEDULE 'E': FTC of fan with SFTC of regulator:**

The contractor shall have to do fixing, testing and commissioning of ceiling fan. The contractor shall provide the mounting arrangement to fans with all necessary hardware such as hooks, clamp, nut-bolts, washer and powder coated MS down rods of minimum thickness 1.5 mm and suitable length as per requirement at site to be maintained. The fan shall be connected through 1.0 Sq. mm 3 core flexible copper cable from the existing ceiling rose. The required standard and suitable hardware shall be arranged by contractor.

Contractor shall have to do supply, fixing, testing and commissioning of electronics step fan regulator. The fan regulator shall be of Anchor Roma model No. **20507** or its equivalent of make as per list of approved make given below. Fan regulator should be suitable for operation on 230V 50 C/S A.C. supply.

The contractor should submit the copy of challan or bill for fan and electronic fan regulator from the manufacturer/authorized dealer issued on the name of contractor.

Note:-The make & model of above item shall be submitted by the contractor & got approved by Sr.DEE/G/ADI or SSE/incharge before supply.

(H) Technical specification for item No. 11 of SCHEDULE 'A' of rates and quantities: [SITC of new stainless steel body 150 Ltr. water Cooler]

The contractor shall have to do supply, installation, testing and commissioning of new drinking water cooler with (Non CFC refrigerant) energy efficient compressor and associate accessories (like flexible pipe for Inlet /outlet water etc.) suitable for operation on 230 V, 50 Hz, A.C. supply and as per specification given below.

Type	Storage
Cooling Capacity	150 Liters/hour
Storage Capacity	150 Liters
Maximum Energy Consumption	1550 Watt for 150 Liters/hour Cooling Capacity
Power Factor	0.85
Water tank sheet material and thickness	Stainless Steel (Grade AISI 304), thickness ≥ 0.8 mm.
Water tank cover and lid bottom sheet material.	Eppoxy Painted Galvanized iron sheet/Al. sheet
Water tank cover and lid bottom sheet thickness.	1.5 millimeter
Cooler cabinet sheet material	Stainless steel (Grade AISI 304)
Cooler cabinet sheet thickness	0.8 millimeter
Refrigerant	Eco-Friendly (Non CFC Refrigerant)
Confirming to Indian Standards	IS: 1475 latest
ISI marked	Yes

Water cooler shall be of Usha, Blue Star, Sidwal, Fedder Llyod, Sunrise, Godrej, Voltas, Hitachi, O'Genaral make and got approval from Sr.DEE/G/ADI or SSE/incharge before supply.

**(I) Technical specification for Item No. 12 of SCHEDULE 'A' of rates and quantities:
[Emergency Light]**

Contractor shall supply of LED emergency light having specification given as under:

Rated power of LED	7 Watt
Emergency illumination time	120 minute
Body material	ABS
Type of Battery	NiCad
Mounting of fixture	Wall mounted

LED Emergency light shall be of Philips, CG, Bajaj, Wipro, GE, HPL, Havells, Orewa, Shakti, Triveni, Osaram, Crompton, Jaquar, Polycab, Hansagreen, Surya, Wattera makes as approved by Sr.DEE/G/ADI or SSE/incharge.

**(J) Technical specification for item No. 13 of SCHEDULE 'A' of rates and quantities:
[2 KVA UPS]**

The contractor shall supply of **2 KVA**, ON Line, single phase input and single phase output UPS suitable for 120-minute battery backup with maintenance free battery set.

Technical specification of UPS is given as under.

1.	Capacity and rating	2 KVA, 1 Phase, 50Hz, 160-260V
2.	PF	Min. 0.9 at full load.
3.	Load PF	0.65 to unity.
4.	Overall efficiency	90% at rated load
5.	Overload Capacity	Deliver a minimum overload of 125% for 10 Minutes and 150% for 30 Sec.
6.	Operating temperature	0-40°C
7.	Total harmonic distortion	Max 3% for linear load & 5% for Nonlinear load
8.	Crest factor	3:1
9.	Noise Level	Max. 55 db
10.	Battery	SMF type
11.	Battery Make	HLB, Amar Raja, Exide, CSB, Hitachi, Okaya, Panasonic, Yuasa.
12.	UPS Make	Hirel, ProtekG, APC, Eaton, Brentford, Schneider Electric, Numeric.
13.	Guarantee	5 Years for UPS & 2 Years for battery.

The contractor shall have to submit the guarantee card for the above said period from the date of supply. The Manufacturer shall be required to guarantee the performance of the equipment against unsatisfactory performance / break down. Installation of equipment or any part thereof found defective within guarantee period shall be replaced by the manufacturer free of charge. The guarantee shall also cover quality, strength and performance of material and equipment used.

The contractor should submit the copy of challan or bill for the above material supplied from the manufacturer/authorized dealer issued on the name of contractor.

(K) Technical specification for item No. 14 & 15 of SCHEDULE 'A' and item No. 06 & 07 of SCHEDULE 'E' of rates and quantities: [Horizontal Direction Drilling/ boring, SITC of HDPE pipe]

The contractor shall have to make horizontal direction drilling/ boring beneath the track/ road without damage of surface road using auger/HDD machine. The bore shall be 150mm. dia. and shall be done at the depth of minimum 1.5 meter or as requirement of site from the ground level this include insertion of 110mm dia. HDPE pipe to accommodate cable. Necessary packing between pipe and cable at both ends to be done in such a manner that cable can be push on in future. Drilling/ boring by auger/HDD machine should be carried out as per instruction of SSE incharge. There should be no any public/passenger complaint regarding this work. Contractor has to do laying of HDPE pipe and cable in the pipe length.

SUPPLY OF HDPE PIPES:-

The contractor shall supply HDPE (High Density Poly Ethylene) pipe of 110mm nominal dia. as per IS 4984-1995 with latest accessories required for laying such as coupler, bend etc.

HDPE pipe shall be as per IS 4984-1995 and shall be got approved from Sr.DEE/G/ADI or SSE/Incharge before supply.

Material grade and class	Description	Nominal diameter (mm)	Wall thickness of pipes (mm)	
			Minimum	Maximum
PE-80 & PN-6	HDPE (High Density Polyethylene) pipe	110	6.3	7.1

LAYING OF HDPE PIPES:-

The contractor shall lay the HDPE pipes beneath the track/ road by horizontal direction drilling/ boring 150mm dia. and shall be done at the depth of minimum 1.5 meter or as requirement of site from the ground level. Contractor has to do laying of HDPE pipe and cable in the pipe length.

Each length of the pipes shall be joined together properly using proper size of socket and aligned in a straight line, keeping an inclination to facilitate the draining of water.

The installation of cable including joints shall be carried out in accordance with code of practice as specified in relevant ISS as amended latest.

Note: Cable will be supplied by Railway.

(L) Technical specification for item No. 16 of SCHEDULE 'A', item No. 10 of SCHEDULE 'B', item No. 07 of SCHEDULE 'C', item No. 07 of SCHEDULE 'D' and item No. 21 of SCHEDULE 'E' of rates and quantities: [DIGGING & RE-FILLING OF CABLE TRENCH]

A trench of 450 mm in width and 1000 mm depth from the normal ground level in normal soil shall be made by the contractor and while laying the cable a layer of riddle soil shall be provided below and above the cable. After doing this the trench can be filled up with soil available thereby. If any damage done, contractor will make good, the cost of damage as decided by railway. If any infringement comes in the digging route then contractor should remove the same. If any hard /stony soil, contractor should adopt new technology method as per scope of work.

(M) Technical specification for item No. 17 of SCHEDULE 'A', item No. 09 of SCHEDULE 'B', item No. 06 of SCHEDULE 'C' and item No. 06 of SCHEDULE 'D' of rates and quantities: [DIGGING & RE-FILLING OF CABLE TRENCH IN PCC/RCC/HARD SOIL]

A trench of 450 mm in width and 1000 mm depth for cable laying from the normal ground level in PCC/RCC/Hard soil shall be made by the contractor by using breaker and while laying the cable a layer of riddle soil shall be provided below and above the cable. After doing this the trench can be filled with soil available thereby. If any damage done, contractor will make good, the cost of damage as decided by railway. If any hard /stony soil, contractor should adopt new technology method as per scope of work.

(N) Technical specification for item No. 18 of SCHEDULE 'A', item No. 11 of SCHEDULE 'B', item No. 08 of SCHEDULE 'C', item No. 08 of SCHEDULE 'D' and item No. 23 of SCHEDULE 'E' of rates and quantities: [TRANSPORTATION, LAYING AND COMMISSIONING OF CABLES]

The contractor shall have to transport all the cables to be used at site shall be issued by Railway from SSE/incharge store OR other places suggested by Rly. and balance material shall also to be deposited back to SSE/incharge store. Contractor shall lay the cable in existing trench, pipe & on Wall/ structure.

Before laying the cable in the ground / Pipes or on the wall/pillars/cable tray cable should be secured properly by providing saddling/clamping arrangement of proper size at suitable interval.

Before and after laying the cable, the IR value should be checked and the contractor shall arrange all the testing instruments. In case of any failure contractor will again re-lay the cable at his own cost.

Armoring of the cable shall be earthed at both end of the cable.

Cable route marker shall be provided on the turning points and in straight portion. The cable marker shall be approved design and should be got approved before providing.

Wherever the cable comes out of the ground at least one loop of sufficient radius should be provided under the ground.

While laying the cable and while digging the trench it should be ensured that no obstruction should come in way of drainage line, power cables, telecommunication cables etc.

If any damage done, contractor will make good, the cost of damage as decided by railway.

(O) Technical specification for item No. 19 of SCHEDULE 'A', item No. 12 of SCHEDULE 'B', item No. 09 of SCHEDULE 'C', item No. 09 of SCHEDULE 'D' and item No. 24 of SCHEDULE 'E' of rates and quantities: [HALF ROUND RCC PIPE]

The contractor shall supply and laying half Round RCC pipes of 100 mm or 150 mm inner dia. (as per mentioned in schedule) and 1.0 Mtr. in length as per given description. The internal surface shall have a smooth finish without any bulge or projections to avoid damage to the cable.

For HALF ROUND RCC PIPE 100 mm. inner dia.

Internal dia.	Thickness	Approx. Weight	Approx. Steel Weight
100mm	25mm	11.5 Kg	190 gm

For HALF ROUND RCC PIPE 150 mm. inner dia.

Internal dia.	External dia.	Approx. Weight	Approx. Steel Weight
150mm	184mm	14.5 Kg	240 gm

LAYING OF PIPES:-

RCC Half round pipes shall be laid above cables for mechanical protection on laid cables in the existing trench. After doing this the trench can be filled up with soil available thereby. If any damage done, contractor will make good, the cost of damage as decide by railway.

(P) Technical specification for item No. 20 of SCHEDULE 'A', item No. 13 of SCHEDULE 'B' and item No. 25 of SCHEDULE 'E' of rates and quantities: [LT CABLE ROUTE MARKERS]

The contractor shall supply, installation, testing and commissioning of cable route markers on route of cable at each turning point and suitable distance in straight portion as guided by Railway representative.

The cable route marker shall be casted of C.I. with information as size, cores and grade of cable shall be displayed as this office drawing No. Sr. DEE/ADI-51/2234. After fabrication the complete marker assembly, it shall be hot dip galvanized to make it anti corrosive and got approved from Sr.DEE/G/ADI or SSE/incharge before bulk supply.

(Q) Technical specification for item No. 21 of SCHEDULE 'A' of rates and quantities: [SITC of 25 KVAR APFC Panel]

1. The contractor shall have to design, supply, install, test and commission APFC panel fabricated by 2mm thick MS sheet, standard angles, channels etc. as required in design. The drawing, design switch gears with make and model of the APFC panel shall be submitted by the contractor & got approved by Sr.DEE/G/ADI or SSE/incharge before fabrication.
2. The APFC panel shall be fabricated by CPRI approved manufacturer.
3. The APFC panel shall be indoor rectangular cubicle type, dust and vermin proof suitable for 3 phase, 4-wire, 415V, 50Hz AC supply system.
4. Bus bar for main circuit and neutral shall have uniform cross section electrolytic tinned copper with color coded heat shrinkable PVC insulated and current density of 1.6 Amp/mm² cross sectional area.
5. Knock out / gland plates as applicable shall be provided. Gland plates of suitable size shall be designed for terminating cables in a straight and easy manner.
6. All power connections from the bus bar shall be made such a manner that there is a clear metal to metal clearance at the tapping is available. Both spring washer and plate washer shall be used with stud/ nuts/to ensure proper contact pressure.
7. The APFC panel shall have metal locks & operated by a common key. All covers & doors to be provided with neoprene gasket. Hinged doors shall be provided on both sides.
8. The sheet steel enclosure / angle / channel used in the fabrication of panel shall be provided with double coating of red oxide and final coating of light grey powder coated paint.
9. The APFC panel shall be supplied complete with base plate of 75mm, louver, four lifting hooks and feeder name plates completely wired and ready for commissioning.
10. Caution board in Hindi, Gujarati & English of metallic type shall be provided on panel.

11. Minimum two earth terminals shall be provided in the APFC panel all sheet steel section shall be electrically connected with a separate G.I. earth strip of 50x6 mm size across the panel at bottom.
12. CT shall be cast resin type & 10VA burden, class 1.0 accuracy and shall be earthed through a separate earth link. One No. sensing CT to be provided for APFC panel. CT shall be of make as per List of Approved make given below.
13. Ammeter of suitable capacity (According to ACB/MCCB Rating) with selector switch (make Salzer / THAKOR / KAYCEE) & CT on each phase of incoming feeder having 63A or more capacity.
14. Multi LED type indication lamp with control fuses on each incoming & outgoing feeder shall be provided. The indication lamps shall be of LK (FORMERLY L&T), Siemens, C&S and Teknik make only.
15. APFC panel shall be mounted on the fabricated MS Angle on floor and cemented trench for incoming and outgoing cables shall be prepared by the contractor.
16. The ACB, MCCB shall be of make as per List of Approved make given below.
17. The breaking capacity of MCCBs should not be less than 35KA with Ics=Icu with thermal magnetic release & Rotary handle.
18. The contractor shall submit three sets of drawing and wiring diagram of APFC panel along with panel at the time of supply.
19. APFC panel should be of future extendable type.
20. Capacitor shall be of heavy duty MPP type.
21. Contractor shall have to provide the control cable from LT panel CT to APFC panel.
22. Make of capacitor - Meher, Crompton, ABB, BHEL, LK (FORMERLY L&T), EPCOS.

The APFC panel shall be comprised with following switch gears:

Incomer:-

- 1 No. 63A MCCB, 4 pole MCCB-Fix type with rotary handle.
- 01 No. APFC relay, 6 stage microprocessor base intelligent versions of Meher, Crompton, ABB, BHEL, LK (FORMERLY L&T), EPCOS, Selec, Havells, Siemens, Schneider.
- 01 No. Ammeter 0-60A with CT, selector switch.
- 01 No. Voltmeter 0-500V with selector switch.
- 01 No. Auto manual switch
- 03 Nos. multi LED type indication lamp with control fuse.
- 01 No. 6" dia. Ventilating fans

Outgoing –

5 KVAR capacitor feeders- 05 Nos.

Each feeder consists of –

5KVAR heavy duty capacitor – 01 No.

Capacitor duty contactor suitable for 5 KVAR – 01No.

25A, 3 pole MCB, 10 KA - 01 No.

ON/OFF push button with indication lamp with control fuse.- 02 Nos.

On delay timer (Make LK (FORMERLY L&T), GE, Siemens)- 01No.

Auto manual switch – 01 No

Note:-

- 1) The contractor shall offer the inspection and testing of APFC panel by Sr.DEE/G/ADI or SSE/incharge at the manufacturer's premises at his own cost for routine / acceptance test. However manufacturer's test certificate shall also be submitted for the type test. All tests will be carried out as per relevant IS.

- 2) Contractor shall have to supply materials as per List of Approved Make given below.

**(R) Technical specification for Item No. 22 of SCHEDULE 'A' of rates and quantities:
[LED illuminated sign / direction boards in half elliptical /Parabolic /Triangular shape]**

Contractor shall have to supply, installation, design, manufacture of wall / hanging / floor mounting type LED illuminated sign / direction boards in half elliptical /Parabolic /Triangular shape as per specification given below.

Model /Type	Full Elliptical (FE) / Half Elliptical (HE) / Semi Elliptical (SE) / Parabolic
Mounting	Mounting arrangement shall be hanging, Wall mounting, Ceiling Mounting, Pole Mounting, Floor Mounting or as per site requirement. Sign Boards shall be with integrated mounting arrangement powder quoted pipes to FOB/PF Structure / walls with tension rope made of SS 304 and supplied with minimum 5 meter 2.5 sq.mm FRLS multi stranded copper flexible cable as per IS: 694 with latest amendment and socket pin for connecting to power supply system. The cost of fixing of sign board with suitable clamping arrangement with SS nut, bolts, washers, square shear nut, nut-bolts, screw, T bolt, Chuck nut, shear nut or welding etc. is also included. The clamps shall be powder coated and enamel paint of approved colour.
Elliptical Glow Board Frame Shall	Shall be made of Extruded Anodised hollow aluminium profile of size not less than 1.2 mm thickness and anodized to minimum 15µm thickness (Grade AC-15) in bronze & silver or any other approved colour. Anodizing coating shall be as per IS: 1868 or latest amendment. Provide Full length square SS powder coated pipe attached to bottom cap square bracket with level adjustment provision ribbiting without welding, pass thorough top cap interlock with clamp SS pipe sliding and level adjustment provision without compromising structural strength of Elliptical Glow Board. Provide nylon die molded & MS machine formed powder coated horizontal or vertical as per requirement heat sink bracket to hold top and bottom aluminium profile with press fit and bolting provision. Top bottom and/or side Cap as per requirement flush fixed at Profile to outer side holding all structural element together.
Bracket / clamp	"I" beams of size 3" - 27" / "T" beams of size 6-8" x 5", "C" beam of size 3" x 5" and round pipes 2" - 6" holding machine bended seven tank processed powder coated clamp with SS 304 nut bolts & spring washers with provision of level, size and alignment adjustment. 'T', 'S' or round shaped clamp from center slot will interlock with top beam/ girder, pipe at various size with horizontal or perpendicular or tapper or slanted form with provision of beam to beam connected bracket to hold sign perpendicular or horizontal. & bottom side of clamp will interlock with pipe of Elliptical Glow Board with SS nut-bolt and spring washer. High strength Round Mounting Clamp set of inner & outer clamp at R 2"/3" & for installation on round pipe of dia 2/3" shall be press-formed in SS 304 grade sheet of 2mm thickness, 2mm rib deep shall be formed along the periphery for additional strength, only the inner clamp shall be used with two holes shall be used for anchoring on wall. Universal mounting clamp approx. 70mm x 31mm x 22mm set consisting of sliding clamp, holding clamp, crimping lock and flexible strip shall be press-formed in SS 304 grade sheet of 1.2mm thickness this clamp shall be slid inside the

	<p>mounting channels fixed to substrates. 0.8mm strip shall be passed through this clamp and around the structure on which the sign is to be installed and crimped firmly by crimping clamp. It should fix at any structure.</p> <p>M10 Square Head Bolts SS 304 grade, 4 side chamfered shall be used for installation. M10 Hexa Head shear nuts, which are high security, anti-theft, permanent fasteners, shall be used and shall be made of SS 304.</p>
Top profile	<p>Top Profile of Elliptical Glow Board shall be made up of Aluminium Alloy (6063-T6) Extruded profile anodised to 15 μm +/- 3 μm. The profile nominal wall thickness shall be 2 mm. and width approx 170 mm, 137 mm and 268 mm. The reflective metallic silver PU particle coated granules shall be provided on the internal face of the profile. The edges of the profile shall be rounded.</p> <p>The profile shall have a slot of approx 4.8 mm & 7mm width on both sides to hold 2/3/4 mm thick polycarbonate sheet. The slot shall be at an angle of 80-84 degree to face firmly hold the polycarbonate sheet in elliptical and parabolic curvature. The Elliptical / Parabolic curvature of the polycarbonate sheet shall be maintained by its inherent flexural tension property. It should have circular slots for M6 self-tapping cheese head screws to fix the end caps. Along the center line of the top of this profile there shall be a 10mm x 3mm slot for press fitting the heat sink holding brackets in place with circular slot for M6 self-tapping screw should be made available. There shall also be a flat extension of 12mm to rectangular slot for additional support / fixing screws to firmly hold the heat sink holding bracket. The Total height of the central Projection should be maintained to minimize obstruction to light illumination.</p>
Bottom, top & side Profile	<p>Bottom, top and side Profile full / half of the Elliptical Glow Board shall be made of extruded anodized Aluminium Alloy hollow profile (6063-T6) having 2mm to 5mm wall thickness. It should have internal ribs with approx 1.5mm, 2.5mm thickness and 4.5mm, 4.2mm wide slot to firmly hold the polycarbonate sheet in elliptical and parabolic curvature using its flexural tension. A circular slot of dia. approx. 4.5 mm at the center of profile shall be provided to fix self-tapping cheese head screw for end cap. An extruded extension diametrically opposite to this circular slot should have approx. 10mm x 3mm slot for press fitting the heat sink holding brackets. Further flat extension of 12 mm shall be provided for screwing the bracket for additional strength & fixed location.</p> <p>Total external width & Height of the bottom, top & side profile should be full of approx. 34mm x 48mm R 11.7mm / 42mm x 50mm, R 24.3mm / 42mm x 80mm, R16mm / 84mm x 80 mm, R16mm without compromising the strength and causing any obstruction to the light while giving maximum viewing area. The bottom corner shall have a curvature of approx. R11.7mm, 24.3mm and 16mm to appear in continuous flow of elliptical Curvature of polycarbonate sheet. This also shall add to aesthetic beauty of the whole Elliptical Glow Board.</p>
Heat Sink Holding bracket (HSH)	<p>Heat Sink Holding Bracket shall be of approx. length 184mm, 252mm, 260mm, 324mm, 397mm, 537mm, 551mm injection moulded in Nylon 6 material & 1130mm, 1156mm, 861mm in MS machine formed powder coated for its strength & flexibility. The bracket shall be of 'I' cross section of sizes approx. 102mm x 15mm x 10mm, 1080mm x 25mm x 5mm, 1156mm x 50mm x 5mm, 861mm x 50mm x 5mm at mid portion and it should reduce proportionately in slant at both the ends for nylon 6mm, MS</p>

	<p>5mm. Thickness without obstructing the light and without compromising on strength.</p> <p>The 'I' cross section nylon shall have ribs for maintaining stiffness. Both the ends of HSH brackets shall have locking clasp to press fit in 10 mm x 3mm slot of top and bottom profile.</p> <p>The mid portion shall have offset of 14mm for nylon and 12 mm for MS. Central clasp shall be moulded in the Heat Sink Holding bracket to firmly hold the Heat Sink along the longitudinal axis of Elliptical Glow Board. The central clasp shall have two prong sets to hold the heat sink across its diagonal or along its sides as required. Two holes as per requirement shall be provided near the end clasps firmly.</p> <p>Two holes for nylon & MS shall be provided on both sides of central clasp to fix at both profiles Two holes shall be provided on both sides of central clasp to fix the mid portion of bracket to strip in the event longer bracket if required</p> <p>The mid portion of HSH bracket approx. 3 mm thick x 10 mm wide aluminium strip in the event longer bracket is required or more than one Heat Sink is required for bigger size of Elliptical Glow Board.</p>
Heat Sink Heat	<p>Heat Sink shall be 25-26 mm hollow anodized Aluminium Alloy (6063-T6) profile of 2mm thickness. Corners shall be flattened to form a square across flat to hold the heat sink diagonally. Heat sink must be press fit horizontally and diagonally from all 8 sides. All the four sides shall have dovetail of slots. Circular slots of dia. 2 mm shall be provided at all four internal corners to tight fit the pins of Heat Sink connector.</p> <p>There shall be a set of three of approx. 1.5mm thick ribs central of approx. 5mm height and two sides of approx. 2mm height. Provision for maximize the surface area to aid in faster cooling as well as for additional strength to hollow square profile.</p>
Heat sink connector	<p>Heat Sink connector shall be a moulded from polycarbonate profile of same cross sectional dimensions as that of Heat Sink. The thickness of the connector shall be approx. 5 mm.</p> <p>Two semicircular slots shall be provided on each face. Provision to pass out hot air from heat sink should be made. Four pins shall be moulded on four corners on both the faces of Heat Sink connectors to be press fitted in Heat Sink profile.</p>
Elliptical Glow Board end cap	<p>End caps full / half with elliptical and parabolic shape shall be made from injection moulded polycarbonate granules 2 mm thick / SS 304 1.2 mm thick / aluminium die casted 8 mm thick having curve on top side and internal hollow and elliptical base at bottom side with reflective internal surface. The End caps shall be perfectly opaque.</p> <p>The standard sizes are:</p> <p>170mm x 304mm x 21mm, R 511mm corner R 11.7mm / 210mm x 100mm x 20mm, R 150mm corner R 39mm / 278mm x 130mm x 20mm, R 193mm corner R39mm / 350mm x 152mm x 20mm, R 257mm corner R 39mm / 425mm x 175mm x 20mm, R 316mm corner R 39mm / 563mm x 215mm x 20mm, R 449mm corner 39mm / 210mm x 69.2mm x 20mm, R 150mm corner R 39mm / 278mm x 84.2mm x 20mm, R 193.48mm corner R 39mm / 350mm x 95.2mm x 20mm, R 257mm corner R 39mm / 425mm x 106.7mm x 20mm, R 318mm corner R 39mm /</p>

563mm x 126.7mm x 20mm, R 449mm corner R 39mm /
 425mm x 150mm x 50mm, R 305mm corner 39mm /
 600mm x 110mm x 50mm, R 445mm corner R39mm /
 862mm x 167mm x 60mm, R 707mm corner R39mm /
 425mm x 190mm x 50mm, R 315mm corner R30mm /
 573mm x 230mm x 57mm, R 450mm corner R30mm /
 859mm x 308mm x 67mm, R 734mm corner R30mm /
 529mm x 308mm x 99mm, R 371mm Corner 40 /
 692mm x 308mm x 85mm, R 528mm corner R53mm /
 1063mm x 415mm x 126mm, R943mm corner R 80mm /
 1167mm x 353mm x 20mm, R 1062mm corner R 11.75mm /
 169mm x 915mm x 30mm, R 1246mm corner R17mm /
 342mm x 2092mm x 30mm, R 2451mm corner R 17.2mm /
 1488mm x 472mm x 30mm, R 1575mm corner R 16.3mm /
 889mm x 263mm x 25mm, R 775mm corner R 17.5mm.

Note: Above size of the end cap will be utilized as per the requirement

The boards shall be such that the text & Graphics displayed on the Polycarbonate sheet held in these end caps should be completely visible even if it is viewed directly from the bottom or any direction; the text is very much legible.

Polycarbonate cap Internal face shall be cross ribbed 2mm x 3mm to increase the strength of the end cap. Eight nos. locating pins tapering towards collar of the end cap shall be provided near the internal periphery of the end cap. These pins shall firmly hold the 3mm translucent polycarbonate sheet in elliptical / parabolic curvature.

Circular cutout of dia. approx. 80mm shall be provided for illuminated branding or opaque cap shall be provided in case of none branding. For branding translucent material fitting provision should provide without shadow on branding. Oblong cutout with collar shall be provided for projecting image of desired text & graphics on the floor below or opaque cap shall be provided in case of non-projecting. 2mm x 5mm Ribs approx. 20mm inside and parallel to the external periphery shall be provided for additional strength. Riser buttons shall be provided along the internal ribs to block the cutouts using opaque sheet screwed through these buttons. These buttons may also be used to mount the LED projector when required. Projector fitting bracket shall be fix to end cap to align with oval slot.

Three nos. cap holding sockets shall be moulded at three corners of the End Cap. Two nos. locating pins shall be provided on each cap holding sockets and shall be provided at the bottom of these pins for additional strength. This pin shall locate in the top and bottom Aluminum profile.

Two tapering ribs shall be provided to cap holding brackets for additional strength. Three through slots of approx. 17 mm x 1.5 mm shall be provided near the top of end cap for heat ventilation. Moulded Screw caps shall be provided to externally press fit in the cap holding sockets. The end cap shall be Moulded Shatter proof opaque polycarbonate as per IS 14443 or latest amended with thickness not less than 1mm and of reputed Indian make using Bayer granules.

SS 304 elliptical or parabolic cap should have approx. 20 mm vertical collar at corners of suitable dia. hole to interlock with profile and structure, square bracket at bottom cap should provide to interlock vertical square

	<p>structure pipe and top cap should have cut out to thorough pass the structure pipe with the provision of ventilation.</p> <p>Aluminium die Casted cap top should have curvature of R 1123-1125 mm and internal hollow with wall thickness of 6-8mm with polished and premiered with metallic PU gloss lacquer coated. internal 2 nos. cap holding socket shall be casted at both corners of cap to interlock with side profile, Bottom casted cap should have side curvature of - R78-79 / 112-113 mm and hollow of approx. 100 mm with internal 2 nos. cap holding socket shall be casted at both the corners of cap to interlock with side profile. Vertical rib should provide to interlock polycarbonate sheet with inner pins support should flushed with side aluminium profile. Cap should have a hole with die moulded dia approx. 12 mm grommet to pass main supply wire.</p>
Cue Beam	<p>Cue beam holding bracket die-moulded with triangular parabolic base of approx. 77mm x 68mm, 2 mm thick. Hollow cylindrical die-moulded cover of dia approx. 29mm and height 43mm attached to side legs with provision of hinge for 360 degree rotation and angle adjustment with oblong cut out of bottom cap. It should fix with bottom cap with 3 nos. holes of dia. Approx. 3 mm.</p> <p>The Elliptical Glow Board shall have the slot for provision of Cue Beam projector wherever required with provision of cue beam holding bracket. Cue beam projector should project the given sign image and text on floor or wall from max distance with maximum brightness than ambient light.</p> <p>2 nos. Plano convex of approx. R 9.22mm, R 7.31mm and 1no. Biconvex lenses of approx. R 19.8mm, R 34.1mm, should fix at given slots.</p> <p>Projector lens with engraved image should create maximum projection on surface</p> <p>The CUE BEAM should incorporate in Elliptical Glow Board.</p> <p>Technical specification of CUE BEAM</p> <p>Voltage - AC 110V~220V</p> <p>Built in LED Driver - 12 V</p> <p>Power - 5W</p> <p>Luminosity - 150~ 200LM</p> <p>Image Projected distance -1~ 3 meters</p> <p>External Dimensions approx. - Ø26mm X 76 mm</p>
Podium	<p>Elliptical shape one piece cut, top & bottom 3mm thick with size approx. 1170 mm x 512 mm x 508 mm at R914mm at corner R 117mm / 1643 mm x 575 mm x 508 mm at R 1652mm at corner R 92.5mm of SS 304 with parabolic shape cut at center having dia approx 8 mm, 2 hole on top for matching with bottom cap of Elliptical Glow Board for fixing and interlocking without welding and bottom approx. 12 mm 4 hole for foundation fitting should be provided. Provide approx. 4 mm 9 holes for ventilation at top and Backside open able door system with lock & key.</p> <p>SS 304 grade frame structure of size approx. 25mm x 50mm x 1.2mm square with vertical and horizontal supports covered with SS 304 sheet of 1.2mm thick with powder coated in elliptical shape machine formed matching with top of podium should provide Anchor fastener fitting provision has to be made for ground fixing.</p>
ACP Cladding	<p>Design, fabrication & installation of 3mm thick exterior grade PVDF coated Aluminium composite panels (Timex, Alucobond) of having 0.5 mm thick aluminium PVDF coated sheet with specific standard colour + 3 mm core material + 0.5 mm aluminium sheet chemically treated (back sheet) bent</p>

	with 5mm uniform machine grooved as per requirement, fitted on anodised aluminium/ anodized aluminium angle Primer with PU coated MS rectangular grid work. Grid for supporting ACP shall be of size approx. 38mm x 38mm x 1.5mm at a distance of Heat sink fixed in Elliptical Glow Board should accurately match Horizontally & Vertically along with existing structure on site. Hardware, fixtures, brackets, anchor, fasteners of SS 304 grade etc. complete duly sealed with weathering silicon (DOW / GE) for circular columns and curved beams etc. Provision of MS clamp/ bracket for fixing with existing structure vertically, horizontally or slanted without welding and with level size alignment adjustment and interlocking provision without compromising strength and structural stability of frame should provide.	
Text /Graphics	Shall be computer cut/printed on 80 µm Monomeric calendared Vinyl matt sheet of reputed make (Metamark / 3M) of Pantone shade 227C/165C/260C/Cool grey 8C/Black/7408C Note: Pantone provides a universal language of color that enables color-critical decisions through every stage of the workflow for brands and manufacturers.	
Led ribbon light Illumination	Ribbon light shall be of waterproof SMD 2835. The width of Ribbon light shall be 12 +/- 1mm. This shall be slide into the dovetail grooves of the heat sink & firmly pasted on all four sides of the heat sink. The light emitted from LED ribbon light should be partially reflected from the elliptical and parabolic curvature of white glossy polycarbonate sheet multiple times. Any obstruction or low brightness at the edges of the beam should be taken care of. Uniform illumination Average 4W-8W/ Sq. ft.	
LED	Linear LED of density 120 LEDs per meter of quality of proven make such as Bridgelux/ NICHIA/ SEOUL Semiconductor/ OSRAM/. OEM certificate of LED should be provided.	
	LED Wattage	0.08 W to 0.1W per LED
	LED Driver	Constant current waterproof LED driver of approved brand make Mean Well / Philips / OSRAM with separate surge protection.
	LED Colour	Cool White
	Colour temperature	5500 K/6500 K
	Viewing angle	Text/Graphics/matter visibility shall not be less than 160°
	Nominal Voltage	230V, AC, 50 Hz
	Operating Voltage Range	150V-260V AC With SMPS power supply
	Index of protection	IP 54
Sizes of Boards	The size of board shall of different sizes, as per the site requirement.	
Sign substrate	Shall be of Eco Friendly, High impact strength, shatter proof, UV resistant, Translucent, nonflammable White polycarbonate solid sheet as per IS 14448 of not less than 3mm of reputed make Bayer / Lexan / Polymac. Light transmission shall be in the range of 60% - 90%. Provide U shaped 7mm x 1mm / 4mm x 1mm / 8 mm x 2mm gasket for tight holding and interlocking polycarbonate sheet in aluminum profile.	

Note: The successful contractor shall arrange of all equipment, tools, consumables, testing meters, Hydra scaffolding, crane, forklift etc. and other required materials for successful completion of the work. Any work not specifically mentioned, but required for successful completion of work is deemed to be included in the work. If any activity required to be included later on due to reliability and safety shall be carried out by contractor without any extra cost.

The contractor should submit the copy of challan or bill for above material from the manufacturer/authorized dealer issued on the name of contractor.

Note: Sample of signage board Drawing & ACS No. 1: Signage guideline for Railway station is attached. Contractor should be prepared and submitted drawing of signage board and got approval from Sr. DEE/G/ADI or SSE/incharge before supply of signage board.

(S) Technical specification for item No. 23 of SCHEDULE 'A' of rates and quantities: [Supply of Modular wiring accessories]

The contractor shall supply of Modular wiring accessories. 1 set of Modular wiring accessories comprises-

S.N.	Description	Quantity
1	08 Module Frame Plate with Matching Cover Plate & box.	1 No.
2	12 Module Frame Plate with Matching Cover Plate & box.	1 No.
3	03 Module Frame Plate with Matching Cover Plate & box.	1 No.
4	06A, Multipin Modular socket.	3 Nos.
5	06A Modular switch	10 Nos.
6	16A Multipin Modular socket	1 No.
7	16A Modular switch	1 No.
8	Modular 5 step Fan regulator	1 No.

Contractor shall have to supply wiring accessories as per List of Approved Make given below & got approved by Sr. DEE/G/ADI or SSE/incharge before supply.

(T) Technical specification for item No. 26 of SCHEDULE 'A', item No. 02 & 03 of SCHEDULE 'B' and item No. 08, 09, 10, 11, 12 & 13 of SCHEDULE 'E' of rates and quantities: [Internal concealed wiring]

The contractor shall supply the material and carry out the concealed wiring from switch board to load point by using three number copper wires with pipe or without pipe as mentioned in schedule of rates & quantity. The copper wires should be of FRLS PVC insulated, multi-strand, single core 1.1 KV grade for phase & neutral and earth continuity in the same conduit as internal earthing of points for light, fan and 6 A plug etc.

The point wiring shall include supply & providing modular switches, sockets & accessories such as suitable size chromium plated metal boxes, cover plate, lamp holders, 3 pin ceiling rose, modular plates, etc. There shall be sufficient space (Empty modules) on switchboard to provide fan regulator & sockets, which are supplied in other item of this schedule.

Wherever required the contractor shall provide metal Jn. boxes for main/submain & light points in concealed manner with PVC connector of suitable size on sidewall.

Area of conductor sq. mm	Nos. & Dia. of wire in mm	Nominal Thickness of insulation in mm
1.5 sq. mm	22/0.30	0.7
2.5 sq. mm	36/0.30	0.8
4 sq. mm	56/0.30	0.8
6 sq. mm	84/0.30	0.8
10 sq. mm	80/0.40	1.0

M.S. sheet metal Jn. boxes in concealed manner with PVC connector of suitable size on sidewall below the ceiling for the tapping the connections of light points, which are provided in “C” channel.

The mains/submain concealed wiring for lighting circuits shall be provided by multi-strand, single core, FRLS PVC insulated 1.1 KV grade three Nos. copper wires as mentioned in schedule of rates for phase & neutral and earth continuity in the same conduit as internal earthing.

There shall be no joint in wires in boards. However if required same should be through connectors of suitable capacity.

All wiring material such as modular switches, sockets, metal box, cover plate and modular plates, lamp holders, 3 pin ceiling rose etc. should be single one make for all items from mentioned makes.

All wiring material such as modular switches, sockets, metal box, cover plate and modular plates, lamp holders, 3 pin ceiling rose etc. should conforming to IS: 3854 -1997. Cat. Nos. of these materials given as under is illustrated example and equivalent of make of these material are as per List of Approved Make given below.

S N	Item	Cat. No.
1	10AX 1 way modular switches	21011(Roma)
2	10AX 1 way modular switches for Fan point	30840(Roma)
3	10 Amp. multi socket	30373(Roma)
4	6A/16A Twin Socket ISI.	30828(Roma)
5	16 Amp 3 pin socket heavy duty	21124(Roma)
6	Fuse unit for 16/10A	21146
7	100W Fan Regulator, 2M, ISI	20507(Roma)
8	3-Pin Ceiling Rose	149A (Leader)
9	Angular Holder	39673(Anchor)
10	Metal Box up to 2 Module	21780(Roma)
11	Metal Box up to 3 Module	21452(Roma)
12	Metal Box up to 6 Module	21463(Roma)
13	Metal Box up to 8 Module	21474 or 30453(Roma)
14	Cover Plate with Frame 1 Module	35286(Lira)
15	Cover Plate with Frame 2 Module	35297(Lira)
	Cover Plate with Frame 3 Module	35300(Lira)
16	Cover Plate with Frame 4 Module	35311(Lira)
17	Cover Plate with Frame 6 Module	35322(Lira)
18	Cover Plate with Frame 8 Module (Horizontal)	35344 (Lira)
19	Cover Plate with Frame 8 Module (Square)	35333 (Lira)
20	Cover Plate with Frame 9 Module (Horizontal)	35388 (Lira)
21	Cover Plate with Frame 12 Module	35355 (Lira)

1.1 **General guidelines for wiring works:**

The completed installation, shall be tested in accordance with the provision of I.E. Rules and code of practice.

Mains/Sub main : The connection from one main/submain board to another main/submain board.

Point wiring: All wiring in a building except that covered by the terms "Mains"/"Sub mains" and also part of the wiring required for the light, fan or plug circuit as case may be will be considered as "point wiring".

Wiring for separate board having. 6 Amps multi pin socket with modular switch: Carry out the wiring up to 3 meter with 2.5 mm Sq. size multistrand FRLS PVC insulated ISI marked copper wire for phase, neutral & one number 1.5 Sq. mm copper wire for earth continuity with PVC pipe from MDB/SDB to this separate board. If as per site condition wiring more than 3 meters is required then the additional length shall be counted as 2.5 Sq. mm mains with pipe.

Wiring for separate board having 2 Nos. 6 Amps multi pin socket with modular switch for each socket: Carry out the wiring up to 3 meter with 2.5 mm Sq. size multistrand FRLS PVC insulated ISI marked copper wire for phase, neutral & one number 1.5 Sq. mm copper wire for earth continuity with PVC pipe from MDB/SDB to this separate board. If as per site condition wiring more than 3 meters is required then the additional length shall be counted as 2.5 Sq. mm mains with pipe.

Wiring for separate board having 4 Nos. 6 Amps multi pin socket with modular switch for each socket: Carry out the wiring up to 3 meter with 2.5 mm Sq. size multistrand FRLS PVC insulated ISI marked copper wire for phase, neutral & one number 1.5 Sq. mm copper wire for earth continuity with PVC pipe from MDB/SDB to this separate board. If as per site condition wiring more than 3 meters is required then the additional length shall be counted as 2.5 Sq. mm mains with pipe.

Wiring for separate board having 16 Amp multi pin Modular socket and switch: Carry out the wiring up to 3 meter with 4 mm Sq. size multistrand FRLS PVC insulated ISI marked copper wire for phase, neutral & one number 2.5 Sq. mm copper wire for earth continuity with PVC pipe from MDB/SDB to this separate board. If as per site condition wiring more than 3 meters is required then the additional length shall be counted as 4 Sq. mm mains with pipe.

The internal wiring of above said separate board is to be done by 4 Sq. mm PVC flexible wire.

1.2 **System of internal wiring:** The wiring shall be done in accordance with the Indian Electricity act 1910 and Rules 1956 as amended up to date and Rules made there under and IS 732 (Pt. I) and 732 (Pt. II) (looping back system of wiring design and constructions).

1.3 The contractor shall have to maintain the standard colour code for circuit such as phase- red, neutral-Black, earth- green/grey.

- 1.4 Connection to light fitting & ceiling fans and other appliances shall be done with 3- core flexible copper cable of proper size.
- 1.5 Passing through floors and walls: Conductors passing through the walls are to be carried in PVC pipe of the suitable size for wiring. Care should be taken that the cable pass through in straight line without twist or cross in wires, on either end of such holes in the walls.
2. **Switches:** All the switches shall be placed in the live or phase conductors of the circuit. The entire switch shall be single pole switch of modular type from mentioned makes and shall be "ON" when the knob is down and of type quick make and break. Marking for lights, fans should be done on switches.
3. **Cables:** All cables of not less than 1100 volts grade shall be used for wiring. All conductors shall be of stranded copper and no conductor (except where flexible is used) shall have a cross section area of less than 1.5 mm Sq. all stranded conductor should be provided with cable socket and lug for connections, joints and termination.
- Earth continuity shall be provided with FRLS PVC insulated, multi strand, copper wire for wiring of light/fan points and mains/ sub-main as mentioned in schedule of rates and shall run along with wiring in PVC conduit pipe and no tapping in between or twisting will be permitted. All metallic parts shall be suitably earthed. All plug sockets, regulators and fans should be connected with earth continuity wire such that the resistance at the remotest point do not exceed 1 ohm. The earth resistance value of all earthings will be displayed along with the date on which earth resistance tested. Earth resistance should be measured and tested jointly.
4. **Wattages:** Unless otherwise specified in the schedule, the following wattages for calculating the load may be taken-
- | | | |
|-------|-------------------------------------|--------------|
| (i) | For each light point (incandescent) | = 60 watts. |
| (ii) | For each fan point | = 100 watts. |
| (iii) | For each plug point | = 100 watts. |
5. The circuit loading shall conform to the following:
- | | |
|------|--|
| (i) | Maximum number of points on any circuit - 7 Nos. |
| (ii) | Maximum load of any sub circuit - 750 watts. |
6. **Mounting height** from floor level shall be generally:-
- | | |
|---------------------------|------------|
| Light fittings | : 2740 mm |
| Switches and plug sockets | : 1525 mm. |
| Fans | : 2900 mm. |
7. **General:** Also installation carried out shall conform to IS: 732 (Pt. II) 1983 as amended latest COP for electrical wiring and fittings in building. Special care shall be taken to give superlative look/get up and the quality of work by adopting standard wiring practice, layout etc., installations shall be carried out in conformity with the requirement of I.E. Act 1910, I.E. Rules 1956, as amended up to date.

All wiring shall be as near the ceiling as possible and due consideration shall be given for neatness and good appearance.

- 8.1 No bare or twisted joint shall be made at intermediate points in the through run of cables unless the length of a final sub-circuit, sub-main is more than the length of the standard coil as given by manufacturer of the cable. If any jointing becomes unavoidable, such joints shall be made through proper junction boxes open to easy inspection. No joints of wires inside Board shall be allowed, if necessary, wires should be connected through connectors.
- 8.2 Looping in system of wiring shall be adopted.
- 8.3 The wiring throughout the circuit should be such that there is no break in the neutral wire in the form of switch. The neutral should be distinctly marked.
- 8.4 In every case when switches and fuses are fitted on the same poles these fuse should be so arranged that fuses are not alive when their respective switches are in the off position.
- 8.5 The wiring of all fans/light point should terminate into three point ceiling rose.
- 8.6 Switches controlling the sockets should be on the live side of the line. All sockets outlet should be of multi pin type with earth terminal/pin connected to earth and following E.L.N. in clock wise as per ISS.
- 8.7 The wiring shall be carried out strictly as per code of practice for electrical wiring installations for system voltage of 650 V, (Revised) as per IS 732 (Pt. II) 1983 as amend latest.
- 8.8 Contractor should employ only qualified staff to supervise and carry out the wiring installation. The supervisor should have first class Electrical Supervisor's certificate and wireman, II class wireman certificate issued by the State Government Names of supervisor's employed should be furnished to the Sr. Divisional Electrical Engineer Ahmedabad. Any changes in the staff should also be similarly advised.
- 9. **Measurements:** Where wiring between two points is payable in terms of lengths involved, the length will be measured from center of the switch, meter, socket or other equipments at one end to the center of the switch, meter socket or other equipment at the other end and payment will be made treating this length as the length of wiring. The measurement will be made along the run of the wiring and rounded to nearest meter.

In case of point in which a single controlling switch (for example Bell Switch) is mounted separately from a mains or sub-main board the wiring between the feeding board and the controlling switch also should be included while determining the category of the point.

- 10 **Testing:** All tests such as Earth resistance test, earth continuity test, insulation resistance test will be carried out as per IS 732 (Pt. III) 1983 as

amended latest and I.E. Act and Rules in presence of Railway's representative. Certificate be signed jointly. Test results of the wiring done to be submitted quarter wise and service building wise to Sr. DEE/ADI.

11. Special Clause :

- (i) Wiring shall include "Main" and "sub-main" to be drawn from the respective main, sub distribution boards and switch boards located at convenient centers duly approved.
- (ii) All phase and neutral wires shall be looped back only at switches and ceiling roses, where ever necessary and the looping shall be limited to only two wires at each terminal. If more than two wires are required to be looped the same shall be done by suitable mechanical connectors.
- (iii) Any masonry work involved will be done by the contractor i.e. fixing of wooden plugs, filling up of holes, etc. and all surface properly done after the work and given white washing.
- (iv) The work of wiring should be completed within the time limit specified in the tender schedule. Any deviation from above condition contractor should not be allowed to carry out work, unless taken prior approval from administration.
- (v) For Providing switch, socket in existing board: Necessary modification in chromium plated metal boxes, modular plates, cover plates etc. are to be carried out by contractor at his own cost.

P.V.C. conduit pipe

The contractor shall supply and lay medium class rigid P.V.C. white coloured conduit pipe of minimum 25 mm dia. in concealed manner. The pipe should be laid in the wall and ceiling of building at the time of its construction. The P.V.C. conduit pipe should be of ISI marked of make as per List of Approved Make given below with all accessories such as various sizes chromium plated concealed type metal box, Tee joints, bends, elbow and coupler etc. for concealed wiring. The P.V.C. conduit pipe should be conforming to IS-9537 part-III (as amended latest).

The rates are inclusive of chasing, providing pipes, fixing with staples and making good surface with cement plaster and the rates of chromium plated concealed type metal boxes are included in wiring item.

Contractor shall have to supply materials as per List of Approved Make given below.

**(U) Technical specification for item No. 33 of SCHEDULE 'A' of rates and quantities:
[Distribution Board]**

- 1. Distribution Board (DB) shall be pre-wired in sheet steel enclosure, with DIN channel, neutral bus-bar. The box and cover shall be properly pretreated, phosphatized with powder coated finish and surface mounted type.
- 2. Detachable plate with Knock out holes shall be provided at the top/bottom of board. Complete board shall be factory fabricated and pre-wired in factory ready for installation at site.
- 3. The DB shall be cubicle type, wall mounted dust and vermin proof suitable for 3 phase, 4-wire, 415V, 50Hz AC supply system.

4. The sheet steel enclosure / angle / channel used in the fabrication of distribution board shall be provided with double coating of red oxide and final coating of light grey powder coated paint.
5. Minimum two earth terminals shall be provided in the DB. All sheet steel section shall be electrically connected with earth.
6. DB shall be mounted on wall/ pillar.
7. The breaking capacity of MCBs should not be less than 10KA & 'C' curve.

The DB/panel shall be comprised with following switchgears:

Incoming circuit:

- 1 No. 40A MCB DP, 'C' curve.

Outgoing circuit:

- **3 Nos. 16 Amp. 30 mA. sensitivity RCBO DP.** RCBO shall be of LK (FORMERLY L&T) cat. No. **AUF3C201603** or legrand cat. No. **4113 24** or its equivalent of make as per List of Approved Make given below.

Note: Technical specification of above MCBs is given in Annexure II given below.

Contractor shall have to supply materials as per List of Approved Make given below & got approved by Sr. DEE/G/ADI or SSE/incharge before supply.

(V) Technical specification for item No. 35 of SCHEDULE 'A', item No. 11 of SCHEDULE 'C', item No. 11 of SCHEDULE 'D' and item No. 15 of SCHEDULE 'E' of rates and quantities: [Octagonal GI pole 5 mtr.]:

The contractor has to supply and erect Octagonal GI pole 5 mtrs long on cement concrete foundation complete with foundation bolt, inbuilt junction box etc. Make of octagonal pole- Bajaj, Philips, BPP, Crompton, RR ISPAT, TRANSRAIL, VSTP (Vipin S. T. Poles Pvt. Ltd.), KP Green Or steel manufacturer approved by CORE of TRD mast and shall be got approved from Sr. DEE/G/ADI or SSE/incharge before supply.

DESIGN OF POLE:-

The Octagonal Poles shall be designed to withstand the maximum wind speed as per IS 875 as these poles. The top loading i.e. area and the weight of fixtures are to be considered to calculate maximum deflection of the pole. The pole shall be **octagonal** cross section and shall be continuously tapered with **single longitudinal welding without** any circumferential welding. The bottom dia. shall be 130mm (Across Face) and top dia. shall be 70mm (Across Face) made up of 03mm thick plate. The base plate shall be of size not less than 200x200x12mm. The hot dip galvanization shall be not less than 65 micron and shall be uniform and smooth finish. No minus side variation in dimensions is allowed.

The octagonal Poles shall have door opening of approximate 400 mm length at the elevation of 600 mm from the Base plate. The door shall be vandal resistance and shall be weather proof to ensure safety of inside connections. The door shall be flush with the exterior surface and shall have suitable locking arrangement. There shall also be suitable arrangement for the purpose of earthing. The pole shall be adequately strengthened at the location of the door to compensate for the loss in section. Bakelite sheet with stud terminal & fuse shall be provided inside the opening for the purpose of termination of cables /wires.

The contractor shall also have to provide suitable bracket on the top of the pole for mounting one/two Nos. Street light fitting as per site requirement and instructed by SSE/incharge. Supply price shall include poles, Suitable bracket, terminal strip & OEM name plate.

DESIGN OF FOUNDATION.

The RCC foundation shall be of 500x500 square and 1000 mm long. The foundation shall be 200mm above the ground level. The foundation shall have 04 Nos. M 16x 600 long "J" type GI bolts along with template and suitable reinforcement. Grade of RCC for foundation shall be M20. The contractor shall arrange cement, sand, concrete & water on their own cost.

Connection to the street light fittings shall be given through inside the pole with flexible, 3-core, multistrand copper conductor, PVC insulated & sheathed wire. Erection of pole means RCC foundation, J bolt, wiring, testing & commissioning etc.

Note:

1. The octagonal pole, bracket, foundation bolt and fastner shall be supplied by OEM only. The inspection of poles shall be offered by contractor at the approved make manufacturer's premises at his own cost before supply at site.
2. Make should be got approved from Sr. DEE/G/ADI or SSE/incharge before supply.
3. If poles or any parts of pole corroded it shall be repaired/replaced by the contractor at his own cost.

(W) Technical specification for item No. 36 of SCHEDULE 'A' of rates and quantities: [Supply, installation, testing and commissioning of 20 Meter high mast]

Contractor shall erection, testing & commissioning of 20 mtr. High mast complete with with panel, fencing, foundation and all associated accessories.

SCOPE:

The scope of this specification covers the manufacture, transport, installation, testing and commissioning of the Raising and Lowering type of High mast towers including the Civil Foundation Works. All items required for the safe and efficient operation and maintenance of the high- mast, whether explicitly stated in the following pages or not, shall be included in the Contract.

Applicable Standards:

The following shall be the Reference Standards for the loading of the High mast.

Sr. No.	Code No.	Title
[a]	I.S. 875(Part iii), 1987	Code and practice for design loads for Structure.
[b]	BSEN10025	Grade of MS Plates.
[c]	BSEN I.S.O. 1461	Galvanizing
[d]	TR.No.7, 1996 of ILE, UK	Specification for Mast and foundation.

HIGH MAST

Make of high mast shall be of Bajaj, Philips, BPP, Crompton, RR ISPAT, TRANSRAIL, VSTP (Vipin S. T. Poles Pvt. Ltd.), KP Green Or steel manufacturer approved by CORE of TRD mast.

Structure:

The High mast shall be of continuously tapered, polygonal cross section, at least 20 sided presenting a good and pleasing appearance and shall be based on proven. In- tension design conforming to the standards referred to above, to give an assured performance and reliable service. The structure shall be suitable for wind loading as per IS 875 Para 3 1987.

Construction:

The mast shall be fabricated from special steel plates, conforming to BS-EN 10-025. The welding shall be in accordance with BS, 5135/AWS. Mast shall be delivered in multiple sections of effective length 10 meters. Thus a 20 Mtr mast shall be delivered in Two sections to site. At site the sections shall be joined together by slip- stressed- fit method. No site welding or bolted joint shall be done on the mast. The minimum overlap distance shall be 1.5 times the diameter at penetration. **There shall be only one longitudinal seam weld per section.** Sections with more than one weld, circumferential or longitudinal shall not be accepted. No site welding or bolted joint shall be done on the mast. **Detailed design calculation of the mast shall be submitted for verification along with the type test certificate.**

Height of mast	Total weight of (Top-middle-Bottom & lantern carriage)	Top Dia.	Bottom Dia.	Thickness of base plate	Dia .of base plate.	Thickness of section
30 mtr in Three sections	1360 Kgs	150mm	600 mm	30mm	750mm	Top-4mm Middle-4mm Bottom-5mm
20 mtr in two sections	680 Kgs	150mm	460 mm	25mm	670mm	Top-3mm Bottom-4mm

The mast shall be provided with fully penetrated flange, which shall be free from any lamination or incursion. The welded connection of the base flange shall be fully developed to the strength of the entire section. The base flange shall be provided with supplementary gussets between the bolt holes to ensure elimination of helical stress concentration. For the environmental protection of the mast, the entire fabricated mast shall be hot dip galvanized, internally and externally, having a uniform thickness of 85 microns for the bottom section and 70 micron for the middle and top section as per BSEN ISO 1461. Galvanizing shall be done in single dipping method for better adhesion and life. Anchor (foundation) bolts along with anchor plate (in casting inside) and base plate shall be supplied.

DOOR OPENING:

An adequate door opening shall be provided at the base of the mast and the opening shall be such that it permits clear access to equipment like winches, cable, plug and socket etc. and also facilitate easy removal of the winch. The door opening shall be complete with a close fitting, vandal resistant, weather proof door provided with a heavy duty double internal lock with special paddle key.

The door opening shall be carefully designed and reinforced with welded steel section, so that the mast section at the base shall be unaffected and undue buckling of the cut portion is prevented. Size of door opening shall not be more than 1200 x 250 mm to avoid buckling of the mast section under heavy wind conditions.

DYNAMIC LOADING FOR THE MAST:

The mast structure shall be suitable to sustain an assumed maximum reaction arising from a wind speed as per IS 875 (three seconds gust) and shall be measured at a height of 10 metre above ground level. The mast shall have wind load factor of 1.25 and material factor of 1.15 (minimum). The design life of the high mast shall be a minimum of 25 years.

LANTERN CARRIAGE:

A fabricated Lantern Carriage shall be provided for fixing and holding the flood light fittings and control gear boxes. The Lantern Carriage shall be of special design and shall be of steel tube construction, the tubes acting as conduits for wires, with holes fully protected by grommets. The Lantern Carriage shall be so design and fabricated to hold the required number of (As per site condition decided by Railway) flood light fittings and the control gear boxes, and also have a perfect self balance.

The Lantern Carriage shall be fabricated in two halves and joined by bolted flanges with stainless steel bolts and nyloc type stainless steel nuts to enable easy installation or removal from the erected mast. The inner lining of the carriage shall be provided with protective PVC arrangement, so that no damage is caused to the surface of the mast during the raising and lowering operation of the carriage. The entire Lantern Carriage shall be hot dip galvanized after fabrication.

JUNCTION BOX:

Weather proof junction box made of Cast Aluminum shall be provided on the Carriage Assembly as required from which the inter connections to the designed number of the flood light luminaries and associated control gears fixed on the carriages shall be made.

RAISING AND LOWERING MECHANISM:

For the installation and maintenance of the luminaries and lamps, it will be necessary to lower and raise the Lantern Carriage Assembly. To enable this, a suitable Winch Arrangement shall be provided with the winch fixed at the base of mast and the specially designed head frame assembly at the top.

WINCH:

The winch shall be of completely self-sustaining type, without the need for brake shoe, spring or clutches. Each driving spindle of the winch shall be positively locked when not in use, gravity activated PAWLS. Individual drum also should be operated for fine adjustment lantern carriage. The capacity, operating speed, safe working load, recommended lubrication and serial number of the winch shall be clearly marked on each winch.

The gear ratio of the winch shall be 53:1. However, the minimum working load shall be not less than 500kg. The winch shall be self –lubricating type by means of an oil bath and the oil shall be readily available grades of reputed producers.

The winch drums shall be grooved to ensure perfect seat for stable and tidy rope lay, with no chances of rope slippage. The rope termination in the winch shall be such that distortion or twisting is eliminated and at least 5 to 6 turns of rope remains on the drum even when the lantern carriage is fully lowered and rested on the rest pads. It should be possible to operate the winch manually by a suitable handle or by an integral power tool. It shall be possible to operate the winch manually by a suitable handle or by an integral power tool. It shall be possible to remove the single/ double drum after dismantling, through the door opening provided at the base of the mast. Also a winch gear box for simultaneous and reversible operation of the single/ double drum winch shall be provided as part of the contract.

The winch shall be tested in the presence of a Railway representative and the test certificates shall be furnished before supply of materials. A test certificate shall be furnished by the Contractor from the original equipment manufacturer for each winch in support of the maximum load operated by the winch.

HEAD FRAME:

The head frame which is to be designed as a capping unit of the mast shall be of welded steel construction galvanized both internally and externally after assembly. The top pulley shall be of appropriate diameter, large enough to accommodate the stainless-steel wire ropes and the multi- core electric cable. The pulley block shall be made of non-corrodible material and shall be of die cast Aluminium Alloy (LM-6). Pulley made of synthetic materials such as Plastic or PVC is not acceptable. Self –lubricating bearings and stainless-steel shaft shall be provided to facilitate smooth and maintenance free operation for a long period. The pulley assembly shall be fully protected by a canopy galvanized internally and externally.

Close fitting guides and sleeves shall be provided to ensure that the ropes and cables do not dislodge from their respective positions in the grooves. The head frame shall be provided with guides and stops with PVC buffer for docking the lantern carriage.

STAINLESS STEEL WIRE ROPES:

The suspension system shall be Two Wire ropes only without any intermediate joint and shall consist of only non- corrodible stainless steel of AISI 316 or better grade.

The stainless-steel wire ropes shall be of 7/19(minimum) construction the central core being of the same material. The overall diameter of the rope shall not be less than 6 mm. The breaking load of each rope shall not be less than 2350 Kg. giving a factor of safety of over 5 for the system at full load as per the TR-7 referred to in the beginning of this specification. The end constructions of ropes to the winch drum shall be fitted with talurit. The thimbles shall be secured on ropes by compression splices. **Two continuous lengths of stainless-steel wire ropes shall be used in the system and no intermediate joints are acceptable in view of the required safety. No intermediate joints/termination, either bolted or else, shall be provided on the wire ropes between winch and lantern carriage.**

ELECTRICAL SYSTEM, CABLE AND CABLE CONNECTIONS:

A suitable terminal box shall be provided as part of the contract at the base compartment of the high mast for terminating the incoming cable. The electrical connection from the bottom to the top shall be made by special trailing cable. The cable shall be EPR insulated and PCP sheathed to get flexibility and endurance. The size of the cable shall be minimum 5 core 2.5 sq. mm. copper. The cable shall be of Polycab, Finolex, RR Kabel, Havells, Avocab, LK (FORMERLY L&T), Anchor, HPL, Fortgloster, KEI, APAR Industries, JOHNSON CAB ELECTRICALS PVT.LTD, Kenter, Darshan plus, Pressfit, Luker make. At the top there shall be weather proof junction box to terminate the trailing cable. Connection from the top junction box to the individual luminaries shall be made by using 3 core 1.5 sq. mm flexible copper PVC cables. The cables shall be of 1100V grade conforming to relevant ISS with IS of make Polycab, Finolex, RR Kabel, Havells, Avocab, LK (FORMERLY L&T), Anchor, HPL, Fortgloster, KEI, APAR Industries, JOHNSON CAB ELECTRICALS PVT.LTD, Kenter, Darshan plus, Pressfit, Luker. The system shall have in built facilities for testing the luminaries while in lowered position.

Also, suitable provision shall be made at the base compartment of the mast to facilitate the operation of internally mounted, electrically operated power tool for raising and lowering of the lantern carriage assembly. The trailing cables of the lantern carriage rings shall be terminated by means of specially designed, metal clad, multi-pin plug and socket provided in the base compartment to enable easy disconnection when required.

Connection to the luminaries should be done in such a way that rain water could not damage the luminaries and mast.

POWER TOOL FOR THE WINCH:

A suitable, high-powered, electrically driven, internally mounted power tool, with manual over ride shall be supplied for the raising and lowering of the lantern carriage for maintenance purposes. The speed of the power tool shall be to suit the system. The power tool shall be single speed, provided with a motor of the required rating. 1.0 HP (minimum) rating. The power tool shall be supplied complete with suitable control. The capacity and speed of the electric motor used in the power tool shall be suitable for the lifting of the design load installed on the lantern carriage.

The power tool mounting shall be so designed that it will not only be self-supporting but also aligns the power tool perfectly with respect to the winch spindle during the operation. Also, a handle for the manual operation of the winches in case of problem with the electrically operated tool, shall be provided and shall incorporate a torque limiting device.

The power tool operation shall always be through a separate torque –limiting device to protect the wire ropes from over stretching. It shall be mechanical with suitable load adjusting device. The torque limiter shall trip the load when it exceeds the adjusted limits. There shall be suitable provision for warning the operator once the load is tripped off. The torque limiter is a requirement as per the relevant standards in view of the overall safety of the system. Each mast shall have its own power tool motor.

- After fixing power motor (Tool for driven lantern) cover should be closed completely in high mast.
- Stopper should be supplied by the company.

LIGHTING FINIAL:

One number heavy duty hot dip galvanized lighting finial shall be provided for each mast. The lighting finial shall be minimum 1.2 M in length and shall be provided at the center of the head frame. It shall be bolted solidly to the head frame to get a direct conducting path

to the earth through the mast. **The lighting finial shall not be provided on the lantern carriage under any circumstances in view of safety of the system.**

AVIATION OBSTRUCTION LIGHT:

Suitable Aviation Obstruction Light of reliable design and reputed manufacturer shall be provided on top of each mast.

EARTHING TERMINALS:

Suitable earth terminal using 12 mm diameter stainless steel bolts shall be provided at a convenient location on the base of the Mast, for lighting and electrical earthing of the mast.

FEEDER PILLAR:

Each mast shall be provided with a feeder pillar fabricated out of 14 SWG CRCA sheet and finished with two coats of red oxide primer and grey enamel paint of shade 631 of IS-5. The feeder pillar shall comprise of incoming 63Amp TPN MCB, copper wiring, outgoing terminals and contactor for reversing the motor, Switch Fuse Unit, HRC fuse. All bus-bars, incoming /outgoing terminals and controls for the power motor. Feeder pillar shall be mounted on suitable foundation near to the mast. Control panel should be of same company of which high mast is being provided.

Contractor shall supply, install, test and commission astronomical time switch suitable for 110-240 V AC, 1 Phase 2 Wire 50Hz supply with 3 pole MNX 25A contactor in feeder pillar.

Astronomical time switch having following feature:

- Latitude/Longitude precise to the minute with time zone.
- Sunrise/sunset or twilight rise/set trigger modes.
- DST, Offset, OFF hours, weekly OFF features.
- 12/24 hour display format.
- 6 years battery reserve.
- Easy manual over ride.
- Ideal for outdoor & street light application.

Astronomical time switch shall be of LK (FORMERLY L&T) model No. **T2DDT7** or its equivalent model of Hager, MDS, GE, Indoasian, Indokupp, HPL, Havells, Legrand, C&S, Oreva, Bentec, LK (FORMERLY L&T) and shall be got approved from Sr.DEE/G/ADI or SSE/electrical before supply.

3 pole contactor having AC3 rating 25A confirms to IS/IEC 60947-4-1. The contactor shall be Cat. No. **CS94110** of LK (FORMERLY L&T) or equivalent of GE, Siemens, HPL, Indoasian, Havells, Legrand, ABB, Schneider, C&S, BCH, Hager make.

INCOMING POWER CABLE:

A cable of size 4x10 sq. mm Aluminium armoured cable for power supply and 4 x 2.5 sq. mm Copper stranded conductor Armoured cable for motor supply, shall be provided from feeder pillar to the base compartment of the high mast. 1100V grade, conforming to IS:1554 Part-I(Latest) with ISI make cable shall be taken to the base compartment of the high mast through the provision made in the foundation.

Fencing:

The contractor shall have to be cut existing rail poles in 2 meters long pieces and made high mast fencing by erecting 8 Nos. rail poles of 2 meters length in approx. circular fashion around the high mast (as per drawing approved by Sr.DEE(G)/ADI) or SSE/electrical. MS strip of 40mm. x 5mm. is to be provided horizontally and weld properly with the rail pole. MS strip will be supplied by contractor. Fencing must cover the feeder pillar (Control panel) of high mast and to be done in such a way that no heavy vehicle could get space to enter inside the fencing area. Contractor shall have to submit drawing of high mast fencing and to get approval from Sr.DEE/G/ADI or SSE/incharge before erection.

Complete fencing shall have smooth finishing and shall not have any sharp edges being potential hazard for maintenance staff in future.

Rail poles shall be provided with double coating of anti-corrosion paint and final coating with aluminum silver paint.

Rails are to be provided by Railway. Contractor has to cut these rails as 2 meter long rail pole and to be installed properly around the high mast. 600mm portion of pole should be buried in ground with PCC in the ratio of 1:2:4.

For carrying out the foundation of rail poles about 600 mm. portion of pole shall be firmly buried in the 300mm length x 300mm breadth x 600 mm deep foundation of cement, concrete & sand in the ratio 1:2:4. Muffing having dia. of 250 mm & length of 250 mm. with cement, concrete & sand in the ratio 1:2:4. Surface of muffing must be smooth. Contractor has to provide two coat of lime on cemented structure after completion of work.

MS strip of 40mm. x 5mm, cement, sand, concrete & water shall be arranged by the contractor.

STANDARDS AND SPECIFICATIONS APPLICABLE:

1.	Switch gear	:	LT switch gear utilization category-AC 23A:IS:139 (P-3) IEC 947 (P-3)
2.	High mast	:	Wind velocity as per IS 875 Pt -3 Code of practice for Grade of MS plates –BSEN-10025/DIN 17100 Welding – BS 5135/AWS, Galvanization –BS, 150146 / BS 729. Mast foundation -TR No. 7, 1996 of ILE UK SS wire rope-AISI 316/304
3.	Earthing	:	Drawing No. EL/ADI/51/2717/20 of Sr. DEE/G/ADI. IS: 3043-1987 for pipe earthing.

NOTE:

- The foundation for high mast shall have to be as per design of high mast manufacturer and the work of foundation as well as erection of high mast shall be carried out under supervision of high mast manufacturer or his authorized representative. The contractor shall have to submit a certificate to this effect from the high mast manufacturer before raising the bill for installation, testing and commissioning.

- Contractor shall arrange necessary inspection for high masts as per Railways requirement at the high mast manufacturer premises.
- The contractor shall have to arrange inspection of the high mast at the manufacturer's premises at his own cost.

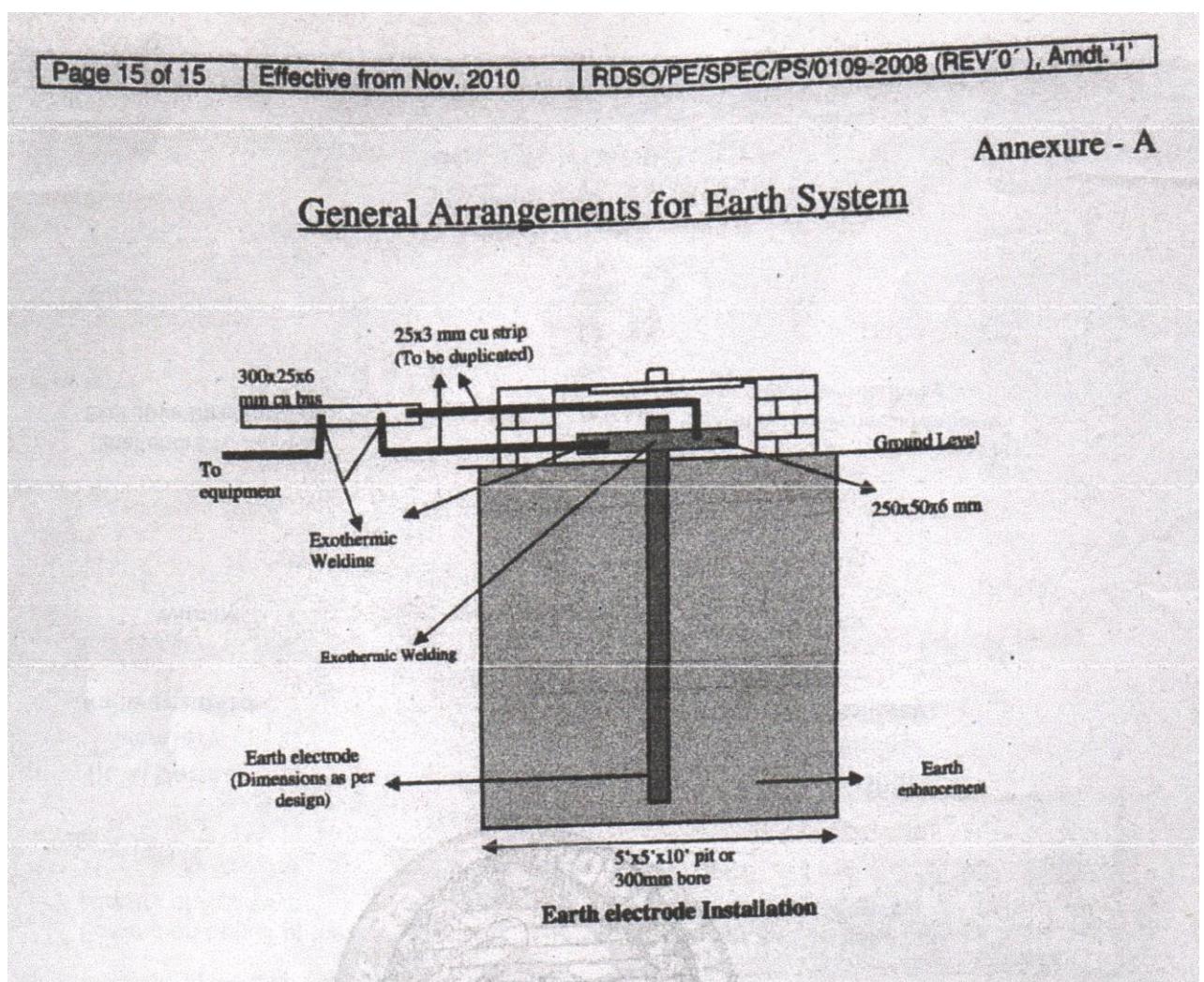
(X) Technical specification for item No. 38 of SCHEDULE 'A', item No. 07 of SCHEDULE 'B', item No. 10 of SCHEDULE 'C', item No. 10 of SCHEDULE 'D', and item No. 27 of SCHEDULE 'E' of rates and quantities: [Maintenance free earthing]

Contractor shall provide Maintenance free earthing complete with all accessories shall be as per RDSO Spec No. RDSO/PE/SPEC/PS/0109(REV.0)-2008, Amendment '1', which should be downloaded from the internet by the contractor.

Maintenance free earthing shall consist of the following: -

1. High tensile-low carbon steel rod having diameter not less than 17mm complying with requirements of BS 4360 Grade 43A or EN10025:2-004 S275JR, molecularly bonded by 99.99% pure high conductivity copper on outer surface with copper coating thickness of 250 micron or more, Length 3000 mm (minimum). Certificates from NABL approved labs shall be submitted with test results.
2. Copper earth busbar of size 250 mm x 50 mm x 6 mm having electrical conductivity of 101% IACS, minimum 99.9% copper content shall be exothermically welded to rod with 4 holes of 12 mm dia. (2 on each side) for connecting earthing conductor.
3. Earth Enhancement compound should have characteristics as mentioned in the RDSO specs., should have low resistivity preferably below 0.2 Ohm-meters, supplied in sealed bags, minimum 75Kgs per pit for 5' x5' x10' size pit and minimum 50Kgs per pit for 300mm bore type pit. The bags shall be marked with manufacturer's name or trade name, quality, batch no. & date of manufacture. Certificates from NABL approved labs shall be submitted with test results, for at least following parameters.
 - i. Composition of Earth Enhancement compound.
 - ii. Resistivity : <2 Ohm-meters
 - iii. pH value : >7 but <9
 - iv. Moisture retain capacity :> 10% at 105 degree Celsius.
 - v. Water solubility : < 5%
4. Backfill material: Good quality soil or excavated soil free from sand, gravel and stones shall be used for backfilling.
5. Earth pit of size 5ft x 5ft x 10ft or min 300 mm bore up to 10ft using earth auger shall be made.
6. Inspection chamber: A concrete box of 300X300X300 mm (inside dimension) & 50mm thickness of wall, with smooth cement plaster finish shall be provided on the top of the pit. A concrete lid, painted black, approx. 50 mm. thick with pulling hooks, shall be provided to cover the earth pit. PVC sleeve shall be provided in concrete wall to take out earthing connections.
7. On backside of the cover, date of the testing and average resistance value shall be written with yellow paint on black background.

8. A copper main busbar of size 300mm x 25mm x 6mm to be installed on nearby wall etc. and must be connected with two copper strips of 25mm x 3mm size each, up to a distance of 05 mtrs from earth busbar.
9. Earthing shall generally be carried out in accordance with the requirement of I.E. rules, 1956, as amended from time to time and shall confirm to IS: 3043 of 1987 with latest amendment.
10. The earth value shall be measured & recorded at the site by painting on earth pit or nearest wall, along with date of testing. It shall be less than 2 ohms and neutral to earth voltage shall be less than 3 volts.
11. Earthing performance after a year of installation shall be jointly checked & measured. It should be less than 2 Ohm.
12. General arrangement of the earth system shall be as per following sketch.



**(Y) Technical specification for item No. 40 of SCHEDULE 'A' of rates and quantities:
[SITC Wall mounted]**

The contractor shall supply of 400 mm sweep wall mounted fan complete with all associated accessories as per specification given under.

Sweep	400 mm.
Rated Air delivery	70 CMM
Rated Speed	1320 RPM
Rated Power	50W

Wall mounted fan shall be ESTEEM of Bajaj make or equivalent of Crompton, Usha, Almonard, Bajaj, Havells, Orient, Luker and shall be got approved from Sr.DEE/G/ADI or SSE/incharge before supply.

**(Z) Technical specification for item No. 41 of SCHEDULE 'A' of rates and quantities:
[Heavy duty Exhaust Fan]**

The contractor shall supply 300 mm sweep heavy duty exhaust fan complete with all associated accessories as per specification given under.

Sweep	300 mm.
Air delivery	1275 CMH
Speed	900 RPM
Rated Power	55W

Heavy duty exhaust fan shall be Supreme Plus of Bajaj make or equivalent of Crompton, Usha, Almonard, Khetan, Havells, Bajaj, LUKER and shall be got approved from Sr.DEE/G/ADI or SSE/incharge before supply.

(AA) Technical specification for item No. 42 of SCHEDULE 'A' of rates and quantities: [FEEDER PILLAR]

1. The contractor shall have to design and supply feeder pillar fabricated by 2 mm thick MS sheet. The drawing, design switch gears with make and model of the feeder pillar shall be submitted by the contractor & got approved by Sr. DEE/G/ADI or SSE/incharge before fabrication.
2. The feeder pillar shall be outdoor rectangular cubicle type, dust and vermin proof.
3. 200A current carrying capacity bus bar of suitable length (Total 04 nos.) for main circuit and neutral shall have uniform cross section electrolytic tinned copper with color coded heat shrinkable PVC insulated and current density of 1.6 Amp/mm² cross sectional area.
4. Knock out / gland plates as applicable shall be provided. Gland plates of suitable size shall be designed for terminating cables in a straight and easy manner.
5. The feeder pillar shall have metal locks & operated by a common key. All covers & doors to be provided with neoprene gasket. Hinged doors shall be provided on both sides.
6. The sheet steel enclosure / angle / channel used in the fabrication of feeder pillar shall be provided with double coating of red oxide and final coating of light grey powder coated paint.
7. Caution board in Hindi, Gujarati & English of metallic type shall be supplied with feeder pillar.
8. Minimum two earth terminals shall be provided in the feeder pillar all sheet steel section shall be electrically connected with a separate G.I. earth strip of 50x6 mm size across the panel at bottom.

9. The breaking capacity of MCCBs should not be less than 35KA and should have microprocessor based release & Rotary handle.

The feeder pillar shall be comprised with following items:

- **1 No. 160 Amp. MCCB 4-pole** microprocessor based release. **Specification of MCCB is given in Annexure II given below.**
- Distribution copper busbar.

Contractor shall have to supply materials as per List of Approved Make given below & got approved by Sr. DEE/G/ADI or SSE/incharge before supply.

Note:- The contractor shall have to arrange inspection of the feeder pillar at the manufacturer's premises at his own cost.

(BB) Technical specification for item No. 43 of SCHEDULE 'A' and item No. 31 & 32 of SCHEDULE 'E' of rates and quantities: [RCBO]

The contractor shall supply or supply, installation, testing and commissioning (As per mentioned in Schedule) 16 Amp, 30mA sensitivity RCBO DP with metal enclosure of same make with ISI mark only. RCBO should be cat. No. **4113 24** of Legrand or model No. **AUF3C201603** of LK (FORMERLY L&T) make or equivalent of make as per List of Approved Make given below.

Contractor shall have to supply materials as per List of Approved Make given below. The contractor should submit the copy of challan or bill for above material from the manufacturer/authorized dealer issued on the name of contractor.

(CC) Technical specification for Item No. 44 of SCHEDULE 'A' of rates and quantities: [8 lockers steel almirah]:

The contractor shall supply 8 lockers steel almirah as per specification given under:

Material	M.S sheet conforming to commercial quality CR-1, Grade 340 of IS 513:2008 (reaffirmed 2013) (Fifth Revision) Amdt. no.1
Sheet Thickness of body, back shelves and pedestal (mm)(+/- 5%)	0.8
Sheet Thickness of door (mm) (+/- 5%)	0.8
Handle	Electroplated Mild steel handle
Number of compartments	8
Height of dressers without pedestal in mm (± 5 mm)	1855
Width of dressers in mm (± 5 mm)	910
Depth of dressers in mm (± 5 mm)	450
Stiffened Pedestal height in mm (± 5 mm)	125

Note:-The make & model of 8 lockers steel almirah shall be submitted by the contractor & got approved by Sr. DEE/G/ADI or SSE/incharge before supply.

(DD) Technical specification for Item No. 45 of SCHEDULE 'A' of rates and quantities: [steel almirah]:

The contractor shall supply steel almirah as per specification given under:

Number of door	2
Installation	Free standing
Pedestal	Yes
Pedestal fitted with	3 mm Teflon Bush
Pedestal height (± 5 mm)	125 mm
Locker required	Yes
Door type	Hinged
Door stiffener up to full door height provided	Yes
Shelves required	Adjustable
Number of shelves	3
Steel sheet material	CRCA sheets conforming to grade CRI of IS 513 (Part-1) 2016 with latest amendments
Stiffener material	Ms sheet
Almirah height (excluding the pedestal height) ± 5 mm	1325 mm
Almirah width ± 5 mm	900 mm
Almirah depth ± 5 mm	505 mm
Locker inside height ± 5 mm	300 mm
Locker inside width ± 5 mm	Half size of almirah width
Side sheet thickness	0.8 mm
Back sheet thickness	0.8 mm
Top sheet thickness	0.8 mm
Bottom sheet thickness	0.8 mm
Shelves sheet thickness	0.8 mm
Shelves supporting bracket thickness	1.6 mm
Door metal stiffeners material	0.8 mm
Steel almirah lock/Locker lock	Six lever locker
Material of lock	Brass and steel finish
Duplicat keys (for each)	Yes
Keys material (for each lock)	Steel
Powder coating	With 50 micron thickness minimum

Note:-The make & model of steel almirah shall be submitted by the contractor & got approved by Sr. DEE/G/ADI or SSE/incharge before supply.

(EE) Technical specification for Item No. 46 of SCHEDULE 'A' of rates and quantities: [Office chair]:

The contractor shall supply office chair as per specification given under:

Type of material (other than wood) used in Polythene cane Chair	hot pressed board
Frame Material	CRCA ERW round pipe
Material of Fabric of Seat Cover	Polyurethane
Thickness of Plywood used in Seat ± 1 (mm)	40 mm

GSM/Thickness of Fabric ± 5 (Gram per Sq. Meter)	80 Gram per Sq. Meter
Density of Polyurethane Foam Used in Seat ± 2 (Kg/Cub M)	45 Kg/Cub. M
Density of Polyurethane Foam Used in Backrest ± 2 (Kg/Cub M)	45 Kg/Cub. M
Arm Material	Chrome mild steel
Thickness of Polyurethane Foam Used in Backrest IN MM (+/- 3 mm)	50 mm
Thickness of Polyurethane Foam Used in Seat IN MM (+/- 3 mm)	50 mm
Shoe Type	Polypropylene
Chair Type	With Arms
Frame Type	4 Legs
Size of Material (mm)	16 gauge tubular pipe
Chair Height ± 15 (mm)	890 mm.
Seat Depth ± 10 (mm)	500 mm.
Seat Width ± 10 (mm)	470 mm.
Seat Height IN MM ± 5 (mm)	460 mm.
Backrest Width ± 10 (mm)	450 mm.
Backrest Height ± 10 (mm)	450 mm.
Arm Length ± 5 (mm)	250 mm.
Arm Width ± 2 (mm)	40 mm.
Paint type	Powder coated on MS

Office chair shall be of Heera or HOF or Ambica or Godrej or other make and shall be got approval from Sr. DEE/G/ADI or SSE/incharge before supply.

(FF) Technical specification for Item No. 47 of SCHEDULE 'A' of rates and quantities: [Steel table]:

The contractor shall supply steel table as per specification given under:

Storage Unit and Drawer Units Material	0.6 mm M S Sheet
Storage	one side
Total Number of Storage Units	triple storage
Table Top Material and Thickness (± 2 mm)	18 mm. thick prelaminated Particle Board
Pedestal (Under structure)	Mild steel rectangular section of outside minimum 30 mm X 20 mm & Wall thickness minimum 1.2 mm
Table Top Length ± 10 (mm)	1500 millimeter
Table Top Width ± 10 (mm)	750 millimeter
Thickness of PVC tape on edges of Table Top banded with the help of hot melt glue (mm)	2.0 mm
Storage Unit and Drawer Units Material	0.6 mm M S Sheet
Shoes Material	nylon

Steel table shall be of Heera or HOF or Ambica or Godrej or other make and shall be got approval from Sr. DEE/G/ADI or SSE/incharge before supply.

(GG) Technical specification for item No. 48, 49 & 50 of SCHEDULE 'A' of rates and quantities: [Supply of MCB]:

➤ **Item No. 48 of SCHEDULE 'A'**

The contractor shall supply 16A MCB DP, 'C' Curve as per specification given in Annexure II given below.

➤ **Item No. 49 of SCHEDULE 'A'**

The contractor shall supply 40A MCB FP, 'C' Curve as per specification given in Annexure II given below.

➤ **Item No. 50 of SCHEDULE 'A'**

The contractor shall supply 63A MCB FP, 'C' Curve as per specification given in Annexure II given below.

The contractor should submit the copy of challan or bill for the MCB supplied from the manufacturer/authorized dealer issued on the name of contractor.

(HH) Technical specification for Item No. 06 of SCHEDULE 'B' of rates and quantities: [Supply, fixing, testing and commissioning of 600x600x3.5 mm copper plate earthing]

Provision of earthing should be carried out as per drawing, having copper plate size of 600x600x3.5 mm, GI pipe having 19 mm dia. approx 2.7 meter long B class of Zenith, Prakash Surya, Jindal, TATA, Swastika, Asian makes only to be used with wire mesh funnel. The earth shall not be situated less than 1.5 meters from any building.

Plate Earthing should be carried out as per IS 3043- 1987 as amended latest and as per Sr. DEE office drawing No. **EL/ADI/51/2476/09**. Drawing shall be available on demand. The earth resistance value shall be measured and tested jointly. The earth resistance should be less than one ohm. It shall be displayed at site by painting nearby wall with red paint surface of size 200X200 mm and noted with white paint as Date of measurement, Earth resistance in Ohms and W/O no.

The earthing shall be connected from earth pit to transformer body / neutral point/ VCB body/ LT panel with 25X6 mm size Annealed Cu strip with PVC green sleeve & other accessories as required.

The electrode shall be suitably protected from mechanical injury by being recessed in walls. The earthing strip shall be buried at least 30 cm (1 foot) deep below ground level and on wall with suitable clamp and connection/ testing. The casing-capping shall be used on wall in place of PVC pipe as per site requirement.

An earthing chamber of cement concrete with RCC slab as per drawing shall be provide on each earthing.

Copper purity certificate of copper plate testing shall be submitted by contractor from Govt. approved laboratory. The contractor should submit the copy of challan for satisfying that **Copper plate** have been purchased from manufacturer/authorized dealer of particular make being used.

(II) Technical specification for item No. 08 of SCHEDULE 'B' and item No. 28 of SCHEDULE 'E' of rates and quantities: [G.I. EARTH STRIP 25x3 mm]

Contractor has to supply, installation, testing & commissioning GI earth strip size-25x3mm with PVC sleeve on walls, ceiling etc. for providing interconnections for different panels and transformers, electrical equipments to earthing. GI strip should be connected with necessary non rusting clamps, washers, nuts and bolts etc.

(JJ) Technical specification for item No. 01 of SCHEDULE 'E' of rates and quantities: [Distribution board/ panel]

1. The scope of work includes, Design, fabrication, supply, loading, transportation, unloading to the site, installation, testing and commissioning of LT panel with following specifications. The work also includes removing of existing feeders and cables from old panels and transformer and reconnecting them properly (by following all safety norms) to the new panel. The re-routed cables shall be properly clamped / saddled / harnessed with the help of GI saddles / M.S. clamps of adequate size.
2. The panel design shall be done through panel design software. The design of the panel shall be submitted to Sr. DEE/G/ADI or SSE/incharge for approval.
3. The entire panel shall be confirming to relevant IS with latest amendments, & IP54 protection. The contractor shall submit original test report, certified through CPRI / ERDA Govt. Testing Agencies.
All the switchgears i.e. ACBs, MCCBs & MCBs shall be of same make.
4. **Panel fabrication:** The Boards shall be fabricated with multifold frame design. Frame should be made out of 2mm thick CRCA sheet steel for outdoor installation. Panel will be Single / Double front, shall be of 'form 3b' construction. Internal fabrication will be bolted / Press fit type. Galvanized Plain Skin Pass (GPSP) / as per OEM sheets may be used for mounting all switchgear. Doors to be fabricated from 2mm sheet multifold design. Side covers will be removable to extend the panel on both sides. The design of the panel shall be compact and modular compartmentalized. Doors and covers should be powder coated and should have EPDM/Neoprene gasket. Doors should be with protective cover / additional door to offer IP54 protection. Unsupported span of sheet steel of main framework and door shall not exceed 1 meter in any direction. Both sides properly ventilated & having sufficient space for maintenance.
Suitable engraved black letters on white nameplates and identification labels of metal for all switchboards and Circuits shall be provided. These shall indicate the feeder number and feeder designation.
5. **Painting:** Powder coating shall be done by surface coating comprising pre-treatment, electrostatic powder spraying & curing by the heat treatment process. CRCA sheet steel used in the fabrication of switchboards shall undergo a rigorous cleaning and surface treatment seven tank process comprising of alkaline degreasing, descaling in dilute sulphuric acid and a recognised phosphating process after which a coat of primer paint with the final paint shall be applied over the treated surface. Final paint coat of oven baked powder coating, of minimum 70-micron thickness shall then be provided. Suitable engraved black letters on white nameplates and identification labels of metal for all Switchboards and Circuits shall be provided. These shall indicate the feeder number and feeder designation.
6. All accessories required for installation and commissioning of the

switchgears/panels etc., whether specifically mentioned or not, are included in the rate and scope of the work.

7. **Busbar:** One set of (3 phases + neutral) bus bars of min. 97% conductivity electrolytic grade copper busbar with current density of 1.6A per Sq. mm of appropriate capacity and size shall be provided in each panel. The certification from original Bus Bar manufacturer specifying conductivity may also be submitted. Busbar support shall be press-fit grip type only. Material used should be SMC / DMC / Nylon 66 which can withstand temperature rise during short circuit condition. They should have minimum Comparative Tracking Index (CTI) of 600V (as per IS 2824).
All bus bars shall be color-coded. Minimum clearances between phases / live parts shall be 25 mm and phases/ live parts/ neutral to ground shall be 19 mm except on the equipment terminals. All bus bars should be verified for its conductivity using conductivity meter.

Minimum size of bus bar in Sq. mm – a) Main busbar – Capacity of individual incoming switch / 1.6 (current density of copper).

b) Busbar for connection from main busbar to outgoing individual switches – Outgoing Individual switch capacity / 1.6 (current density of copper).

8. Connection between MCCB/switches to Vertical / Horizontal Busbar should be made using PVC insulated & sheathed multi strand copper conductor single core, FRLS cable of proper size 1100 Volt grade confirming to IS:694 of 2010 or latest, or flexible busbar of proper size.
9. For rating 100A and below, Clip-on terminal, (Make: Elmex, Connectwell) with busbar should be used. For rating 125A and above Cast Resin mold with copper busbar should be used.
10. **Multifunction Energy meter:** One LED display Multifunction Meter min Class 1.0 Accuracy with RS485 Modbus protocol communication port, to monitor vital electrical parameters such as V, A, F, PF, kW, kVA, kVAR, kWh, kVAh, kVARh, Runhours, On hours, Phase angle, Interrupts, THD, Events (High-Low), Neutral Current, Energy import and export etc. shall be provided on panel incomer side with CT and through Control MCB of 6A, 10kA.
11. **Wiring:** Internal control wiring shall be made with minimum 1.5 Sq. mm PVC insulated copper multi stranded wire confirming to IS 694 / 1998 or latest complete with copper crimping sockets of proper size and ratings. 2.5 Sq. mm should be used for CT wiring.
The wiring shall be coded and labelled with approved ferrules for identification. Runs of wires shall be neatly bunched and suitably supported and clamped. Means shall be provided for easy identification of wires. Identification ferrules shall use at both end of wires. All control wires meant for external connections are to be brought out on a terminal board.
Separate Communication wiring should be laid through all feeders for switchgear & meters. The communication wiring should be sufficient for conveying ON-OFF-Trip feedback. The communication wiring should be terminated on to separate marshalling box in the panel. The communication cable should be low impedance, twin pair twisted & shielded (Belden /Lapp or equivalent)
12. Suitable lugs and cable glands for all incoming and outgoing cables shall be provided.

- 13.03 nos. of indicating lamps (LED type) of Red, Yellow and Blue colours with holders and wiring shall be provided on each incomer, and ON/OFF LED indicator for each outgoing switch.
14. **Earthing:** The panel board shall be properly earthed as per IS. Two earth terminals of 12 mm diameter G.I. nut/bolt with washers shall be provided on either side of the panel and all sheet steel section shall be electrically connected with a separate G.I. earth strip of 50 x 6 mm size across the panel at bottom and to the nearest earth terminal.
15. Metallic Caution Board in three languages riveted to the panel board as per IS 2551/1963.
16. **Labels:**
The following information is required on the label: Assembly Manufacturer's name – Identification number – Date of manufacture.
17. The successful tenderer should submit delivery challan / copy of original voucher of OEM / Authorized dealer to ascertain originality of items like MCBs, RCBOs, MCCBs, ACB, CTs, PTs etc.
18. Catalog no. & specification details of each type / capacity of MCBs, RCBOs, MCCBs, ACBs etc. to be submitted by the firm.
19. Panel shall be procured only from CPRI/ ERDA type test certified panel manufacturer, and he shall confirm and submit the report for
- i) Verification of the short circuit and temperature rise test.
 - ii) Degree of protection IP 54.
20. A factory inspection for the panel to eliminate defects at earlier stage shall be arranged by the firm, and shall be carried out with Railway representative, if asked by Railway authority. If asked for Heat run test at rated current should be carried at manufacturer's factory.
21. The panel board shall be wall mounted / CC flooring with MS stand made of MS angle of size 50 mm x 50 mm x 6 mm and skeleton type angle structures with holes for cable entry & exit as per site condition. The angle structure of panel should be covered with M.S. Sheet and duly painted. The wall mounting panel board shall be fixed on the wall / pillar with suitable fixing arrangement as per site conditions and with appropriate size/ capacity and Nos. of GI screws/ nut bolts/ fasteners etc.
22. The panel shall be erected on anti-vibrating rubber pad of adequate thickness to avoid undue vibrations.
23. Heavy duty M.S. angle structure or concrete platform made from a standard concrete mixture of preparation 1:3:6 of suitable height shall be made, wherever it is required.

The DB/panel shall be comprised with following switchgears:

Incoming circuit:

- 1 No. 160A MCCB FP microprocessor release, 36 kA.

Outgoing circuit:

- 4 Nos. 40A. MCB FP, 'C' Curve.

Note: Specification of above MCBs & MCCBs are given in Annexure II given below.

Contractor shall have to supply materials as per List of Approved Make given below & got approved by Sr. DEE/G/ADI or SSE/incharge before supply.

Note:- The contractor shall have to arrange inspection of the LT PANEL at the manufacturer's premises at his own cost.

(KK) Technical specification for item No. 02 of SCHEDULE 'E' of rates and quantities: [Precooling box (20A & 63A plug socket box)]:

The contractor has to supply, install, test and commission of 20A & 63A plug socket with TOP enclosed in metal Box. Metal box shall be made of 2mm thick MS sheet, powder coated, dust and vermin proof comprising as following.

- [i] Three phase, 5-pin 415V, 63A capacity plug socket [make- MDS, GE, Indoasian, HPL, BCH, C&S, Jainson, Ajmera, CG, Havells LK (FORMERLY, L&T), Schneider] shall be heavy duty metal body type, spring loaded butt type contacts, self-aligned and self-wiping type confirming to IEC:60309 or latest. The plug socket shall be controlled by 100A, 4pole MCCB shall be of 35 KA rupturing capacity with lcs=lcu, The MCCB shall be as per IS. MCCB shall be of LK (FORMERLY L&T), Siemens, Havells, Legrand, ABB, Schneider, C&S, HPL make and shall be got approved from Sr.DEE/G/ADI or SSE/Incharge before supply.
- [ii] Single phase, 230V, 20A capacity 3-pin plug socket shall be heavy duty metal body type. The 20A Plug socket [make- MDS, GE, Indoasian, HPL, BCH, C&S, Jainson, Ajmera, CG, Havells LK (FORMERLY, L&T), Schneider] shall be controlled by C-curve type MCB DP of 20A capacity. MCB shall be of Hager, MDS, Havells, Legrand, C&S, LK (FORMERLY L&T), Honeywell, HPL make and shall be got approved from Sr.DEE/G/ADI or SSE/Incharge before supply. The rupturing capacity of MCBs shall be 10 KA, C curve.

The box shall be internally wired by PVC insulated, single core flexible copper cable of suitable size with copper crimping lugs. Terminal strips shall be provided for loop in loop out connections of cables. The door of the box shall have locking arrangement. The box shall be securely mounted on wall with necessary MS clamps, nuts, bolts etc.

Note:- The drawing, design plug socket, switchgears with make and model of the box shall be submitted by the contractor & got approved by Sr.DEE/G/ADI or SSE/Incharge. Contractor shall have to arrange the inspection of plug socket box at manufacturer's premises before supply at site at his own cost.

(LL) Technical specification for item no. 03 of SCHEDULE 'E' of rates and quantities: [110V BATTERY CHARGING TERMINALS (EFT)]

The contractor have to supply and fix EFT on existing Rail/RCC pole with the help of MS clamp of 45x8mm and suitable length and nut bolt. EFT should be made in the shape of box of 14SWG painted MS sheet having dimension 350x200x180mm with hinged door. Bottom side of the box should be open. The box have aluminium stud of size 130x25x25mm for positive and negative terminals fitted on hylem sheet of size 220x100x10mm. Positive and negative should be separated by hylem sheet of size 100x65x6mm. Hylem sheet should be supported by MS strip of size 25x3mm to the MS box. Both side of stud should have screwed hole to house 10mm dia. and 90mm long aluminium screw and screw should be provided to tightening the feeding cable. There shall be 'U' clamp of aluminium of size 80x25x3mm for better clamping to cable and provide tightening arrangement of incoming cable on aluminium stud on opposite side.

The 110V charging terminals shall be painted with yellow enamel paint. The cable shall be properly clamped with wall. On EFT, write "110V DC" and mark symbol '+' & '-' for identification of polarity.

The drawing and design of Battery charging terminal (EFT) should be got approved by Sr.DEE/G/ADI or SSE/incharge before fabrication.

(MM) Technical specification for item no. 04 of SCHEDULE 'E' of rates and quantities: [200A CHARGING RECTIFIER]

Contractor shall supply, installation, testing and commissioning of Battery charger rectifier set as per specification given as under

1. The main component of battery charging rectifier set shall be confirming to the following IS specification (latest edition) which shall be supply in the manner already amended by this specification. The Indian electricity rules shall also be applicable wherever necessary.

(a)	Rectifier transformer to ISS	2026 with class 'B' insulation.
(b)	Silicon Rectifier to ISS	3895
(c)	Electrical Indicating instruments (Heavy duty) to ISS	1248
(d)	Rotary switches to ISS	1567

2. Rating & other particulars:-

Rectifier shall be design for the following ratings and other particulars-

(a)	Input supply	415V, 3 phase. 50 HZ A.C. supply + variation as per IE rules
(b)	Output switch	30 KW, 200A. 110/150 V DC supply by means of rotary selector switch.
(c)	Bridge connected full wave silicon rectifier	No. of DC circuits and cut outs: 2x200A HRC fuse & 1 No. 200A, 10 KA MCCB.
(d)	Rating	Continuous.

3. Service Conditions:-

3.1	Maximum humidity	100%
3.2	Maximum ambient temperature	50°C
3.3	Atmospheric condition	Dirty/Polluted

4. Type of construction, mounting:-

4.1 Enclosure:-

The unit shall be suitable for both indoor & outdoor duty, suitable for pole mounting, weather proof where there is heavy rainfall and surrounding are prone to water splashing. It shall be possible to open the unit from 2 sides. The meter shall be water tight suitably protected by acrylic sheet and metallic foil for mechanical protection. The rectifier set shall be erected in cubical of MS sheet of not less than 2 mm thick.

The cubical shall be robust in construction to prevent damage due to vibration encountered during handling and transit in service. The angle iron of the

framework shall be liberal sizes and provided with suitable bracings to prevent bending or buckling. The heavy transformer shall be strongly supported and bolted so that its supports do not buckle or bend during transit. The bottom shall have angles to withstand the handling and also the entire bottom portion of the battery charger assembly shall be provided with perforated MS plate and wire mesh to avoid entry to lizards but provide adequate air for cooling.

The steel sheet panels and frame work shall be under got to special treatment such as degreasing or rust removal. It shall be given a phosphate coating and primer coating to withstand the industrial environments. The final finishing shall be smooth with attractive standard, yellow/green enamel paint or hammer finish.

The rectifier set shall be mounted on four cast iron wheels of adequate strength and internal connections shall be with crimped sockets and multi strand copper shall neatly encored and numbered for identification. All the nuts and bolts shall be zinc plated / passivated.

4.2 Ventilation:-

Ventilation of adequate size and capacity shall be provided with automatic switch "ON/OFF" arrangement with the operation of rectifier set. A separate switch for fan shall be provided with fuse protection.

5. Components of rectifier set.

5.1 Main transformer:-

The transformer shall be double wound with copper conductor air cooled fully insulated with class "B" insulation, continuous rating with OFF load tap changing links to compensate with supply voltage variation. The transformer shall be delta-star connected with primary tap changing arrangement to get out put 110 to 150V DC. The fine control may be taken from the primary of the transformer. The transformer shall be vacuum impregnated, flash tested with 2500V for one minute. The transformer shall be confirming to IS 2026 (Latest) and have overload capacity of 15% for 30minutes

5.2 Rectifier:

The rectifier shall be suitable for indoor as well as outdoor duty in covered shed. The rectifier shall consist of high power silicon diodes with liberal cooling fans, connection holes, storage switching voltage surges up to 500V. Over load capacity shall also be catered to withstand short circuit in DC conductors. Suitable surge suppressor with capacitor, resistance network shall be provided for long life of diodes. The diodes shall be rated for taking 50% overload for a period of 4 to 5 hours. The temperature rise of the diodes and its junction at full load shall be well within its rated value under extreme ambient conditions. The rectifier diodes shall of the reputed makes acceptable i.e. Hind rectifiers, Ruttonshaw, Automatic Electric, Keltron only. Each diode shall be provided with resistance capacitor circuit for diode protection against voltage surge. HRC fuse of adequate capacity shall be provided in DC output circuit. The protection arrangement shall function satisfactorily in case of repeated short circuit in battery charging lines. 3 numbers indication lamps shall be provided to indicate the availability of the power supply.

5.3 Choke:

A ballast choke of adequate capacity shall be provided in AC side to minimize variation in charging current due to input voltage fluctuation and to limit / abort

fluctuation in battery charging line. The choke shall be wound with copper conductor. It shall be vacuum impregnated and comply with ISS 2026 (Latest).

5.4 Bus-Bar:- All DC bus-bars shall be made of copper for minimum 200A capacity and shall be insulated with PVC sleeve with proper identification of positive and negative.

5.5 1 No. 63 Amp 10 KA MCCB with neutral link shall be provided for incoming AC supply and 63 A HRC fuses shall be provided in each feeder.

5.6 Voltage and current control:

The unit shall be provided with 2 Nos. heavy duty rotary switches of adequate capacity and of reputed make for current control. These 2 Nos. four position control switches shall provide for allowing the output voltage to be varied between 110 to 150 volts DC. Rotary switches shall be robust in construction and compact with current breaking capacity preferably one step higher than necessary and confirming to ISS 1567/60 or latest. The capacity of rotary switches shall be of 40 A. The rotary switches shall be of Kaycee/Thakor/Switchcon make. 'ON' and 'OFF' pilot lamp indicator shall be provided.

5.7 DC side control and protections:-

Two complete set of outgoing DC terminal with 200A HRC fuse and 200 A MCCB on DC output circuit complete with nuts, check nuts, spring washer including crimping sockets suitable for PVC heavy duty aluminium armoured cable.

5.8 Meters and indicating lamps:

Ammeter voltmeter shall be industrial grade, flush pattern, robust in construction for high stability under the most severe and vibrating conditions shall be provided on DC side of range 300A with suitable and reliable shunt. Meters shall be only of MECO/AF/NIPPON makes and shall confirm to relevant ISS.

One set of indication lamps (Neon type) for 3 phases shall be provided.

6. Bushes shall be provided at the cable entries. .

7. The contractor shall have to provide metallic name plate on the front body cover engraved with details of battery charger such as primary supply voltage, secondary supply voltage, Sr. No., make and manufacture's address.

Note:- (i) The contractor should offer inspection & testing of battery charger at manufacturer's premises at his own cost.

(ii) Battery charger shall be got approved by Sr.DEE/G/ADI or SSE/incharge before supply.

(NN) Technical specification for item no. 05 of SCHEDULE 'E' of rates and quantities: [GI cable tray 200 mm x50 mm]

The contractor shall supply, installation, testing and commissioning of 14 SWG 50 mm height, 200 mm width GI hot dip perforated cable tray complete with required accessories & hardware for fixing, installation and mounting of tray. The contractor should be got approved by Sr. DEE/G/ADI or SSE/incharge for cable tray and its mounting arrangement also before supply.

Make and model of cable tray is to be got approved before supply.

(OO) Technical specification for item no. 19 of SCHEDULE 'E' of rates and quantities: [SITC PVC Exhaust Fan]

The contractor shall supply, install, test and commission 300 mm sweep PVC body exhaust fan complete with all associated accessories as per specification given as under.

Sweep	300 mm.
Air delivery	1125 CMH
Speed	1000 RPM
Rated Power	55W

PVC exhaust fan shall be Maxima DX of Bajaj make or equivalent of Crompton, Usha, Almonard, Khetan, Havells, Bajaj, LUKER make and shall be got approved from Sr.DEE/G/ADI or SSE/incharge before supply.

(PP) Technical specification for item No. item No. 20 of SCHEDULE 'E' of rates and quantities: [DIGGING & RE-FILLING OF CABLE TRENCH IN PCC/RCC/HARD SOIL]

A trench of 650 mm in width and 1000 mm depth for double cable laying from the normal ground level in PCC/RCC/Hard soil shall be made by the contractor by using breaker and while laying the cable a layer of riddle soil shall be provided below and above the cable. After doing this the trench can be filled with soil available thereby. If any damage done, contractor will make good, the cost of damage as decide by railway. If any hard /stony soil, contractor should adopt new technology method as per scope of work.

(QQ) Technical specification for item No. 22 of SCHEDULE 'E' of rates and quantities: [DIGGING & RE-FILLING OF CABLE TRENCH]

A trench of 650 mm in width and 1000 mm depth for double cable laying from the normal ground level in normal soil shall be made by the contractor and while laying the cable a layer of riddle soil shall be provided below and above the cable. After doing this the trench can be filled up with soil available thereby. If any damage done, contractor will make good, the cost of damage as decided by railway. If any infringement comes in the digging route then contractor should remove the same. If any hard /stony soil, contractor should adopt new technology method as per scope of work.

(RR) Technical specification for item No. 26 of SCHEDULE 'E' of rates and quantities: [Laying of cable in tray/air/ on wall/pole etc.]:

Cable shall be laid between poles and main boards. These cables are to be laid in existing cable trench /tray/on wall / Pole / Air with suitable of clamps.

Route of the cable.

Before laying is under taken the route shall be marked in consultation with Railway's representative at site.

Jointing:

Before jointing is commenced all safety precautions like isolation, discharging, earthing etc. shall be taken to ensure that the cable would not be in-advertantly charged from live supply. Where cable is to be jointed with the existing cable the sequence should be so arranged, as to avoid crossing of cores while jointing.

The contractor shall lay cable in cable tray with proper manner i.e. use of cable tie securing tightness. Precaution to be taken for laying of cable and no damage should occurred.

All cables, before laying, shall be tested with a 500V megger for cables of 1.1KV grade, or with a 2500/5000V megger for cables of higher voltage. The cable cores shall be tested for continuity, absence of cross phasing, and insulation resistance from conductors to earth / armour and between conductors.

The installation of cable including joints shall be carried out in accordance with code of practice as specified in relevant IS as amended latest.

(SS) Technical specification for item No. 29 of SCHEDULE 'E' of rates and quantities: [SITC of 2 KVA UPS]

The contractor shall supply, installation, testing and commissioning of **2 KVA**, ON Line, single phase input and single phase output UPS suitable for 120-minute battery backup with maintenance free battery set.

Technical specification of UPS is given as under.

1.	Capacity and rating	2 KVA, 1 Phase, 50Hz, 160-260V
2.	PF	Min. 0.9 at full load.
3.	Load PF	0.65 to unity.
4.	Overall efficiency	90% at rated load
5.	Overload Capacity	Deliver a minimum overload of 125% for 10 Minutes and 150% for 30 Sec.
6.	Operating temperature	0-40°C
7.	Total harmonic distortion	Max 3% for linear load & 5% for Nonlinear load
8.	Crest factor	3:1
9.	Noise Level	Max. 55 db
10.	Battery	SMF type
11.	Battery Make	HLB, Amar Raja, Exide, CSB, Hitachi, Okaya, Panasonic, Yuasa.
12.	UPS Make	Hirel, ProtekG, APC, Eaton, Brentford, Schneider Electric, Numeric.
13.	Guarantee	5 Years for UPS & 2 Years for battery.

The contractor shall have to submit the guarantee card for the above said period from the date of supply. The Manufacturer shall be required to guarantee the performance of the equipment against unsatisfactory performance / break down. Installation of equipment or any part thereof found defective within guarantee period shall be replaced by the manufacturer free of charge. The guarantee shall also cover quality, strength and performance of material and equipment used.

The contractor should submit the copy of challan or bill for the above material supplied from the manufacturer/authorized dealer issued on the name of contractor.

(TT) Technical specification for item No. 30 of SCHEDULE 'E' of rates and quantities: [SFTC of MCB]:

The contractor shall have to do supply, installation (fixing), testing and commissioning 10A MCB SP, 'C' Curve as per specification given in **Annexure II** given below.

The contractor should submit the copy of challan or bill for the MCB supplied from the manufacturer/authorized dealer issued on the name of contractor.

(UU) Technical specification for item No. 33 of SCHEDULE 'E' of rates and quantities: [RCBO]

The contractor shall supply 25 Amp, 30mA sensitivity RCBO DP with metal enclosure of same make with ISI mark only. RCBO should be cat. No. **4113 25** of Legrand or model No. **AUF3C202503** of LK (FORMERLY L&T) make or equivalent of make as per List of Approved Make given below.

Contractor shall have to supply materials as per List of Approved Make given below. The contractor should submit the copy of challan or bill for above material from the manufacturer/authorized dealer issued on the name of contractor.

Technical Specification of MCCB's & MCB's**Specification MCCB's**

- (i) MCCB should be equipped with Quick make, Quick break & trip free mechanism. The MCCB should be of current limiting design.
- (ii) MCCBs shall be 4 pole, 415VAC, 50 Hz.
The rated service breaking capacity should be equal to rated ultimate breaking capacities (Ics=Icu=100%).
- (iii) All MCCB protection release should be Microprocessor based having inbuilt adjustable protection against Overload and Short Circuit (S). If used as incomer, then it should have earth fault protection and time delay in addition to the above protection. It should be possible to use Earth leakage Relay with MCCBs. MCCBs should not have load line bias.
- (iv) All MCCBs should be 4 Pole with 100% Neutral.
- (v) The capacity and quantity of MCCBs, etc. in a particular panel shall be as mentioned in the corresponding item of tender schedule.
- (vi) MCCBs shall be complete with operating mechanism, spreader terminals, Extended rotary handle with door defeat facility & padlocking facility, Trip, Auxiliary contact along with UV/shunt release, and other accessories of appropriate rating, as per site requirement, conform to IS: 13947 Part 2, IEC 60947-2, EN 60947. MCCB incoming and outgoing connection to be connected by copper busbar.
- (vii) Auto on-load changeover switch (auto transfer switch) shall be provided in the panels, wherever mentioned in the schedule.
ATS 4 pole shall have facility of Priority Source Selection and shall be suitable for 3-Phase as well as 1- Phase Sources. Protections: UV/OV, Phase Sequence, Single Phasing, Frequency. Terminal Shrouds, Phase Barriers & Source Separator shall be provided. ATS shall be conforming to IS / IEC 60947-6-1.

Specification of MCB

- (i) MCBs shall be conforming to IS/IEC 60898-1-2002, ISI / CE Marked, Rated short circuit breaking capacity- 10KA, IP 20 protected terminals.
- (ii) The MCB housing shall have unique property of di-electric strength, arc resistance, insulation, flame retardancy and temperature resistance.
- (iii) The MCB shall be suitable for isolation.
- (iv) The MCB shall be of Minimum Energy Limiting of Class 3, line load biased, shall have Trip free mechanism, True contact position indicator.
- (v) The MCB shall have BI connect terminals for both busbar and cable termination on both sides.
- (vi) The MCB shall have Label holder to make circuit identification easy.
- (vii) The MCB shall have rated impulse voltage of minimum 4kV and operating temperature - 25°C to +70°C.
- (viii) The MCB shall have the termination capacity of 35 Sq. mm for rigid and 25 Sq. mm for flexible.
- (ix) The MCB shall have electrical life of 20,000 electrical operating cycles (up to 32A) and 10,000 operating cycles (40A-63A) and mechanical life minimum 1, 00,000 operating cycles.
- (x) The MCB shall be suitable for Accessories fitment (Auxiliary contact, Shunt Release & Trip Alarm Contact)

Contractor shall have to supply MCB & MCCB as per List of Approved Make given below & got approved by Sr. DEE/G/ADI or SSE/electrical before supply.

List of Approved Make:

- (a) **Casing Caping/conduit:** Presto plast, Precision, Modi, Pressfit, Premium, Honeywell, BLP (Bhagalaxmi Plastic Industries).
- (b) **Copper/aluminium Wire:** Polycab, Finolex, RR Kabel, Havells, Avocab, LK (FORMERLY L&T), Anchor, HPL, Fortgloster, KEI, APAR Industries, JOHNSON CAB ELECTRICALS PVT.LTD, Kenter, Darshan plus, Pressfit, Luker.
- (c) **Holder, ceiling rose, switches:** : Anchor, Leader, legrand, Crabtree, Honeywell, HPL, Pressfit, Wattcab.
- (d) **Modular switch and socket:** Anchor/ Roma, Penta, Leader, Crabtree, Legrand, Honeywell, HPL, C&S, Pressfit, Wattcab.
- (e) **Plug/socket 6/16 Amp, adopter:** Anchor, Leader, Roma, Penta, Havells, legrand, Crabtree, MK, Precision, Honeywell, HPL, Pressfit, Wattcab.
- (f) **DP switch with fuse:** Anchor, Leader, Havells, C&S, LK (FORMERLY L&T), Polycab, Honeywell, HPL, Wattcab.
- (g) **Call Bell:** Anchor, Roma, Leader, havells, HPL.
- (h) **Ceiling fan:** Usha, Crompton, Orient, Bajaj, havells, Amul (Alok brand), LUKER.
- (i) **Electronic fan regulator:** Anchor, Penta, Roma, Rider, Legrand, Leader, Crabtree, Philips, Havells, Honeywell, Pressfit, Wattcab.
- (j) **MCB:** Hager, MDS, Havells, Legrand, C&S, LK (FORMERLY L&T), Honeywell, HPL Siemens, Schneider, Pressfit .
- (k) **DB, ELCB, RCCB, RCBO:** Hager, MDS, Havells, Legrand, C&S, LK (FORMERLY L&T), Honeywell, HPL, Siemens, Schneider.
- (l) **MCCB:** LK (FORMERLY L&T), Siemens, Havells, Legrand, ABB, Schneider, C&S, HPL.
- (m) **GI Pipe:** Zenith, Prakash Surya, Jindal, TATA, Swastika, Asian.
- (n) **Measuring Instrument Voltmeter/Ammeter:** Motwane, Meco, Toshniwal, Hitachi, HPL, Baroda Meter, Havells, C&S.
- (o) **Electronic Energy Meter:** LK (FORMERLY L&T), Siemens, Meco, Enercon, Havells, HPL, Elmeasure, Panasonic, Secure meters.
- (p) **Indication lamp:** LK (FORMERLY L&T), Siemens, C&S, Teknik.
- (q) **Insrument transformer (CT/PT):** Ashmor, C&S, LK (FORMERLY L&T), MECO, Virat, Kuppa, AE.
- (r) **Paints:** Asian, Nerolac, Dulex, Shalimar.
- (s) **LED Luminaire:** Philips, Wipro, Jaquar, Havells, Crompton, Polycab, Hansagreen, Surya, HPL, Wattera, LUKER.
- (t) **SFU/TPN/Changeover Switch:** LK (FORMERLY L&T), ABB, Siemens, Schneider, Legrand, CG, C&S Havells.
- (u) **ERW pole/Octagonal GI pole /High Mast/Stadium Mast:** Bajaj, Philips, BPP, Crompton, RR ISPAT, TRANSRAIL, VSTP (Vipin S. T. Poles Pvt. Ltd.), KP Green Or steel manufacturer approved by CORE of TRD mast.

Contractor shall have to supply materials as per above List of Approved Make and to be got approved from Sr.DEE/G/ADI or SSE/Incharge before supply.

DECLARATION

I am / We are not related to any employee in any capacity on the Western Railway.

OR

I/We draw attention to the fact that I/We are related to the following employees of the Western Railway.

Sr. No	Name of the employee	Department	Degree of relation ship

[Signature of the Tenderer]

Address

Note: The items which is not applicable should be struck off.

*****END OF TENDER DOCUMENT*****